

# PUBLIC POLICY FOR THE Private sector

Note No. 145

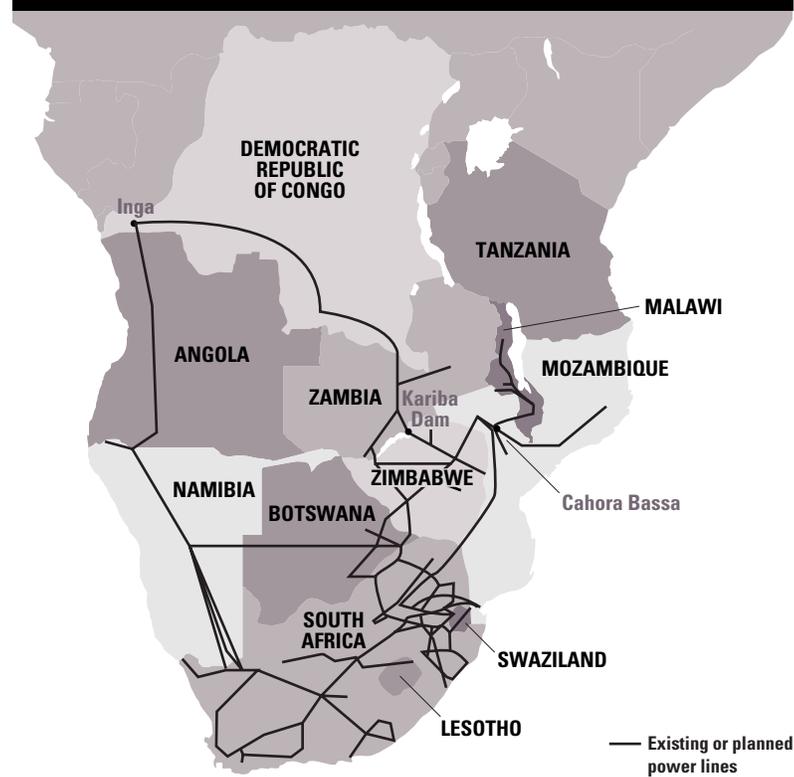
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## Promoting Regional Power Trade— The Southern African Power Pool

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The Southern African Power Pool (SAPP), the first formal international pool to be set up outside North America and Western Europe, was inaugurated in 1995. While the utilities of southern Africa have been importing and exporting electricity for four decades, these trades occurred through bilateral contracts that were complex and often difficult to administer. The objective of shifting to the pool is to create a more efficient regional market. Although physically the pool is still embryonic and trade volumes average roughly 3 percent of production, confidence in the market and mutual trust between the members are being strengthened and sector coordination is dramatically improved. This Note reviews the factors that have eased the way for the pool agreements and the challenges that remain in getting the multilateral trading operation under way.

**FIGURE 1 SOUTHERN AFRICAN POWER POOL**



Power exchange first arose because of the distribution of power sources in the region: a large reserve of low-cost hydroelectricity in the northern part (especially the Inga Reservoir in the Democratic Republic of Congo and the Cahora-Bassa Reservoir in Mozambique), large reserves of cheap coal in South Africa, and the Kariba Dam (on the border between Zambia and Zimbabwe), which, being in the middle of the regional system, can play the “buffer” role. As the network has been reinforced and extended, many arrangements have arisen for the sale and wheeling of electrical power between countries in the region.

The new pool agreement covers about 9 million square kilometers and 200 million people. The number of customers of the interconnected national systems has been estimated at more than 4.1 million, though this figure understates the total number of retail customers because some of the customers are distribution companies.

The SAPP members agreed to develop their pooling operations as a “loose pool” along the lines of NORDEL/NordPool (Scandinavia),





### **SAPP members and their utilities**

**Angola**  
Empresa  
National de  
Electricidade (ENE)

**Botswana**  
Botswana Power  
Corporation (BPC)

**Democratic  
Republic of Congo**  
Société Nationale  
d'Electricité (SNEL)

**Lesotho**  
Lesotho Electricity  
Commission (LEC)

**Malawi**  
Malawi Electricity  
Supply Commission  
(ESCOM)

**Mozambique**  
Electricidade de  
Mozambique (EDM)

**Namibia**  
Namibia Power  
(NAMPOWER)

**South Africa**  
Electricity Supply  
Commission (ESKOM)

**Swaziland**  
Swaziland Electricity  
(SEB)

**Tanzania**  
Tanzania Electricity  
Supply Company  
(TANESCO)

**Zambia**  
Zambian Electricity  
Supply Corporation  
(ZESCO)

**Zimbabwe**  
Zimbabwe Electricity  
Supply Authority  
(ZESA)

UCPTE (Western Europe), and such U.S. pools as the Midcontinent Area Power Pool before the 1996 restructuring of the U.S. electricity market. Loose pools emphasize the constant exchange of information in order to maximize both the economic and reliability benefits from trading and system autonomy. These pools do not use central dispatch of power plants, often relying instead on long-term bilateral contracts for electricity supply between generators and customers. These contracts are supplemented with short-term contracts and other deals under the overall agreement. Loose pools may provide central services, however, including producing continuous, real-time data to match generation and demand, developing indicative expansion plans, and implementing emergency procedures. Loose pools also establish detailed common design and operational standards to ensure system security and reliability and to facilitate trades.

In the SAPP full membership is limited to the national utilities. Most are still vertically integrated, with a primary mandate of ensuring the autonomy and self-sufficiency of the domestic system. The benefits of the pool include reductions or postponements in new requirements for generating capacity and reserves, reductions in fuel costs, and more efficient use of hydro-electricity. To estimate the potential gains, a Southern African Development Community (SADC) electric power study conducted in 1990–92 compared the costs of integrated regional development with those of independent development, in which each country follows a strategy of self-sufficiency. The study showed savings of US\$785 million (1992 prices), or 20 percent, over 1995–2010. Because the Democratic Republic of Congo and South Africa were not members of the SADC at the time of the study, the comparison did not include their system expansion plans, though it did account for energy trade opportunities. Including these two countries boosts the benefits significantly.

### **The agreements**

The Southern African Power Pool is based on agreements rather than on law. The pool was

inaugurated after the Inter-Governmental Memorandum of Understanding was signed by a majority of the SADC members. The memorandum of understanding and its subsidiary agreements—the Inter-Utility Memorandum of Understanding, the Agreement Between Operating Members, and the Operating Guidelines—have now been signed by all the SADC members and their national power utilities.

The SAPP agreements state that the purpose of the pool is to allow its members to coordinate the planning and operation of their systems while maintaining reliability, autonomy, and self-sufficiency, and to share in the benefits of operating the pool. The agreements incorporate the SADC treaty, the SADC Dispute Resolution Tribunal, the SADC energy ministers, and the Technical and Administrative Unit. The Inter-Governmental Memorandum of Understanding establishes that the SAPP agreements must be interpreted in a manner consistent with the SADC treaty and that the final and binding dispute resolution forum is the SADC Dispute Resolution Tribunal. The energy ministers are responsible for resolving major policy issues in the SAPP and for admitting new members to the pool. The Technical and Administrative Unit provides secretariat and other services to the SAPP executive committee, acts as liaison to the SADC, and seeks funding according to the recommendations of the executive committee.

The SAPP is organized under the executive committee, which acts as the board of directors of the pool, and a management committee, which oversees the administration of the pool. Three subcommittees serve under the direction of the management committee: the planning subcommittee (which focuses on reviewing wheeling rates annually and developing an indicative SAPP expansion plan every two years), the operating subcommittee and its associated coordination center, and the environmental subcommittee. The coordination center, which is still being set up, will be responsible for such tasks as undertaking most pool monitoring activities, carrying out operating and planning studies, determining trans-

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fer limits on tie-lines, administering a regional database, disseminating maintenance schedules, providing technical advice, and seeking funding for its needs.

Each member must meet its Accredited Capacity Obligation, a requirement that each utility have sufficient capacity to cover the forecast monthly peak. Each member is also obligated to supply emergency energy for up to six hours, to provide automatic generation control and other facilities in its control area, to allow wheeling through its system where technically and economically feasible, to submit maintenance schedules, to disclose information and costs related to thermal generating facilities, and to contribute toward the center's costs.

A key element in the operation of the pool is the SAPP pricing arrangement, set out in thirteen detailed schedules in the operating agreement. These schedules cover four broad types of transaction: firm power contracts of varying duration; nonfirm power contracts of varying duration; mutual support contracts such as operating reserve, emergency energy, and control area services; and scheduled outage energy, energy banking, and wheeling.

## Implementation

Three major factors played a key part in the development of the regional pool agreements: the availability of complementary power sources, an active regional organization for economic cooperation, and the political will to support increased regional energy trade. The Southern African Development Community and its predecessor, the Southern African Development Co-ordination Conference, served as a focal point for the promotion of regional integration, facilitating investment in projects (such as interconnection projects) that allowed increased regional power trade. The momentum for regional integration, including increased power trade, was further strengthened by the emergence of more democratic governments in several countries and the cessation of hostilities in others. Also helpful has been having at least one country or part-

ner (South Africa) act as a driver, encouraging more passive parties.

The experience of the SAPP shows that in moving from pool agreements to implementation, it is possible for some participants to move in smaller, incremental steps toward the overall goals set by the agreements. While all participants must take consistent steps, they do not need to move at the same pace. And while all participants have agreed to an international pool, it is reasonable to expect that self-sufficiency and autonomy will remain the priority for some members, at least through the first phase of operations. The pool agreements include provisions that recognize these concerns while also encouraging greater integration, for example, by permitting members to meet their Accredited Capacity Obligation through a contract with another member. Not all countries prefer such a gradualist approach, however: Botswana, Mozambique, and Namibia have opted to rely more on importing power than on building new capacity. Regardless of the preferred path, it is essential to set pool governance rules so that all members, large and small, perceive that they have a voice.

As national regulatory agencies develop and begin to assert their authority there is a risk that they might not be sufficiently attuned to the needs of the regional market. Experience in other countries shows that although a pool can operate where regulatory regimes differ, as they do among SAPP countries, possibilities for gaming or unfair advantage created by differences in regulatory systems can undermine members' willingness to participate. So national-level regulatory statutes should be carefully drafted so that the agency jurisdictions are properly defined, directed and restrained in order to avoid regulatory obstacles to trade. There should also be periodic reviews of regulatory compatibility as the SAPP develops. In addition, the need for a consistent approach to transmission access is becoming apparent as more independent power producers (IPPs) and independent transmission projects (ITPs) express interest in investing in the region. So far only Zambia has required its regulator to take into account SAPP interests.



A review of the SAPP's first year of operation shows that several important practical issues need to be addressed to support the development of the pool. First, the power utilities in each country need to be put on a more viable financial footing to ensure that they are credit-worthy and able to respond to commercial incentives for trading power, including the ability to generate foreign exchange. Toward this end, commercialization programs are under way or under consideration at half the utilities (EDM, ENE, ESCOM, ESKOM, ZESA, and ZESCO). Most advanced in power system reform are South Africa and Zambia.

Second, the SAPP members need to reach agreement on the design and staffing of the coordination center, a politically challenging task, so that the center can become operational. The key steps are deciding on a neutral location; selecting a neutral manager with sufficient autonomy; establishing a legal status; defining clear governance rules; setting guidelines for the interface between the center, SAPP members, and the SADC; identifying equipment needs, especially computer hardware and software; training operators; twinning with a mature pool to develop skills; and developing a realistic budget. By the end of the first year SAPP members had made progress on only a few of these issues. They had agreed to establish the center in Harare, Zimbabwe, separate from ZESA, and had advertised for a manager. The operating subcommittee had drafted a constitution that was being finalized. And training programs for operators had been offered, with more under preparation.

Third, the pool would benefit from broadening its membership to include existing institutions that control or influence significant generation or transmission, such as Hidroelectrica de Cahora Bassa, the Copperbelt Energy Consortium, the new private owner of the Power Division of the Zambia Consolidated Copper Mining Company, and the Zambezi River Authority. But this will mean developing procedures (voting rules) to give voice to and account for the interests of these players as well as other new entrants, such as IPPs and ITPs.

Fourth, to allow efficient operation of the pool and encourage an IPP presence, all the SAPP utilities should unbundle their domestic transmission pricing and ensure members adopt identical rules to set transmission costs. In addition, a study is needed to assess the effects on pool development of transmission pricing under the SAPP and current national pricing policies.

Fifth, SAPP members need to estimate and meet financing requirements for operations and new generation and transmission projects. In identifying potential new projects, they should use compatible generation and transmission planning software that explicitly allows for risk analysis and for dealing with hydrological uncertainty.

Sixth, SAPP members need to harmonize ESKOM's internal competitive generators pool with the SAPP cooperative pool. The internal pool, set up in 1996, is based on the England and Wales model and currently does not provide for access to third party operators. SAPP members also need to address the risk that the different triggers for capacity addition (price signals for the internal pool and a planned approach for the other SAPP members) could lead to suboptimal investment.

Finally, because the SAPP establishes a largely self-governing regime at the operating level, and as experience in Argentina, Europe, and North America shows, members will need to quickly set up an effective dispute resolution process. Clear resolution procedures combined with realistic enforcement could also help in attracting new generation and minimizing national self-sufficiency concerns.

This Note draws heavily from *Supporting the Implementation of the Southern African Power Pool*, forthcoming as a World Bank Technical Paper (Washington, D.C.).

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