

## CHAPTER EIGHT

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### ARGENTINA

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**A**rgentina achieved petroleum self-sufficiency in the early 1980s and within a decade was exporting crude oil and natural gas to regional markets.<sup>1</sup> The country's transformation into a net energy exporter in the 1990s coincided with the decision by then-president Carlos Saúl Menem to privatize and deregulate most of the energy sector. This decision resulted in an influx of foreign capital that was accompanied by a transfer of new technology and significant reductions in environmental contamination, heightened efficiency and productivity in the energy sector, and lower consumer electricity bills.

The January 2002 devaluation of the peso and a concurrent intervention in the market, coming after years of recession, had a devastating impact on private energy firms. For one thing, it undermined any incentive to explore and develop new energy reserves, expand transport and transmission capacity, or invest in expensive, new imported technology. Accordingly, when Argentina's economy began recovering at the end of 2003, energy demand soon exceeded available supply during the peak winter and summer months. Frozen end-user fees exacerbated the situation by artificially inflating demand levels. All these factors have contributed to the current energy shortages in Argentina as well as restrictions on natural gas exports. In addition, Argentina has been forced to import natural gas from Bolivia and high-priced electricity from Brazil, and it has even had to use the Venezuelan state petroleum company to purchase fuel oil from various sources around the world at exorbitant prices. This represents a remarkable turn of events from a decade ago, when some touted Argentina as a major international energy powerhouse.

Argentina's current energy predicament cannot be fully understood without referring to the country's recent political turmoil. Néstor Kirchner, a member of the Justicialista Party founded by Juan Domingo Perón, became president in May 2003 after former president Carlos Menem, another Justicialista, dropped out of the second round when it became clear he could not win. By doing so, Menem ensured that Kirchner would have problems consolidating his legitimacy, given that he obtained only 22 percent of the vote in the first round in April 2003. Aggravating Kirchner's weak grip on power was the fact that he was the former governor of the southern province of Santa Cruz. His political base, therefore, lay far from Buenos Aires's industrial suburbs, where Justicialista Party bosses can quickly mobilize mobs of the unemployed in exchange for access to public assistance grants and "make work" projects. That reality helped to prematurely end Fernando de la Rúa's presidency in 2001 and sent his short-lived successor, former governor Alfredo Rodríguez Saá, back to his home province of San Luis after only seven days in office. It also made the ex-governor of Buenos Aires province, Eduardo Duhalde, interim president after his selection by a Justicialista-dominated congress.

Following his victory by default, Kirchner found it expedient to quickly build his popularity by playing the nationalist card used by his political godfather Duhalde. He therefore let foreign investors bear the brunt of the cost for the peso's sharp devaluation in 2002 and kept end-user rates for natural gas and electricity frozen.<sup>2</sup> When foreign companies complained that this destroyed any incentive to invest in the Argentine energy sector, Kirchner retorted that they should use the money they overcharged Argentines throughout the 1990s. However unjustified the charge, it played well with a majority of Argentines, many of whom had lost their life savings in accounts held in foreign banks.

This chapter provides an overview of each of the major energy sectors in Argentina, including the political developments that led to the current situation and, where relevant, the impact on regional integration. The chapter then analyzes the feasibility of implementing Kirchner's National Energy Plan launched in May 2004 and prospects for the new state energy firm Energía Argentina, S.A. (ENARSA), including the possibility of Chinese investment. There is also a discussion of how increasing environmental awareness among Argentines may affect future energy-sector projects. The chapter concludes with a discussion of

Argentina's prospects for achieving a competitive and sustainable energy sector as well as the future of energy integration in South America's Southern Cone.

## COAL

Until World War II, Argentina relied on coal imported from the United Kingdom as its primary source of energy.<sup>3</sup> Coal today plays a relatively insignificant role in the country's energy balance. For one thing, Argentina has sparse coal reserves, and what reserves it has are concentrated almost exclusively in isolated Patagonia. In addition, heavy investment in new natural gas-powered thermal plants and increased reliance on hydroelectricity throughout the 1990s rendered coal an almost obsolete source of energy.

## ELECTRICITY

In December 1991, the Argentine Congress ratified Law 24.065, which split the Argentine electricity sector into three separate components: (1) generation, (2) transmission, and (3) distribution. This law authorized the Secretariat of Energy to set overall electricity policy and establish rules on investment and network access, as well as issue export and import permits. Approval of rate changes and the issuance and enforcement of regulations governing the transmission and distribution of electricity was the responsibility of the newly created Ente Nacional Regulador de la Electricidad (ENRE). Law 24.065 also established a not-for-profit entity, which later became the *Compañía Administradora del Mercado Mayorista Eléctrico* (CAMMESA), to oversee administration of a wholesale "spot" market for electricity sold to distributors or directly to large end users.<sup>4</sup> Enforcement of competition policy was initially entrusted to the Secretariat of Energy, but this was later transferred to the Tribunal for the Defense of Competition following passage of Law 25.156 in 1999.<sup>5</sup>

Under the 1991 Argentine electricity legislation, generation (which involves the actual production of electricity from different energy sources) was completely deregulated and prices were based on actual production costs. Electricity was generally sold through a competitive wholesale "spot" market administered by CAMMESA. The law, however, also recognized

the right of large users to enter into fixed-rate contracts directly with the owners of generators and to have nondiscriminatory access to the transmission networks. Transmission and distribution companies were given a monopoly within designated territories and their prices were regulated by ENRE.

By the late 1990s, some 40 generators were operating throughout Argentina. These generators were owned by private- and public-sector firms as well as cooperatives.<sup>6</sup> For example, the federal government retained control of the country's two major hydroelectric generators at Yacretá and Salto Grande as well as its two nuclear reactors, while the province of Buenos Aires continued to operate some older thermal plants. Similarly, while the country's main high-tension transmission network was awarded after open bidding in 1993 to the private *Compañía Nacional de Transporte Energética en Alta Tensión* (TRANSENER), many smaller medium-tension networks remained under the control of provincial governments or local cooperatives. Distribution services were also either privatized or left under the control of provincial governments as well as municipal cooperatives.

Before January 2002, end-user rates for the transmission and distribution of electricity were based on ENRE-approved five-year tariff schedules in U.S. dollars. Within the five-year period, transmission and distribution rates were subject to automatic twice-a-year adjustments for inflation (based on the U.S. consumer price index) as well as any increases in federal, provincial, and municipal government taxes. In addition, unforeseen costs could also lead to higher end-user rates if authorized by ENRE following a public hearing. When the distributor bought electricity on the spot market, end users were sheltered from seasonal price gyrations by a CAMMESA Stabilization Fund. The basic concept behind this fund was that distributors would deposit the excess collected from end users when wholesale "spot" market charges fell below the tariff on file with ENRE. Conversely, distributors would be compensated for unexpected increases due to seasonal factors that could not be passed on to end users by taking money out of the Stabilization Fund.

In January 2002, Congress approved an economic emergency law that converted end-user charges for electricity into Argentine pesos at a one-to-one parity that did not reflect the actual market rate of exchange of at least three pesos to one U.S. dollar. The same legislation also froze rates that transmission and distribution companies could charge end users at 2001 levels. Owners of generators were technically still allowed

to charge market prices for producing electricity, albeit tempered by various formulas for calculating “real” costs. Rather than pass on any increases to end users, however, the federal government forced the CAMMESA Stabilization Fund to pay for them. Given its grossly expanded new mandate, the Stabilization Fund ran out of cash by mid-2003. After this point, CAMMESA began “paying” the privately owned generators with Argentine government bonds.

In mid-2004, the federal government authorized a partial pass-through of higher generation costs to larger industrial and commercial users.<sup>7</sup> Tariff hikes for transmission and distribution services, however, have been delayed by the Kirchner administration’s insistence that the private firms first drop their international arbitration claims. These claims are based on alleged breaches by the Argentine government of bilateral investment treaties when it forcibly converted utility tariffs into pesos and froze them in 2002. The long delay in approving rate increases for transmission and distribution services is also seen by some observers as a ploy to force frustrated foreign firms to sell their assets cheaply to Argentine-owned companies or investment funds that enjoy good political connections to the Kirchner administration. Meanwhile, electricity rates for all residential users—albeit not the taxes in their bills—remain frozen through the end of 2007.<sup>8</sup>

The Kirchner administration initially claimed in mid-2004 that increased revenue collected from higher electricity generation prices paid by larger industrial and commercial users would replenish the CAMMESA Stabilization Fund and allow redemption of the bonds issued to generator owners. Despite this promise, the private generator owners have yet to see their outstanding bonds redeemed. Instead, the Secretariat of Energy in July 2004 came up with a new scheme that required generator owners to deposit 65 percent of their bonds in a trust fund called the Fondo de Inversión en el Mercado Eléctrico Mayorista (FONIVEMEM). The bonds are supposed to be redeemed for cash to build two new thermal plants in Buenos Aires and Rosario. In return for this forced investment, the generator owners will receive shares in the new plants. Because it was unclear at the time where the natural gas to supply the new plants was supposed to come from, many generator owners initially balked at handing over their bonds.<sup>9</sup> In response, the Secretariat of Energy in February 2005 announced that it would forcibly require these recalcitrant firms to direct 100 percent of their bonds to FONIVEMEM or risk never being able to redeem them.

The strong-arm tactics used to get private-sector generator owners to contribute to FONIVEMEM illustrate the Kirchner administration's antagonistic relationship with foreign utility firms. At the same time, they also indicate a grudging acknowledgment of the financial and technological constraints that prevent outright renationalization of the electricity sector and its return to the public sector. Instead, the Kirchner administration appears to be trying to establish a system whereby the discretionary powers of private firms are circumscribed and the government assumes a preponderant role in directing investment decisions.

### **Regional Integration**

The Argentine and Brazilian electric grids are interconnected by two conversion plants located in Garabí (just over the Argentine border in the southern Brazilian state of Rio Grande do Sul). The conversion plants are owned by ENDESA, a private-sector distributor headquartered in Spain and operating in both countries. The plants can transmit up to 2,000 megawatts (MW) per hour of electricity from Argentina to Brazil, but only 500 MW per hour in the opposite direction. The reason for this disparity is that its primary purpose when built in 2000 was to support Brazil's hydrodependent electricity grid with cheaper Argentine natural gas-generated electricity. Ironically, it was the Argentine government that found itself forced to buy electricity from Brazil in 2004. When Brazil sought to purchase electricity from Argentina in March 2005, the Argentines initially balked and only relented when Brasília threatened not to sell any electricity to the Argentines if they needed it later that winter during their peak-demand season.

Three electricity connections exist between Argentina and Uruguay, including one at the Salto Grande Dam that connects the two country's electricity grids. In 2004 this interconnection allowed Uruguay to purchase electricity from Brazil (via Garabí) to make up for shortages arising from a severe drought affecting the country's hydroelectric stations. There are also three electricity connections between Argentina and Paraguay. The one at Clorinda (Argentina)–Guarambaré (Paraguay) came into operation in 1994 and primarily serves as a backup for communities in the Argentine province of Formosa when their system fails.

The Argentine and Chilean electric grids are not connected. A major explanation for this is that, until recently, electricity rates in both Argentina and Chile were fairly similar. This undermined any private-sector

incentive to interconnect the two grid systems. The significant increase in Chilean electricity rates, expected from a May 2005 law further liberalizing wholesale electricity prices and allowing owners of power generators and distributors to sign long-term supply contracts, may soon provide an important economic justification for integrating the Argentine and Chilean grids. Despite the current lack of an interconnection, a privately owned electricity line with a capacity of 600 MW per hour does run from a gas-powered thermal plant in the northwestern Argentine province of Salta to a mine in northern Chile. Interestingly, the electricity generated from this power plant cannot at present be fed into the Argentine grid system.

## HYDROPOWER

In the early 1990s, hydropower generated less than a third of the electricity in Argentina (versus well over half from thermal plants and less than 10 percent from nuclear power plants). The most important hydroelectric station at the time was the binational Salto Grande Dam built in the 1970s over the Uruguay River that separates Argentina and Uruguay. In less than a decade, however, hydropower surged well ahead of nuclear power, and in 2002 it even challenged natural gas as the primary domestically obtained energy source used to generate electricity (although it represents a small part of the country's overall energy matrix, which is dominated by natural gas and petroleum).

Hydropower's increased importance can be attributed to the completion in 1994 of the binational hydroelectric Yacyretá Dam over the Paraná River that forms part of the border between Argentina and Paraguay. Although plans to build Yacyretá were first announced in the 1970s, long delays were incurred, principally by the need to compensate displaced property "owners" who demanded high prices for their land.

One of the problems in relying on hydropower is that it is subject to the vagaries of the weather. Drought in Brazil in 2001 led to major power outages and mandatory conservation measures. Similarly, the severe drought that affected the entire Southern Cone of South America in 2004 meant that only 3 of Salto Grande's 20 turbines could operate because of dramatically reduced water levels.<sup>10</sup> Despite these drawbacks, the big advantage favoring construction of at least smaller hydroelectric dams is the fact that most of the inputs and technology required to build them are available locally.

## NATURAL GAS

Natural gas production began in the south of Argentina around Comodoro Rivadavia in 1913.<sup>11</sup> Until the 1950s, however, gas was considered a minor energy source in Argentina and was generally “flared” or burned off.<sup>12</sup> This changed following the construction of new pipelines in the 1950s to transport natural gas from fields in the south and northwest of the country to Buenos Aires.<sup>13</sup> By 1997, natural gas supplied almost half of Argentina’s energy consumption needs, and the country became the third largest user of natural gas in the world, after the United States and Russia.<sup>14</sup>

The state-owned Gas del Estado was established in 1946 to transport and distribute natural gas to end users. Natural gas production, however, was the monopoly of the state-owned petroleum company Yacimientos Petrolíferos Fiscales (YPF).<sup>15</sup> In 1993, Gas del Estado was replaced by two private transport firms (Transportadores de Gas del Norte, or TGN, and Transportadores de Gas del Sur, or TGS) and eight private regional distributors.<sup>16</sup> YPF was also privatized in 1993, and concessions to explore and extract natural gas were opened up to private-sector competition.

Law 24.076 of May 1992 established the general regulatory framework for the transport and distribution of natural gas by private firms. The production of natural gas, however, remained subject to Argentina’s 1967 hydrocarbons law (Law 17.319). The Secretariat of Energy has jurisdiction over the exploration and production of natural gas resources. The secretariat also has the authority to determine conditions for the exporting or importing natural gas. For its part, the *Ente Nacional Regulador del Gas* (hereinafter ENARGAS) created by Law 24.076 has regulatory oversight over the transport and distribution of natural gas and approves rate changes. ENARGAS also initially had the authority to enforce competition, but this was transferred to the Tribunal to Enforce Competition in 1999.<sup>17</sup>

Until 2002, end-user rates for natural gas were based on its wellhead market price as well as a fee for transport and distribution services. The charge for transport and distribution services was set by ENARGAS for five-year periods in U.S. dollars and adjusted every six months for inflation based on the U.S. consumer price index. Any increases in federal, provincial, or municipal taxes were automatically passed on to the consumer. In addition, transport and distribution firms had the right

to petition ENARGAS for increases within five-year periods based on unforeseen circumstances. Unlike the situation in the electricity sector, however, natural gas prices were not determined by what could be bought on a “spot” market but rather were the result of a sales contract between the producer and distributor. Increases in the market price of natural gas at the source could only be “passed through” to the end user if authorized by ENARGAS following a public hearing.

As was true of the electricity sector, in January 2002 the federal government used the economic emergency law to convert end-user rates for natural gas into Argentine pesos on a one-to-one basis and froze them at 2001 levels. Legally, the price freeze did not cover the price of natural gas charged by producers, which could still be sold at market rates (albeit in pesos). The failure of ENARGAS to approve any pass-through of price increases to distributors and final consumers, however, meant that natural gas prices for domestic sales (where some 90 percent of Argentine production is directed) became frozen in actual practice as well.<sup>18</sup>

In mid-2004, the federal government negotiated a schedule of price increases for natural gas sold to larger industrial and commercial end users. As of July 2005, businesses were paying the full market price for natural gas. The federal government is still negotiating increases in transport and distribution rates for larger industrial and commercial customers. Negotiations have been complicated by government demands that private firms first drop their international arbitration claims against Argentina for losses sustained from the 2002 conversion to pesos and price freezes. Some see this negotiating stance as a ploy to force frustrated foreign firms to sell their assets to politically well-connected Argentine firms at bargain-basement prices. In the meantime, natural gas rates for residential users remain frozen until at least sometime in 2007.

Given that the bulk of Argentine natural gas is consumed domestically, the federal government’s 2002 intervention in the market mechanism for determining prices destroyed any incentive for most producers to explore and expand natural gas output.<sup>19</sup> It also undermined any incentive for transporters to increase capacity, although admittedly capacity constraints had already been a problem throughout the 1990s.<sup>20</sup> Furthermore, artificially low natural gas prices induced a surge in demand that eventually outstripped supply.<sup>21</sup> All these factors have contributed to severe shortages since 2004 and have required the federal government to restrict natural gas exports as well as import natural gas and

substitute fuels to run power plants. The irony is that the federal government has “subsidized” the purchase of these foreign fuel substitutes with general revenue collected from taxpayers while refusing to allow domestic natural gas producers to pass on the true cost of their fuel to these same group of Argentines. Apparently, the federal government prefers to exercise control over this revenue flow rather than allow it go directly from consumers to the private producers.

### **Regional Integration**

Since the mid-1990s, at least five gas pipelines have been constructed linking Argentina with Chile. (See the text box on Chile’s energy resources on page 223.) In 2000, a gas pipeline called the Transportadora de Gas del MERCOSUR, or TGM, was built from Argentina to a gas-powered thermal plant just over the border that serves parts of the southern Brazilian state of Rio Grande do Sul. Plans to extend this pipeline to the city of Porto Alegre have been shelved over continued uncertainty regarding the future of Argentine natural gas supplies. In 2002, a pipeline connecting Argentina and Uruguay was opened that runs from Buenos Aires to Colonia and Montevideo. Questions over future Argentine natural gas supplies have also called into question Uruguayan plans to move away from its current heavy dependence on hydropower to greater use of natural gas-generated electricity.

Article 3 of Law 24.076, the 1992 framework legislation governing the transport and distribution of natural gas in Argentina, authorizes the Secretariat of Energy to permit the export of natural gas within 90 days after a request is made, so long as domestic supply is not negatively affected. In 1998 the Secretariat of Energy issued Resolution 299, which formalized the regulatory procedure for requesting export authorizations and mandated that it should be granted based on the principles of transparency, nondiscrimination, and public interest.<sup>22</sup> This regulation was supplemented in 2001 with Resolution 131, which allowed for the automatic approval of natural gas exports following a 30-day waiting period.

As a result of the 2004 natural gas crunch, Resolution 131 was revoked and substituted with a new procedure that requires producers to show that national demand is being met before the Secretariat of Energy will authorize natural gas exports. Although this new procedure has never completely stopped exports, it has restricted the quantity of natural gas requested by foreign customers when required. Accordingly,

Chilean thermal plants were forced to ration energy to industrial users in 2004 following interruptions of gas imports from Argentina. While the restrictions on Argentine natural gas exports were not as dramatic for the Brazilian or Uruguayan energy sectors, this is only because they import much smaller amounts of Argentine natural gas than Chile. One important incentive that prevents the revenue-hungry federal government from significantly interfering with gas exports is the 20 percent export or retention tax it collects on those shipments.

The shortage of Argentine natural gas supplies since 2004 has forced reactivation of the long-underutilized natural gas pipeline from Bolivia.<sup>23</sup> The irony is that as late as 2001, there were plans to use this pipeline to supply Brazil with Argentine natural gas by connecting it to a *Petróleo Brasileiro, S.A. (Petrobras)* pipeline from Santa Cruz, Bolivia, to São Paulo completed in 2000.<sup>24</sup> In November 2004, President Kirchner and his then Bolivian counterpart, Carlos Mesa, signed an agreement under which Bolivia agreed to sell natural gas to Argentina albeit this time at the same price that it was sold to Brazil. In October 2006, Kirchner and Bolivian president Evo Morales signed a new agreement under which Bolivia guaranteed to provide Argentina with 22.7 million cubic meters of natural gas per day for the next 20 years.<sup>25</sup> Argentina agreed to pay a relatively high US\$5.00 per million Btu, although the price is to be adjusted every six months based on comparative prices for diesel and fuel oil. Since 2004, Argentina has also used *Petróleos de Venezuela S.A. (PDVSA)* as a broker-financier to import fuel oil in order to operate older thermal plants in coastal Argentina.<sup>26</sup>

## NUCLEAR POWER

Unlike the situation affecting other forms of electricity generation, Argentina was never able to privatize its two nuclear power plants. Most industry analysts believe that the huge expenditure involved in building and maintaining a nuclear plant makes it difficult to entice private-sector investment. One comparative advantage that Argentina enjoys in the nuclear power sector, however, is access to an ample domestic supply of uranium.

Argentina's first nuclear power plant, Atucha I, near Buenos Aires, became operational in 1974. A second plant was subsequently opened at Embalse Rio III in Córdoba. Although work began on Atucha II in 1981, completion of this third plant has been delayed by budget problems and public concerns over the safety of nuclear power. More recently, the

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## Chile and Energy

As a result of severe droughts in the mid-1990s, Chile began to move away from heavy dependence on hydropower, which until then generated approximately 70 percent of the country's electricity supply. Throughout the late 1990s, a number of natural gas-powered thermal plants were built in the central part of the country to generate electricity. Except for small natural gas fields in the extreme south of the country operated by the country's sole domestic producer, the state-owned Empresa Nacional del Petróleo (ENAP), Chile is dependent on imports to meet its natural gas needs. This fact explains why Chile was so anxious to sign a protocol on natural gas integration with Argentina in 1995 in conjunction with a bilateral Latin American Integration Association (ALADI) preferential market access agreement.

The arrival of Argentine gas allowed for rapid expansion of Chilean consumption, which more than quadrupled during the period 1996–2001.<sup>1</sup> By 2002, natural gas was responsible for generating just over 30 percent of Chilean electricity capacity while reliance on hydropower had been reduced to 37 percent. Reliance on domestically sourced coal remained steady at around 20 percent.

The first signs of trouble in relying on Argentine natural gas appeared in February 2002 when a worker's strike in Neuquén temporarily interrupted natural gas shipments to Chile. In April 2004, the Argentine government began restricting natural gas exports to Chile as a result of domestic shortages. Supply restrictions were sizable, reaching 34 percent of normal shipments to southern and central Chile in May 2004, for example, and 58 percent of shipments transported over two pipelines into the far north of the country.<sup>2</sup> The Chilean government protested, arguing the restrictions violated a nondiscrimination clause in the 1995 ALADI Protocol on Natural Gas Integration. The Kirchner administration initially responded that the protocol was unenforceable since the Argentine Congress had never ratified it. When even Argentine lawyers noted that this argument was not legally sustainable, the Casa Rosada changed tactics. First, it pointed to language in Article 2 of the protocol that recognized that natural gas exports from Argentina required authorization that could only be granted if internal supply was not detrimentally affected. Second, the Kirchner administration blamed producers for failing to make adequate investments to ensure enough supplies for the domestic market and for fulfilling contracts with Chilean customers.

The Chilean government preferred to downplay the interruptions in Argentine natural gas and not risk inflaming demagogic nationalist sentiments in Buenos Aires and further restrictions. Instead, Chile used its Asia Pacific Economic Council membership to reach an understanding with Indonesia to import expensive liquefied natural gas (LNG). Peru also announced that it might sell Chile small amounts of LNG from Camisea. In addition, ENAP began construction of a regasification plant on the central coast. Picking up on Chile's vulnerability, then-Bolivian president Carlos Mesa offered to sell the Chileans natural gas in exchange

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**Chile and Energy** (*continued*)

for recovering a direct outlet to the Pacific lost to Chile after the late-nineteenth-century War of the Pacific. Mesa's weak grip on power and uncertainty over Bolivia's political future made it impossible for any Chilean government to even contemplate such an offer.

Until the regasification plant is completed in 2008, Chile will have to hope that its hydroelectricity dams run at full capacity, especially now when there are major interruptions in natural gas exports from Argentina. Chile will be forced to import more fuel oil and increase its dependence on less environmentally friendly coal to generate electricity. Chile will also have to seriously contemplate building new hydroelectric dams in the far south, investing in nontraditional sources of renewable energy, interconnect at least the northern and central electricity grids, and reconsider its historical aversion to nuclear power.

**Notes**

1. Felipe Balmaceda and Pablo Serra, "Chile: Energy Dependence," in *Gas Market Integration in the Southern Cone*, ed. Paulina Beato and Juan Benavides (Washington, D.C.: Inter-American Development Bank, 2004), 121.

2. *Ibid.*, 151. It is important to note, however, that for the entire year 2004 Argentina actually exported more natural gas to Chile than the year before. The same was true for 2005.

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decision by Siemens (the German firm that was originally to supply the equipment for Atucha II) to sell its nuclear business to Framatome ANP of France means that Argentina must re-negotiate the former supply contract with Siemens. The Kirchner administration hopes to complete the renegotiation and have Atucha II in operation by 2009. Although Atucha II will double the output capability of Atucha I, it is unlikely to dramatically alter nuclear power's contribution to the Argentine energy matrix for the foreseeable future. This is because both Atucha I and Embalse Rio III will have to be decommissioned for mandatory refurbishment by the end of the decade. New technologies that now make it possible to build smaller and more cost-efficient reactors may, however, result in greater reliance on nuclear power over the long run.

**OIL**

Oil was inadvertently discovered in the Patagonia at Comodoro Rivadavia on December 13, 1907, by government drillers looking for potable water.<sup>27</sup> Early production was left in the hands of the private sector until

YPF was established in 1922 as the world's first vertically integrated state petroleum company. Even with the establishment of YPF, the pendulum swung a number of times between strongly nationalistic petroleum policies that favored an YPF monopoly in petroleum production and those receptive to private-sector investment.<sup>28</sup> By the late 1980s, YPF had mushroomed into Argentina's largest employer and was an international case study in the mismanagement, inefficiency, and corruption of a state-owned enterprise.

YPF was privatized in 1993 at the same time that all upstream exploration and production activities were opened to private-sector competition. Private-sector participation in upstream activities is considered one of the major factors for increased oil output throughout much of the 1990s.<sup>29</sup> Oil production peaked in 1998, and has actually contracted in recent years primarily because of a lack of exploration and the development of new wells. Between 1998 and 2001, the primary causes attributed to this lack of investment were the sharp drop in international oil prices and the Argentine recession, which created serious doubts about the future expansion of the domestic market.

Since early 2002, the drop-off in new investment in the oil sector has been attributed to the failure of producers to receive the full international market price for domestic sales of oil and derivatives as well as a retention tax. The retention tax on exports is on top of the 12 percent royalty tax levied by the federal government on the wellhead value of each barrel of oil or relevant unit of natural gas. By law, the proceeds from the royalty must be transferred to the provincial governments where the oil and natural gas were extracted. Provincial governors (particularly those not aligned with the Justicialista faction in power in Buenos Aires) complain that the federal government fails to transfer the full royalty payments owed because the wellhead price of oil or natural gas is reduced by the export tax, and the royalty is collected from the remaining amount. In addition to restoring market prices and getting rid of the retention taxes, oil industry executives express a need to extend the date of expiration of existing concessions, most of which expire in 2016 or 2017, to encourage new investments. They also want the federal government to replace what they deem to be an antiquated Law 17.319 of 1967 with a more modern hydrocarbons law that, *inter alia*, creates uniform provincial environmental and technical standards for the petroleum industry and permits concessions to terminate with the exhaustion of the reserves.

In the early 1990s, interfuel substitution (based mainly on greater use of natural gas) served to drastically cut down fuel oil consumption in Argentina and, in fact, lowered the demand for all other oil products as well.<sup>30</sup> In addition to the extensive construction of new combined-cycle thermal plants powered by natural gas throughout the early 1990s, this substitution of fuels was also noticeable in the Argentine automotive sector, where 13 percent of passenger vehicles now run on compressed natural gas.<sup>31</sup>

### **Regional Integration**

Argentina exports crude oil and derivatives primarily to Chile and its three MERCOSUR partners (i.e., Brazil, Paraguay, and Uruguay). Although crude oil is shipped to Brazil and Uruguay by tanker and to Paraguay by barge, it is transported over the Andes to Chile through the Estenssoro-Pedrales international oil pipeline. Argentine law requires that producers show that the domestic market and refineries are being adequately supplied before they can export crude oil. An export or retention tax of 20 percent over the wellhead price of a barrel of oil was originally imposed in February 2002 and increased to 25 percent in May 2004. It was replaced in August 2004 with a rolling tax based on the actual price of oil, which ranges from 25 percent at \$32.00 a barrel up to a maximum of 45 percent if the price of a barrel is \$45.00 or higher. The Kirchner administration does not hide the fact that the rolling retention tax is designed to force producers to adequately service the domestic market before exporting to foreign markets. Accordingly, the tax is likely to rise, as oil is expected to remain above \$50.00 a barrel for some years to come. The tax appeared to have its intended effect, as Argentine oil exports are reported to have dropped 15 percent in 2005 from the year before.<sup>32</sup>

### **ALTERNATIVE ENERGY RESOURCES**

In September 1998, Congress approved Law 25.019, which provides incentives to encourage greater use of wind and solar energy. For example, firms that invest in equipment and plants that utilize solar or wind power are entitled to a 15-year exemption from payment of the value-added tax (VAT).

Patagonia is said to be especially suitable for construction of wind-mills used to capture and, through turbines, convert the region's steady

wind flows into electricity. Studies indicate that because of these steady winds, the cost of generating energy through wind power would be 50 percent less in Patagonia than in Europe.<sup>33</sup> However, initial windmill installation costs are high. In addition, Argentina's urban centers are located far from where this wind energy can be harnessed and will require building extensive new transmission lines. On the other hand, high startup costs are outweighed by the fact that little capital is required for exploration, the energy resource is free and renewable, there are almost no negative environmental side effects, and operation and maintenance costs are low. Wind power could therefore become a credible option for generating electricity in southern Argentina. Argentina currently has an experimental windmill park located in the southern province of Chubut as well as windmill cooperatives scattered throughout the country generating small amounts of electricity. The new Argentine state energy firm ENARSA is also expanding a windmill park in Santa Cruz that will service up to 15,000 people in nearby communities and is maximizing the use of domestically produced components.

Northwestern Argentina is particularly blessed with ample sunshine, which makes solar power a feasible option for further expansion in that part of the country. To take advantage of this energy source, solar cells must be installed to capture the sun's rays and transform it into different forms of energy (e.g., electricity, vapor). Only about 4.5 MW per hour of energy is currently generated through solar panels in Argentina (versus 500 MW in Japan, 206 MW in the United States, or even 12 MW in Brazil).<sup>34</sup> Solar-generated heat and lighting is limited to homes and public buildings in isolated rural regions of Argentina, and solar power is used to run some agricultural irrigation and signaling systems.

Energy derived from ocean tides is similar in concept to hydroelectricity in that the twice-a-day coming and going of the tides drives turbines that generate power. In the 1960s, the then-Argentine state energy company identified at least two bays with very high tides in coastal Patagonia where this type of electricity generation was feasible. The biggest drawback is high initial investment costs that exceed those required for building hydroelectric dams because of dikes that must be built in the ocean to channel tide flows.

Geothermal power using the heat and vapor emitted from below the earth's surface is another energy source that the federal government is developing. Western Argentina has at least 42 volcanic sites along the Andes where hot water and vapor could be tapped and used for heating

purposes or to generate electricity. At present, there is only one experimental geothermal plant at Copahue in the southern province of Neuquén. Built in 1988, this experimental plant has the capacity to produce 100 kilowatts of electricity for local tourist resorts (although it is currently out of service). The federal government is studying the feasibility of building a second geothermal plant at Copahue that, when combined with the first, could supply electricity to 15,000 people. One drawback is that geothermal sites are located far from major urban centers, making transmission expensive.

Finally, the federal government is also studying ways to use organic materials or biomass as a source of energy. One method being closely examined involves harnessing the energy released from decomposing organic material exposed to sunlight as a result of photosynthesis and combustion. There are already examples in industry where biomass energy is being harnessed. For example, a steel company in Jujuy in northwestern Argentina uses vegetable-based biomass to run its factory, while Argentine sugar processing plants use discarded sugarcane stalks as fuel to run some of their machinery. Some commentators point out that many poor Argentines have already taken the lead in this area because they cannot afford fossil fuels and must resort to using wood or discarded organic material to cook or for heat.

## **THE FEASIBILITY OF IMPLEMENTING THE NATIONAL ENERGY PLAN**

In May 2004, President Kirchner announced a national energy plan that incorporated projects already in the process of being implemented as well as new ones. Among projects in the process of implementation were the importation of fuel oil through PDVSA, natural gas from Bolivia, and electricity from Brazil, as well as the completion of two new high-tension wires from the hydroelectric dams around Comahue to Buenos Aires (which were finally completed in mid-2005) and the interconnection of the national electricity grid with the Patagonian grid system.

Among new projects proposed under the national energy plan is one to increase water levels at the Yacyretá hydroelectric dam and finish building transformers to connect lower tension electric lines with TRANSENER. Another project calls for the establishment of a spot market for natural gas purchases.<sup>35</sup> In conjunction with this spot mar-

ket, the Kirchner administration has proposed that prices and capacity constraints affecting the entire chain of production, transport, and distribution of natural gas be made publicly available through the Internet. There are also projects intended to improve electricity transmission capacity in northeastern Argentina and other parts of the country, finish the Atucha II nuclear plant by 2009, and complete a natural gas pipeline across northeastern Argentina. A pipeline from Tierra del Fuego to central Argentina that was proposed in the national energy plan was finally completed a year late in 2005.

The biggest criticism leveled at the Kirchner administration's national energy plan is that it focuses exclusively on the short term, when the country also needs a sustainable plan of action for the next two decades. This less ambitious approach, however, corresponds with the Kirchner administration's efforts to downplay the country's energy problems so as not to alarm voters. Another criticism leveled at the national energy plan is that financing for proposed projects is often based on implausible scenarios. For example, the money for raising water levels and adding three new turbines at Yacyretá is expected to come from the World Bank, even though the country is still at loggerheads with multilateral institutions over its 2002 private debt default.

In addition, many projects set highly unrealistic completion deadlines or are based on uncertain political contingencies. For example, building a pipeline across northeastern Argentina is contingent on having access to inexpensive Bolivian natural gas. Furthermore, the Kirchner administration proposes using money collected through export taxes on petroleum derivatives, although these taxes tend to discourage exports.

On the positive side, the Kirchner administration's plan to introduce a spot market for natural gas will make it harder for producers to manipulate prices.<sup>36</sup> This is important in Argentina given that one company, Repsol YPF, controls at least 60 percent of natural gas production and 80 percent of natural gas sales.<sup>37</sup> By also requiring that information on pipeline capacity be made available electronically, the Kirchner administration is hoping to prevent transport firms from hiding the actual use of pipelines and manipulating prices once the pre-2002 regime is fully restored. The Kirchner administration has also created special fiduciary funds to increase capacity for natural gas transport and electricity transmission that will be funded primarily by taxes collected on eventually higher energy tariffs.

The national energy plan contains a program to promote energy conservation by requiring electricity distributors to reward customers who reduce overall usage and impose surcharges on larger commercial customers who exceed consumption rates over the same month in the previous year. Similarly, natural gas distributors are required to reduce rates for end users who conserve, while charging larger commercial and residential customers who exceed usage for the same month in the previous year the full market price of natural gas plus a surcharge.<sup>38</sup> The conservation program is limited to natural gas distributors during the winter months and to the three electricity companies under federal jurisdiction that serve metropolitan Buenos Aires (albeit on a year-round basis and representing 45 percent of the Argentine electricity market). Some electricity distributors in other parts of the country also participate, but on a voluntary basis. While natural gas usage did drop during the winter of 2004 (widely attributed to a winter that was milder than 2003), by the end of the year, overall usage had considerably surpassed that of 2003. Meanwhile, electricity usage dropped a few percentage points from the year before, but this drop was concentrated almost exclusively among residential users.<sup>39</sup>

In 2005 the federal government increased fines for excess electricity usage and hoped a new law that required merchants to display comparative energy efficiency charts for electrical appliances sold in the country would reduce electricity use. For excess natural gas usage between April 15 and September 15, 2005, the federal government expanded the scope of residential customers subject to surcharges for excessive use. It also mandated that the colder winter months of 2003 be utilized as the comparative reference base. Critics point out that the federal government's focus on monthly trends still does nothing to promote usage during nonpeak hours, a major flaw if the goal is long-term energy conservation. In addition, requiring merchants to display comparative energy efficiency charts for appliances is undermined by the fact that the average Argentine consumer today makes his or her purchases based only on upfront price considerations.

## **THE STRATEGY BEHIND THE CREATION OF ENARSA**

In May 2004, Congress approved Law 25,943 creating the mixed private/state-owned energy company *Energía Argentina S.A.* ENARSA

is authorized to explore, extract, transport, warehouse, distribute, sell, and refine all forms of liquid, gas, or solid hydrocarbons in Argentina. ENARSA is also given the exclusive right to sell new concession contracts to private firms for offshore exploration and extraction of hydrocarbons found on Argentina's continental shelf.

The rationale for establishing ENARSA is that a state-owned firm is needed to substantially increase exploration activities and develop new hydrocarbon reserves in Argentina. The larger private companies supposedly have no incentive to do so, regardless of the local investment environment, because of their presence in other countries where crude oil and natural gas reserves may be larger and extraction easier and less expensive than in Argentina. This is said to be a particular problem in Argentina given that Repsol YPF dominates oil and natural gas production and has substantial reserves in neighboring Bolivia.<sup>40</sup> Accordingly, it was probably only rising uncertainty about the future of the Bolivian hydrocarbons sector that led Repsol YPF to announce plans in May 2005 to invest \$4.8 billion over the next four years in exploring new offshore hydrocarbon reserves in Argentina and increasing natural gas and oil production.

Although ENARSA currently has a board of directors and executives, it has no operating capital and owns no wellheads. In addition, most of the company's executives are reported to have little or no experience in the petroleum industry. The Kirchner administration appears to be gambling on ENARSA's exclusive authority to grant concessions for offshore exploration and drilling as a mechanism for attracting capital. In addition, the Kirchner administration sent a bill to Congress in May 2005 designed to encourage private firms to enter into joint ventures with ENARSA to exploit currently undeveloped onshore oil and natural gas reserves. The bill was finally approved in October 2006 and exempts participating firms from paying the value-added tax on inputs as well as duties on imported capital goods. In addition, firms will be able to amortize equipment purchases over a shorter period of time and thereby reduce corporate tax payments.

For the short term, ENARSA will not be a major player in the Argentine energy sector. Instead, ENARSA provides a convenient vehicle for establishing joint venture agreements with private firms that gives the federal government greater control over exploration and development decisions and where to direct petroleum and natural gas supplies. The Kirchner administration believes that any private-sector reticence over

such a restrictive arrangement can be overcome with the fiscal incentives it is offering.

ENARSA will undoubtedly play a larger role in the Argentine hydrocarbons sector over the medium to long terms if substantial offshore reserves of natural gas and oil are discovered and successfully developed. In addition, ENARSA could become the recipient of lucrative assets in electricity generation, as well as energy transmission and distribution, as foreign firms dump their ownership interests, frustrated by the limited operation and maintenance role envisioned for them by the Kirchner administration. It is unlikely, however, that any Argentine government will use ENARSA to renationalize the entire hydrocarbons sector. There is an appreciation that this would require huge, long-term capital investments that no Argentine government will be in a position to undertake for the foreseeable future.

All the recent talk of South American brotherhood emanating from Brasília and Caracas has, until now, not led to major investments in the Argentine energy sector. Although Petrobras does have a substantial presence in Argentine natural gas production and transport as well as in petroleum retail operations, the company's presence in Argentina is rooted in efforts to ensure Brazilian energy self-sufficiency rather than as part of a more ambitious regional political and development strategy. Meanwhile, the major joint venture announced by ENARSA and PDVSA in November 2004 to open hundreds of service stations throughout Argentina has not gone beyond two opened in Buenos Aires. Over the medium to long terms, however, PDVSA's ample pool of cash and Petrobras's recognized international expertise in deep-sea drilling techniques provide an interesting combination that could prove extremely beneficial to ENARSA.

### **A CHINESE BRIDE FOR ENARSA?**

During a visit to Buenos Aires by Chinese president Hu Jintao in November 2004, it was widely reported in the Argentine press that China would make a \$5 billion investment in ENARSA. That announcement, as well as other promised Chinese investments in Argentina, turned out to be illusory.<sup>41</sup> If Chinese investment in ENARSA does materialize in the future, it will likely only come if the Chinese are willing to provide sufficient compensation for access to Argentine natural gas and oil. One

positive aspect of the recent energy crisis in Argentina is that it has caused Argentines to accept that their reserves are limited and should be prioritized for national development purposes. Accordingly, unless the Chinese plan to invest heavily in other areas of the Argentine economy—such as boring a tunnel through the Andes to facilitate soy and mineral exports—they are unlikely to find much receptivity for investment objectives that are restricted to oil and/or natural gas extraction.

## ENVIRONMENTAL CONSIDERATIONS

Since the 1990s, Argentina has adopted many environmental norms at the federal, provincial, and municipal levels that are applicable to any activity that may potentially cause direct or indirect damage to the environment. There is also federal and some provincial legislation that requires the preparation and submission of environmental impact statements in conjunction with, *inter alia*, the construction of hydroelectric dams, mining, and petroleum activities. Furthermore, both the Argentine mining and hydrocarbons laws impose environmental obligations. This increase in legislation has been accompanied by a growing awareness among Argentines of the need to protect their environment for future generations. With reforms made to the Argentine Constitution in 1994, private citizens now can request an order of protection from the courts to prevent any activity that undermines the right to a safe and balanced environment.

Heightened environmental awareness in Argentina has made it difficult for the government to build more than the two nuclear power plants already in operation. The fact that most hydrocarbon production sites or hydroelectricity stations are located far from major population centers has avoided significant citizen opposition to develop new sites. Although the building of electricity transmission wires and pipelines has also historically not engendered significant citizen opposition, an increasingly environmentally conscious public will undoubtedly challenge future projects of this nature. In the province of Salta, for example, a U.S.-based petroleum company was recently sued in conjunction with an exploration road built alongside a forest of certified tropical hardwood lumber. The plaintiff seeks to have its forestland restored to its original condition and demands monetary damages based, among other things, on allegations that the foreign company failed to complete all the

necessary environmental impact studies before constructing a road that contributed to severe land erosion and loss of trees.

## CONCLUSION

Primary responsibility for Argentina's current energy crisis lies with the federal government's January 2002 intervention in the market price mechanism for setting the price of natural gas and electricity. The long delay in lifting price controls can be explained, in part, by a weak government that feared the wrath of an infuriated populace. It is unfair, however, to put the entire blame for Argentina's current energy problems on a dysfunctional political system plagued by infighting and intrigue and fixated on short-term political gain. The pre-2002 regulatory regime had many shortcomings that contributed to the current energy shortages. For example, the regulatory framework for electricity relied solely on market mechanisms for the expansion of transmission capacity that proved woefully inadequate.<sup>42</sup> In particular, the predominant use of the spot market for electricity purchases provided insufficient long-term price indicators needed to encourage expansion in transmission capacity as well as in electricity generation. Transmission firms were also under no legal obligation to build transformers to reduce the kilowatts necessary to transport energy between different grids (an omission that contributes to needless waste of energy). In addition, the regulatory agencies themselves were not immune to political pressure and corruption. This last deficiency was probably exacerbated in recent years when both Duhalde and Kirchner packed ENRE and ENARGAS with Justicialista cronies.

The Kirchner administration's response to the Argentine energy crisis has been focused on redressing immediate problems that if ignored risk alienating voters. Accordingly, the convincing victory by Kirchner's allies in the October 2005 congressional elections, touted as a referendum on his presidency, will change little. Kirchner now seems focused on ensuring victory for himself or his designated heir in the 2007 presidential elections. He will therefore not adopt measures that directly hurt the pocketbooks of significant numbers of voters, even if they inevitably pay for these populist policies through higher taxes or lost job opportunities. The absence of any significant opposition party in Argentina today almost ensures that the Justicialistas will emerge victorious in 2007. That

could mean an additional four years of populist measures that will do little to resolve Argentina's underlying energy problems, which require a long-term plan.

The resounding Justicialista victory in the October 2005 midterm elections also means the continuation of efforts to limit the role of foreign and domestic private energy firms to mere concessionaires restricted to operation and maintenance functions for which they receive a fee. Those firms unhappy with this new limited and constrained role will do what some have already done: cut their losses, sell remaining assets cheaply to politically connected Argentine investment groups, and abandon the country. The federal government, in turn, will use tax revenue to finance transmission and distribution improvements. Such an arrangement allows the government to escape direct blame if things should go wrong because the entity visible to the public remains a private firm. Over the next decade, the federal government will also use ENARSA to assume a greater role in directing new exploration and production activities as well as maximizing revenue intake from the sale of natural energy resources.

The scenario described above of improvisation and a creeping renationalization of the energy industry could be reversed by a sharp drop in federal government revenue and/or a collapse of the Argentine energy sector. Either scenario, individually or in tandem, is plausible in the near term. For example, a sharp drop in commodity exports or a slowdown in domestic growth sparked by inflation from the inevitable lifting of price and wage controls would reduce federal tax collection. The confluence of an unusually cold winter, a severe drought, and civil unrest in Bolivia could also result in widespread power outages and fuel shortages for both industry and residences. Any collapse of the economy and/or the energy sector before the 2007 elections might well bring to power a more market-oriented opposition candidate with a longer-term vision for overcoming the country's energy emergency. Even with a Justicialista in the Casa Rosada after 2007, he or she might be forced to at least restore the pre-2002 energy regime in order to respond to a severe economic and/or energy collapse and to hang onto power.

In the event the Argentine economy and the energy sector manage to squeak by without catastrophe over the next few years, the fact that the current energy crisis is regional in scope is bound to force some long-term changes in Argentine policy. This will be true irrespective of who sits in the Casa Rosada. For nations in the region with less volatile

politics and longer-term development strategies, this reality provides certain influence in nudging the others to cooperate in optimizing the use of energy resources and spreading risks. An example of this type of regional leadership came in May 2005, when Chile made a deal with Brazil to pay for more expensive Brazilian-generated electricity that Argentina might have to import to make up for domestic shortages in natural-gas-generated electricity. The expectation was that the Argentine government would therefore have less need to curtail natural gas exports to Chile.

In June 2005 the Chileans again exercised leadership by organizing a meeting in Lima of the ministers of energy from Argentina, Brazil, Chile, Peru, and Uruguay to discuss purchasing natural gas from Camisea in Peru.<sup>43</sup>

When examined from a regional perspective, there are plenty of energy resources in South America to comfortably supply the four core MERCOSUR countries (Argentina, Brazil, Paraguay, and Uruguay) and the current six associate members (Bolivia, Chile, Colombia, Ecuador, Peru, and Venezuela) for the foreseeable future. Over the next decade, MERCOSUR will serve as a vehicle for harmonizing regulatory and tax frameworks in the member countries and encouraging interconnection agreements that link up the different national electricity grids. Enhanced regional cooperation in the energy sector was already initiated in the late 1990s with the drafting of basic rules to ensure a competitive and non-discriminatory environment for intra-MERCOSUR trade in electricity and natural gas.<sup>44</sup> By 2025 South America's Southern Cone will have a fully integrated electricity grid. Electricity for this grid will be generated primarily from natural gas, but will also include other nontraditional sources, such as nuclear as well as more environmentally friendly wind and geothermal power. In addition, the grid will be managed by a regional supranational authority that can quickly redirect electricity supplies to where it is most needed. The region could also be served by an extensive system of natural gas pipelines whose primary purpose would be to supply local markets and not function as mere conduits to overseas markets. This is particularly true of Argentina, where the country's shrinking fossil fuel reserves will be used primarily to supply voracious domestic demand.

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## Notes

1. Interestingly, about 31 percent of Argentine crude oil production in 1991 went to the United States. Kang Wu, *Energy in Latin America: Production, Consumption, and Future Growth* (Westport, Conn.: Praeger Publishers, 1995), 93.

2. In fairness to Duhalde, his economy minister, Roberto Lavagna, did issue a decree in January 2003 that increased electricity prices and natural gas rates. The decree was struck down by a judicial decision in February 2003 that ruled the increases unconstitutional, a decision later affirmed by an appellate court. Cynical observers, however, dismiss the rate increase and subsequent judicial intervention as a charade orchestrated by Duhalde. The original decree is said to have been a ploy to gain IMF and foreign government favor for a debt rollover. When political cronies in the judiciary later reversed the increases, it provided Duhalde an out by arguing that his efforts to unfreeze utility rates were thwarted by an “independent” court system.

3. Carl E. Solberg, *Oil and Nationalism in Argentina* (Stanford, Calif.: Stanford University Press, 1979), viii.

4. Manuel A. Abdala and Pablo T. Spiller, *Instituciones, Contratos y Regulación en Argentina* (Buenos Aires: Temas Grupo Editorial SRL, 1999), 109. CAMMESA is made up of representatives of the Secretariat of Energy (with veto power) and four civil associations representing generator owners, transmitters, distributors, and large end users (p. 110). Prior to the 2002 economic emergency, CAMMESA was obligated to first purchase from generator owners offering the lowest cost electricity. This was supposed to provide a strong incentive for generator owners to keep their prices competitive and profit margins within a 15 percent band.

5. *Ibid.*, 110, fn. 3. Importantly, regulations at the generation level are complemented by those dealing with environmental protection and security for the specific source of energy (i.e., hydroelectricity, thermal, or nuclear); *ibid.*, 112, fn. 5.

6. *Ibid.*, 124. The entry of so many new players led to important technological advances that resulted in more efficient use of the primary resources, allowing rates for wholesale buyers to drop by 60 percent in the period 1992–1999.

7. Larger users are defined as those entities that consume more than 10 kilowatts of electricity per year. One reason that the federal government finally permitted the pass-through of higher electricity generation costs to larger industrial and commercial end users was the realization that by keeping them frozen it was indirectly subsidizing industrial production.

8. Although there has been no pass-through of the real cost of electricity generation to residential users since 2002, and transmission company and distributor tariffs remain frozen at 2001 prices, the tax bite has been steadily rising. It is estimated that in 2003 some 33 percent of the average end user's bill in Buenos Aires represented taxes, while in the case of Entre Rios more than 60 percent of the energy bill was made up of taxes. Overall, Argentine taxes on energy bills are reputed to be among the highest in Latin America, averaging 30 percent versus 11 percent in Chile or 1 percent in Venezuela. See Fundación para el Desarrollo Eléctrico, *Informe Sobre la Demanda del Consumo Eléctrico Argentino* (Buenos Aires: FUNDELEC, 2003), annex I.

9. The federal government hopes to source the natural gas from either Bolivia or new sites that will be developed off shore in Patagonia and Tierra del Fuego. The government claims that current capacity bottlenecks in transporting the gas from either source will be overcome by the laying of new gas pipelines. The gas pipeline project from Bolivia remained shelved until late 2006, however, by uncertainty over the country's political direction with respect to its hydrocarbons sector.

10. Fundación para el Desarrollo Eléctrico, *Evolución del Servicio Eléctrico Argentino y Sus Consecuencias para el Sistema por el Período 2005–2007* (Buenos Aires: FUNDELEC, 2005), 4.

11. Transportadora de Gas del Sur, *Historias del Gas en la Argentina: 1823–1998* (Buenos Aires: TGS, 1998), 30.

12. James Edward Zinser, "Alternative Means of Satisfying Argentine Petroleum Demand: Importation, Government Production, or Foreign Private Contractual Production: A Comparative Analysis and a Recommended Petroleum Policy" (Ph.D. diss., Univ. of Oregon, 1967), 23.

13. Solberg, *Oil and Nationalism in Argentina*, 165. These two initial pipelines were joined by others in the coming decades, including the first internation-

al pipeline in Latin America that connected Santa Cruz de la Sierra in Bolivia with Campo Durán in Argentina in 1972.

14. Transportadora de Gas del Sur, *Historias del gas*, 39.

15. Prior to its privatization in 1993, YPF was a fully integrated company that controlled a wide variety of oil and non-oil assets such as natural gas and monopolized all upstream exploration and production activities in Argentina. Kang Wu, *Energy in Latin America*, 93.

16. Abdala and Spiller, *Instituciones, contratos y regulación*, 132.

17. *Ibid.*, 134, 136.

18. As might be expected, the failure to allow producers to charge the full market price for natural gas created an important incentive to export. This was tempered, however, by a 20 export or retention tax introduced in 2002. In addition, in 2004 the federal government began restricting natural gas exports until national demand was satisfied.

19. Unsurprisingly, between 2000 and 2003, natural gas reserves in Argentina fell approximately 21 percent. "Preocupante Relación Entre Reservas y Producción," *Technoil*, no. 264 (December 2004): 12–14.

20. Problems in domestic supply during the 1990s, for example, were attributed to bottlenecks in the transport network and not because of production limitations. Abdala and Spiller, *Instituciones, contratos y regulación*, 145. Between 1993 and 2003, no gas pipelines (excluding export pipelines) were built in Argentina. Instead, network capacity was increased through additions of loops and compression. Diego Bondorovsky and Diego Petrecolla, "Argentina: From Growth to Crisis," in *Gas Market Integration in the Southern Cone*, ed. Paulina Beato and Juan Benavides (Washington, D.C.: Inter-American Development Bank, 2004), 21.

21. The Kirchner administration tried to put a positive spin on the 2004 shortage by attributing the surge in energy demand to the reactivation of small and medium-sized enterprises throughout the country as a result of new government policies favoring this sector of the economy. It is also widely reported in Argentina that large-scale users have never faced any interference in gaining access to natural gas, so long as they were willing to pay market rates in hard currency.

22. Abdala and Spiller, *Instituciones, contratos y regulación*, 138. Already in the 1990s some commentators viewed this authority, based on a Canadian model, as providing too much discretionary power that could be abused by opportunistic government officials and/or be used to artificially interfere with free trade.

23. Interestingly, the natural gas sold by Bolivia to Argentina in 2004 was at a lower price than sold to Brazil, but slightly above the price of Argentine gas sold

to Chile. The lower price was to show “solidarity” with Argentina in view of the fact that the Argentines continued to buy Bolivian gas throughout the 1990s at levels higher than was necessary. Even so, it was purposefully priced above that of Argentine gas sold to Chile in order to prevent reshipment of Bolivian gas to that country.

24. In 2001, Pluspetrol inaugurated two collection pipelines between Madres-jones-Bermejo in Bolivia and Campo Durán in Argentina. The gas imported from Bolivia is liquefied in Campo Durán and is also used to generate electricity in northwestern Argentina. Bondorovsky and Petrecolla, “Argentina,” 30. The completion of these two collection pipelines broke the monopoly that Repsol YPF had previously enjoyed in importing and selling natural gas from Bolivia in the Argentine market.

25. “Con el Acuerdo por el Gas, Kirchner Respalda a Morales,” *Energía & Negocios*, no. 124 (November 2006): 1–3. The Bolivian Hydrocarbons Chamber estimates that for Bolivia to meet its export commitments with Argentina will require an investment of approximately \$2 billion for new exploration and another \$1 billion for transport infrastructure improvements. As part of the agreement, Argentina is required to provide a \$400 million loan and technical assistance to build a refinery in the southern Bolivian city of Tarija to produce liquefied gas and gasoline that will be exported to Argentina.

26. The fuel oil sold by PDVSA to Argentina is reported to be considerably higher in cost than if Argentina were to buy it directly from producers in Mexico, Russia, the United States, or elsewhere. Venezuela’s mercurial president Hugo Chávez originally promised to supply Argentina with Venezuelan fuel oil in 2004. When it was discovered that the Venezuelan product was too heavy and would quickly wear down the turbines in Argentine thermal plants, Chávez insisted he could still supply fuel oil to Argentine specifications. Although PDVSA has done so, it is as brokers and after collection of a hefty commission. The Kirchner administration tried to downplay news reports in 2004 that it was overcharged (and that it had to dip into funds of the government pension fund ANSES to come up with the money) by pointing out that it sent 1,000 cows to Venezuela in lieu of hard currency and the repayment period extended over a year.

27. Solberg, *Oil and Nationalism in Argentina*, 8.

28. The results of a surprise opening by the strongly nationalistic Frondizi government, for example, were spectacular as more new wells were drilled between 1959 and 1962 than in the previous quarter century and oil output almost tripled (*ibid.*, 168). In fact, in 1963 Argentina was able to export both crude oil and derivative petroleum products for the first time in the country’s history. Zinser, “Alternative Means of Satisfying Argentine Petroleum Demand,” 62.

29. Kang Wu, *Energy in Latin America*, 92.

30. *Ibid.*, 98. One of the ironies of this drop off in demand for other oil products, for example, was the inability of Argentine-based refineries to supply local power plants in 2004 when the country experienced a shortage of natural gas and was forced to import fuel oil. Throughout the 1990s, it had made little economic sense for Argentine refineries to continue producing fuel oil for a steadily shrinking domestic and even regional market. Price controls introduced in 2002 destroyed any remaining profit incentive to do so.

31. "Toda la Industria del GNC Se Congregó en Buenos Aires," *Technoil*, no. 264 (December 2004): 30–34. A major factor in the growing preference for vehicles fueled with compressed natural gas in Argentina is government intervention in setting natural gas prices. While a liter of gasoline cost 1.85 pesos in February 2005, a liter of compressed natural gas cost only 68 centavos. "Se Inauguró La Primera Estación de Servicio ENARSA/PDVSA," *Technoil*, no. 265 (March 2005): 34–36. This price differential caused demand for compressed natural gas to increase 43 percent during the period 2001–03. Bondorovsky and Petrecolla, "Argentina," 13.

32. See the editorial in the April 2006 electronic newsletter on energy of the Fundación Consejo Para el Proyecto Argentino, [http://www.gabinete.org.ar/Abril\\_2006/editorial](http://www.gabinete.org.ar/Abril_2006/editorial).

33. Fundación para el Desarrollo Eléctrico, *La Próxima Central Eléctrica: Un Desafío de Hoy* (Buenos Aires: FUNDELEC, October 2004), 18. Despite the higher expense, European countries such as Germany and Denmark generate a not insignificant 1,546 MW and 835 MW per hour from wind power. Even the United States generates 1,596 MW per hour. See Dirección Nacional de Promoción, *Energías Renovables 2004: Energía eólica* (Buenos Aires: Secretaría de Energía, 2004), 5.

34. Fundación para el Desarrollo Eléctrico, *La próxima central eléctrica*, 21.

35. Theoretically, the spot market will be open to all consumers, but it is difficult to see how anyone but large purchasers such as owners of electricity generators or large industrial end users can realistically make use of it.

36. A competitive and transparent spot market for natural gas could reduce transaction costs by making it easier for distributors and large end users to shop around for better prices. Abdala and Spiller, *Instituciones, contratos y regulación*, 144–145.

37. A high level of reserves in the hands of one company can act as a barrier to the entry of potential competitors and prevents existing producers from increasing their share of sales by lowering prices because the dominant company can agree with large customers to meet the competition's lower prices, a practice that YPF engaged in throughout the 1990s. Diego Bondorovsky and Diego Petrecolla, "Argentina's Natural Gas Markets: Antitrust and Regional In-

tegration Issues,” in *Competition Policy in Regulated Industries: Approaches for Emerging Economies*, ed. Paulina Beato and Jean-Jacques Laffont (Washington, D.C.: Inter-American Development Bank, 2002), 110, 114.

38. The federal government ordered that the extra money collected by the electricity and natural gas distributors should compensate for the lower rates charged to energy conserving clients. Any leftover funds should be deposited in a special trust fund that will provide capital for improving the electricity transmission and natural gas transport networks.

39. Industry sources are not surprised by this result, given that electricity demand is fairly price inelastic and only a severe price rise would lead to any noticeable reduction in usage among industrial producers. The surcharges are deemed part of the price of doing business and simply passed on to consumers.

40. Repsol YPF’s reputed pre-2002 lack of interest in searching for new reserves and expanding production in Argentina is also attributed to the huge debt incurred to acquire YPF in 1999 for \$14 billion. Repsol YPF was reported to be more interested in using revenue to pay off that debt rather than in exploration or in increasing yields from existing reserves through the use of expensive new technology.

41. The Chinese Embassy in Buenos Aires claims these promises of multi-billion-dollar Chinese investments in Argentina were made by persons who claimed to be associated with the Chinese government but in fact had no official connection. “No Se Cumplan los Acuerdos Con China,” *La Nación*, June 1, 2005, 8; Mariano Obarrio, “De Aquel ‘Megaanuncio’ Quedó Muy Poco,” *La Nación*, June 1, 2005, 8.

42. While high- and medium-volume transmission lines increased by 42 percent in the period 1991–97 and energy failures were significantly reduced, there were still black or brownouts, of which more than 90 percent were attributable to transmission problems. Abdala and Spiller, *Instituciones, contratos y regulación*, 125.

43. The Inter-American Development Bank has expressed an interest in providing some of the funding for what is being called the Gasoducto del Sur. However, the pipeline is also contingent on developing new reserves at Camisea, because Peru is already contractually obligated to supply Mexico with most of what can be extracted from current wells and is not directed to the domestic market.

44. Under Common Market Decision 10/98, the four MERCOSUR countries agree to ensure a competitive, transparent, and nondiscriminatory environment for the generation and intraregional trade of electricity. This includes an obligation not to distort market conditions through the use of subsidies and

not to discriminate against producers or consumers based on their geographic location. Common Market Decision 10/99 creates similar obligations for the production, transport, and distribution of natural gas, and it adds a special obligation to protect end users from monopolies, oligopolies, and other abuses resulting from market share domination.