



An Infrastructure Action Plan For South Sudan

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3.1 Key Principles for the Design of the Infrastructure Plan

As the discussion in Chapters 1 and 2 indicates, the case for a major program of investment in basic infrastructure is compelling. The Infrastructure Action Plan outlined in this Report is comprehensive and ambitious. The design of the proposed program is built around the following five basic objectives for the country:

- Development of the water resources of the country in a manner that is consistent with the objectives of the Nile Basin Initiative for cooperative and sustainable use of the water resources of the ten riparian countries of the Nile Basin.
- Sustainable utilization of the vast natural resources which include land, forestry and fisheries.
- Increased access to basic services, including water and sanitation, electric power, transport and communication in the country.
- Rehabilitate, upgrade and expand the country's basic infrastructure to ensure that the network provides land-locked South Sudan with reliable and cost-effective access to regional and international markets.
- Working with the international donor community and private investors, the Government will use a portion of petroleum revenues to fund the development of a network of basic infrastructure that will provide direct benefits for the existing population and future generations in South Sudan.

3.2 Main Components of the Infrastructure Plan

The key objective of the proposed infrastructure program is to rehabilitate, upgrade and expand the basic infrastructure network of the country in the decade ahead, consistent with the principles outlined in the preceding Section. The main components of the proposed program are as follows:

- Rehabilitate the existing road network and upgrade the national network to provide all-weather access and transport services to major regional and international markets and among the ten state capitals of the country. The development of an all-weather national truck network will be accompanied by substantial improvement and expansion of the feeder road network of the country to facilitate access of farming communities to domestic and regional markets.
- Upgrade and improve basic infrastructure for other modes of transport, in particular water transport and associated port facilities on the Nile River and navigable tributaries, and civil aviation services for domestic and international traffic focusing on upgrading the status of air traffic communications and safety in South Sudan to a standard consistent with the requirements of the ICAO. These initiatives will be complemented by further investigation of the costs and benefits associated with the expansion of the existing railway network to link South Sudan to Uganda and Kenya, and the possible construction of a pipeline to transport oil to an international port in Kenya or Djibouti.

- Substantially increase the power generation capacity within all ten states, starting with a major investment in diesel generation, alongside significant investments in the development of a national transmission and distribution grid. The development of key components of a national transmission grid will then lay the foundations for subsequent development of hydropower generation capacity and gas-fired thermal plants that will make use of the petroleum resources of the South Sudan to meet domestic demand and perhaps provide opportunities for export of electric power to neighboring countries.
- Rehabilitate and expand water and sanitation infrastructure in urban and rural areas to ensure that a majority of the population has access to improved water and sanitation services by 2020. The Report proposes a set of MDG goals for the country that should be met by 2020.
- Develop a national communications grid for ICT, which will be based on a fiber optic network linked to the submarine cable along the eastern seaboard of Africa. This grid will significantly reduce the cost of network connections and enable the citizens of South Sudan access communications services at reasonable costs. The low population density in rural communities will benefit from the network through the design and implementation of a policy of universal access for the country.

The proposed program for development of basic infrastructure assets and services will be complemented by strengthening and reforming relevant institutions in order to bolster capacities for independent regulation of basic infrastructure services, promote private investment in infrastructure assets and services, train and make available the skills required by public sector for effective

oversight and management of the basic infrastructure of the country.

3.3 Program Expenditures and Funding Arrangements

3.3.1 Overview of the Program

Table 3.1 provides summary costs of the proposed infrastructure program for 2011-2020 for capacity building, technical support and studies and capital outlays for rehabilitation of and upgrade of existing infrastructure assets, and construction of new facilities. The total cost is estimated at \$13.8 billion at 2010 constant prices and exchange rate. A high priority is assigned to the development of a national road network in the decade ahead, along with reliable connections to neighboring countries and international ports, and a much expanded rural road network that gives a majority of rural dwellers improved access to services and markets. The total cost of the proposed roads program is \$6.3 billion – 45% of the entire infrastructure program for the decade ahead. The Report proposes an investment of \$2.3 billion in developing a national electric power network that will provide urban areas and the business community with affordable access to a reliable supply of electricity. The other major infrastructure investment program is water supply and sanitation, the total cost of which is estimated at \$1.9 billion. Successful implementation of the proposed program will bring a range of benefits to South Sudan, including improved transport and electricity services with lower costs for service provision. Other key parts of the program will ensure improved access to low cost communications networks, and improved access to safe water and sanitation in both urban and rural areas. These and other benefits are discussed at greater length in Chapter 4.

Table 3.1: Development Expenditures for the Proposed Infrastructure Program
(\$ millions at 2010 constant prices)

Category	Estimate	Projected						Total
	2010	2011	2012	2013	2014	2015	2020	2011-20
Public sector								
Infrastructure general	75.1	35.1	4.0	9.0	11.5	13.0	5.5	118.1
Water resource management	3.4	13.3	24.6	79.2	173.0	222.3	122.2	877.6
Irrigation for agriculture	2.0	4.0	3.0	13.0	17.0	30.0	80.0	435.0
Transport sector								
Roads	262.8	193.8	258.3	486.2	487.7	511.9	1 057.1	6 264.2
River transport and ports	14.2	9.9	9.5	4.7	3.5	9.2	2.8	51.4
Railways	-	1.2	1.8	2.7	3.5	3.0	-	87.2
Aviation	6.4	10.9	31.8	18.6	23.1	26.5	5.5	149.1
Sub-total	283.4	215.9	301.4	512.2	517.8	550.6	1 065.4	6 551.8

Category	Estimate	Projected						Total
	2010	2011	2012	2013	2014	2015	2020	2011-20
Electric power programs	9.4	9.3	33.9	140.6	205.9	138.6	181.7	1 468.2
Water supply and sanitation	30.4	69.4	110.9	109.9	106.6	114.9	209.6	1 386.2
Communications	13.1	9.8	10.8	10.1	9.2	7.6	3.6	66.9
Total	416.7	356.8	488.5	874.0	1 040.9	1 077.0	1 668.0	10 903.9
Government								
Government	231.2	176.5	281.4	523.1	633.4	653.7	1 139.3	7 112.3
Donors								
Donors	185.5	180.3	207.2	350.9	407.5	423.2	528.7	3 791.5
Private sector								
Irrigation for agriculture	-	-	3.0	15.0	30.0	72.0	60.0	600.0
Transport sector								
River transport and ports	-	-	-	-	-	-	2.7	15.5
Aviation	-	-	-	-	-	-	18.8	73.0
Electric power programs	-	-	9.3	199.9	258.7	198.6	59.8	870.4
Water supply and sanitation	-	-	44.8	48.2	49.3	52.0	83.2	554.9
Communications	51.2	52.1	65.1	70.0	74.2	89.2	165.2	1 000.5
Total	51.2	52.1	122.2	333.1	412.1	411.7	389.7	3 114.3
Grand total	467.9	408.9	610.7	1 207.1	1 453.1	1 488.7	2 057.7	14 018.2

Source: Tables 3.5, 3.6, 3.7 and 3.8.

3.3.2 Funding Arrangements for Development Expenditures

As shown in Table 3.2 the plan proposes that the Government provides \$7.13 billion – a little more than half of the total funding required for full implementation of the program, with the donor community providing \$3.75 billion and private investors the balance of \$2.9 billion. About 96% of these expenditures are capital outlays that will rehabilitate and upgrade existing infrastructure and construct new facilities. In 2010, investment expenditures on basic infrastructure were about \$450 million – equivalent to approximately 8.4% of non-oil GDP and this level of investment in infrastructure is already relatively higher than levels in many developing countries. The substantial ongoing program of investment is due in part

to strong donor support to rehabilitate existing assets and private investment in the communications network of the country. But, of course, South Sudan is starting from lower levels of infrastructure development in the country.

As Table 3.2 indicates, full implementation of the proposed program will require investment levels in infrastructure in the range of 20% of non-oil GDP for much of the decade ahead. Investment outlays by the government will rise steadily from current levels of about 4% of non-oil GDP to about 11% by 2020, while donor-funded investment will build up to about 5% of non-oil GDP in the latter part of the decade, after which it will decline to much lower levels relative to non-oil GDP. Private investment, mainly in power and communications, will increase from less than 1% of non-oil GDP at present to about 6% by 2015 and then decline to 3%-4% by the end of the decade.

Table 3.2: Funding of Development Expenditures for Infrastructure Development

Program	Estimate	Projected						Total
	2010	2011	2012	2013	2014	2015	2020	2011-20
Development expenditures (\$ million at 2010 constant prices and exchange rate)								
Capacity building & studies								
Government	-	-	-	-	-	-	-	-
Donors	14.5	17.8	71.9	102.4	88.3	72.3	20.3	505.3
Sub-total	14.5	17.8	71.9	102.4	88.3	72.3	20.3	505.3
Capital expenditures								
Public investment								
Government	237.5	221.8	280.9	517.6	629.9	651.7	1 139.3	7 142.2
Donors	164.7	117.1	135.8	254.0	322.7	352.9	508.4	3 256.4

Program 2010	Estimate	Projected						Total
	2011	2012	2013	2014	2015	2020	2011-20	
Sub-total	402.2	339.0	416.7	771.6	952.7	1 004.6	1 647.7	10 398.6
Private investment	51.2	52.1	122.2	333.1	412.1	411.7	389.7	3 114.3
Total investment	453.4	391.1	538.9	1 104.7	1 364.8	1 416.4	2 037.4	13 512.9
Total development expenditures	467.9	408.9	610.7	1 207.1	1 453.1	1 488.7	2 057.7	14 018.2
Investment expenditures as percent of non-oil GDP								
Public investment								
Government	4.4	4.4	4.9	8.6	9.8	9.5	11.1	
Donors	3.1	2.3	2.4	4.2	5.0	5.1	5.0	
Sub-total	7.5	6.7	7.3	12.8	14.8	14.6	16.1	
Private investment	1.0	1.0	2.1	5.5	6.4	6.0	3.8	
Total investment	8.4	7.7	9.4	18.3	21.2	20.6	19.9	
Memo item:								
Non-oil GDP (\$ mill)	5 380	5 083	5 739	6 051	6 428	6 868	10 246	

Source: Tables 2.15, 3.1 and Annex Table 3.8.

There are two key issues for the design and management of this program. The issue of implementation is discussed later in this Chapter. As discussed in Chapter 2, there are uncertainties about the future level of donor support for South Sudan. Currently, about \$900 million a year of development assistance is allocated to South Sudan – equivalent to about \$95 per capita. For the purposes of this Report, it is assumed that the allocation of development assistance will rise steadily to about \$140 per capita by 2020, which translates into a total annual allocation of roughly \$2 billion by that time. At the levels projected in Table 2.10, the Government will need to have donors allocate 25% of their development assistance to the proposed infrastructure program. This is a modest increase given that allocations to infrastructure programs over 2008-2010 period accounted for about 22% of the total development assistance provided by donors.

Assuming that Government implements programs and policies to improve the operating environment of the private sector in South Sudan, the annual private sector financing of infrastructure assets is projected to increase to \$400 million by 2014-2015. Table 3.1 indicates that the current private investment is largely confined to the communications sector where a number of operators are expanding their voice and data networks. The proposal is to step up private investment in commercial irrigation programs, in power sector generation, and in the development of a fiber optic grid for the entire country. Only small amounts of private investment are anticipated in the transport sector, largely because it will take time to build traffic volumes to attract investors.

The key issue is whether the Government will be able to increase its annual budget allocations for capital outlays on basic infrastructure from the current levels of about

\$200 million to \$650 million by 2015 and \$1 billion or more by 2020. The analysis of the budget outlook and options in Chapter 2 suggests that in the event that the Government receives at least 80% of the oil revenues generated from fields within South Sudan, these proposed levels of funding for the infrastructure program would be manageable. On the contrary, substantially lower amounts of oil revenue as a result of lower international prices, less than anticipated volumes of production or less favorable revenue sharing arrangements would raise serious doubts about the ability of the Government to fund an infrastructure program of this magnitude. As the discussion in Chapter 4 indicates, the implication would be lower levels of growth in the non-oil economy and greater difficulties in creating productive employment opportunities for the labor force.

The Action Plan proposes that \$ 500 million is allocated to capacity building, technical support and studies activities. These activities will be funded by the donor community and in addition to this; donors will also share their invaluable experience in designing and implementing similar programs. Alongside this, the Government should avoid fragmentation of these capacity building and technical support programs among large numbers of donors. Consolidation of technical support and capacity building for each sector should be an important feature of these programs. The Government will therefore need to take the lead in the dialogue with donors about the design of these programs and arrangements for their funding. With the imminent closure of the Multi-Donor Trust Fund (MDTF), there may be merit in creating a special facility for capacity building and technical support that pools donor resources, but gives participating donors a clear role in the design and allocation of funds to such programs.

3.3.3 Maintenance of Infrastructure Assets

Central to the success of the proposed IAP is a strong commitment to maintain the infrastructure assets by national and sub-national governments. Failure to significantly increase budgets for routine maintenance of these assets will result in deterioration of the quality of infrastructure services and in the long-term a substantially higher cost of rehabilitating the assets.

Information on the current level of public spending on

routine maintenance is incomplete. What is clear is that allocations for this purpose in the National budget are modest. Routine maintenance expenditures by state and local governments are not available; nor are maintenance expenditures funded by the international donor community. Anecdotal evidence suggests that total public spending on routine maintenance of the basic infrastructure of the country was estimated in the range of \$20-25 million in 2010 (Annex Table 3.8). Information on private sector spending on routine maintenance of infrastructure assets (mainly on the communications network of the country) is also not available. For the purposes of this Report it is assumed that it will be about \$7 million in 2020.

Table 3.3: Expenditures on Routine Maintenance (\$ millions at 2010 constant prices and exchange rate)

Category	Estimate		Projected		Total 2011-2020
	2010	2011	2015	2020	
Routine maintenance					
Water resource management	0.2	0.6	19.9	34.1	167.7
Irrigation	0.6	0.8	7.6	41.4	155.4
Water supply and sanitation	4.2	6.9	27.5	75.7	355.1
Electric power	2.1	2.5	48.6	93.2	459.6
Roads	10.5	12.4	41.1	108.8	508.9
Ports and waterways	0.2	0.3	2.3	3.5	24.1
Civil aviation	0.2	0.3	7.0	11.3	71.0
Railways	-	-	4.5	7.5	52.8
Communications	10.4	12.8	25.3	51.6	292.5
Unallocated	1.1	1.4	5.7	5.7	52.6
Total	29.6	37.9	189.6	432.8	2 139.7
Public	22.2	28.5	129.0	300.9	1 479.9
Private	7.3	9.4	60.6	131.9	659.8
Capital stock					
Water resource management	6.0	15.7	497.3	852.3	852.3
Irrigation	15.3	19.3	190.8	1 034.8	1 034.8
Water supply and sanitation	106.2	172.4	686.7	1 891.8	1 891.8
Electric power	52.8	61.3	1 216.2	2 330.1	2 330.1
Roads	1 052.8	1 240.7	2 922.9	7 234.1	7 234.1
Ports and waterways	18.0	27.1	41.9	70.9	70.9
Civil aviation	17.3	28.2	119.2	226.2	226.2
Railways	0.5	1.1	2.1	77.1	77.1
Communications	260.2	319.2	632.7	1 289.5	1 289.5
Unallocated	106.9	142.0	142.0	142.0	142.0
Total	1 635.9	2 027.0	6 451.8	15 148.8	15 148.8
Public	1 452.6	1 791.6	4 937.2	11 851.2	11 851.2
Private	183.3	235.4	1 514.6	3 297.6	3 297.6
Maintenance as % capital stock					
Public	1.5	1.6	2.6	2.5	12.5
Private	4.0	4.0	4.0	4.0	20.0
Total	1.8	1.9	2.9	2.9	14.1

Source: Annex Tables 3.8, 3.9 and 3.10.

Table 3.3 provides an estimated value of the end-of-year value of the capital stock of the infrastructure of South Sudan.¹⁴ The value of the capital stock at end 2010 is estimated at \$1.63 billion, including \$1.15 billion of public assets and \$180 million of private assets. The implication is that public spending on routine maintenance in 2010 was equivalent to about 1.5% of the value of the capital stock. It is assumed that private spending was equivalent to 4% of the capital stock. As Table 3.3 indicates, the replacement value of the stock of infrastructure in the country is projected to increase to about \$15 billion by 2020 (at 2010 constant prices and exchange rate). This is a major investment for the country. Since a large portion is basic infrastructure that will be created by the public sector, this will represent a transformation of petroleum assets into financial assets and then into basic infrastructure for the country. Proper maintenance of this important asset will ensure that the current serious infrastructure bottlenecks of the country will be removed and poor quality infrastructure will no longer be an impediment to service provision and economic growth.

The proposed Action Plan calls for an increase in annual spending on routine maintenance to about \$420 million by 2020, \$300 million of this sum will be public sector spending. In addition to this routine maintenance, the proposed program also calls for increased annual levels of spending on periodic maintenance of about \$50 million for the road network. This build-up in annual maintenance spending to around \$500 million by 2020 represents an important opportunity to further develop private sector capacities within South Sudan. The position taken in this Report is consistent with the Government's policy of promoting opportunities for private sector development and a concerted effort should be made in the near- and medium-term to ensure that responsibility

for maintenance work is competitively contracted to the private sector. Successful implementation of such a policy will require substantial technical support to the relevant ministries that have responsibilities for implementation of projects and programs, including in particular, translation of project design into procurement packages for public tender. The manner in which this might be done is detailed in Chapter 4.

3.4 Highlights of the Sectoral Programs

3.4.1 Land and Water Resource Management

Given the significant potential of the agricultural sector, the Action Plan for land and water resource management has seven main components: (i) build capacities at the national, state and local levels for effective administration and management of land resources; (ii) strengthen capacities for protection and management of the extensive bio-diversity of the country; (iii) improve basic information about the water resources of South Sudan; (iv) build institutional capacities for management of the water resources; (v) strengthen capacities for interaction and dialogue with other Nile Basin riparian countries regarding management of use of the Basin resources; (vi) undertake substantial investment in facilities for surface storage and transport of water to meet current and future demand; and (vii) build institutional capacities to ensure full recovery of the costs or supplying raw and treated water for agricultural, household and industrial use.

Table 3.4: Indicative Projection of Land and Water Use in South Sudan

Indicator	2010	2015	2020
Land resources (ha '000)			
Total land area	644 331	644 331	644 331
Cultivated area	2 681	2 991	4 000
Harvested area	1 000	1 320	2 500
Irrigated area	32	132	400
Protected conservation area	155 925	155 925	155 925

¹⁴ By way of comparison, the unweighted average ratio of construction value added to fixed investment is for the following group of countries for 2009-2010 was about 25%: Burkina Faso, Ethiopia, Kenya, Malawi, Niger, Rwanda, Sudan, and Uganda. The average for Sudan, for example, was 22%.

Indicator	2010	2015	2020
Cultivated as % of total area	0.4	0.5	0.6
Harvested as % of cultivated area	37.3	44.1	62.5
Irrigated as % of cultivated area	1.2	4.4	10.0
Conservation area as % total area	24.2	24.2	24.2
Water demand (bill m³)			
Agriculture	0.61	2.06	5.10
Households	0.05	0.08	0.17
Industry	0.01	0.01	0.02
Total	0.66	2.16	5.30
Agriculture use per ha harvested (m ³ per ha)	610	1 562	2 042

Source: Table 2.7, Table 2.10 and Table 5.5.

As Table 3.4 indicates, the cultivated area is expected to increase by about 50% to 4 million hectares by 2020 – equivalent to about 6.2% of the total area of the country. The harvested area will increase from the current 37% of the cultivated area to about 63% by 2020 and the irrigated area will increase from 1% of the cultivated area to about 10% by 2020. The Report puts particular emphasis on strengthening capacities for water resources management and further development of these resources to meet existing and future demand as well as reduce hydrological and climatic vulnerability. The proposed program for management and development of the water resources of the country amounts are estimated at \$880 million over 2011-2020 period, of this amount, \$850 million will be allocated for expansion of water supply, improvement in measures to control floods and protection and access to water ways (at 2010 constant prices and exchange rate).

3.4.2 Irrigation for Agriculture

Presently, only 1% of the cultivated area is irrigated. The proposed Action Plan calls for an increase in the irrigated area from the current 32,000 hectares (ha) to 400,000 ha by 2020. It is anticipated that the smallholder farms will dominate the increase in irrigation and they are expected to account for half of this increase; the remainder will go to medium- and large-scale commercial farming operations. Funding and implementation of these smallholder programs will be supported by the government and development partners. The total cost of the proposed program for irrigation is estimated at \$1 billion, at an average cost of \$2,500 per ha (at 2010 constant prices and exchange rate).

As a first step in development of the irrigation potential, the Action Plan calls for the preparation of a national master plan for development of irrigation programs in the decade ahead. This plan will underpin the design and

implementation of irrigation programs for smallholder farms and medium- and large-scale commercial farming opportunities to promote production of high value crops for domestic and international markets.

3.4.3 Transportation

Development of the road network: Consistent with the SSDP, the Action Plan prioritizes the rehabilitation and upgrade of the road network of the country. The proposed roads program is based on implementation of a eight-point program in the decade ahead: (i) rehabilitate and upgrade of the entire 7,369 km of inter-state trunk roads; (ii) upgrade of the existing 1,451 km of state primary roads to all-weather standard; (iii) upgrade of the existing 3,822 km of secondary roads to all-weather standard; (iv) upgrade of 2,178 km of tertiary roads to all-weather standard; (v) pave an additional 440 km of urban roads and upgrade 300 km to all-weather standard; (vi) strengthen financial and institutional capacities for regular maintenance of the road network and oversight of the road transport industry; (vii) develop urban transport services; and (viii) implement a comprehensive program for road safety.

Implementation of this program will result in a substantial improvement in the connectivity among all ten states as well as South Sudan's links with other countries in the region; this will increase the access to markets by a large portion of the population. A key objective for the program is to significantly lower the current very high cost of transport in South Sudan. A reduction in freight rates from current levels of 20 US cents per ton km to less than 10 US cents per ton km will have a significant impact on the cost structure and on the ability of rural communities and small business to compete with imports of food products and several other consumer goods. Lower freight rates will also lower the current capital cost of construction activity in the country because of its impact on the cost of imported

construction materials. The total cost of the roads program is estimated at \$6.3 billion, including some \$80 million to support capacity building and technical studies, with the balance of the funding coming from the increased national budget allocations to the roads sector programs.

River transport and ports: Portions of the White Nile River and its tributaries offer cost effective transport options for communities along these waterways, especially in the wet seasons when road transport can be severely restricted. The navigable portion of the river network crosses six of the ten states of the country. The proposed Action Plan for these waterways and ports will address three particular sets of concerns associated with the development of this transport mode in the decade ahead: (i) complete bathymetric surveys of all potentially navigable portions of the waterways to identify navigation constraints, map all navigable routes and lay foundations for subsequent detailed river engineering studies that will provide a basis for dredging operations and location of navigation aids; (ii) upgrade the capacities of existing river ports and associated cargo handling and storage facilities; and (iii) support capacity building programs that include staff development and improved institutional capacities to promote and regulate the development of private water transport services. The proposed program for river transport and ports is estimated at \$70 million for the decade ahead, including \$14 million for capacity building in preparation of the detailed marine studies. An amount of \$53 million is proposed for dredging, navigational aids and improvement of port facilities. These estimates are provisional at this stage. Final estimates for the capital cost of the proposed program will be based on the findings of the surveys and detailed engineering studies. Funding for the program will come from the government, the donor community and the private sector.

Railways: The primary focus of the proposed Action Plan for the railways sub-sector will be to develop an appropriate institutional and regulatory framework to further extend the railway network in South Sudan. Key elements of the program include: (i) development of the legal, institutional and regulatory framework for the sector,

including issues related to infrastructure assets ownership; (ii) establish arrangements for management and operation of rail services in South Sudan; (iii) undertake a detailed inventory of the existing track and signaling system; (iv) carryout an assessment of potential demand for traffic on the existing 248 km rail line from the border with Sudan to Wau and prospective traffic for the proposed extension of the line from Wau to Nimule on the border with Uganda; (v) rehabilitate the existing line to Wau; and (vi) carryout a detailed feasibility study for the proposed extension from Wau to Nimule. The cost of the proposed program for the railways sub-sector is about \$90 million, including \$11 million for studies and personnel and institutional capacity building. An amount of \$77 million is proposed for rehabilitation of the existing line. The bulk of the funding will come from the government. No provision is included for a possible extension of the line to Nimule.

Civil aviation: The proposed program for civil aviation includes the following components for action in the short-term: (i) restructure and strengthen institutional arrangements for the civil aviation industry; (ii) working with ICAO, formulate and implement an air transport policy that is consistent with requirements for airspace surveillance and traffic management in the medium-term ; (iii) complete the ongoing upgrade of the Juba domestic and international airport; (iv) upgrade selected airports in the state capitals and other locations; (v) implement a major program of staff development and capacity building consistent with the requirements for compliance with ICAO standards and recommended practices; and (vi) develop an appropriate Public Private Partnership (PPP)-type framework for possible concession agreements with private investors to operate selected airports in South Sudan. The proposed program for the civil aviation sub-sector involves expenditures of about \$223 million in the decade ahead. This will be allocated as follows; roughly \$13 million will go to capacity building, technical support and studies, and about \$210 million will be used to rehabilitate and upgrade of major airports and airspace surveillance and air transport management. The bulk of the funding will come from the government and private concessionaires.

Table 3.5: Selected Indicators for the Electric Power Sector

Indicator	2010	2015	2020	2025	Annual growth rate (%)		
					2011-2015	2016-2020	2021-2025
					Electrification rate (% of households)		
Urban	5.2	8.4	51.9	74.5			
National	0.8	1.8	12.3	19.8			
Total consumption (GWh)	238	732	1 961	3 256	25.2	21.8	13.5
Consumption per capita (kWh/person)	25	61	139	188	19.5	18.0	6.2
Required supply(GWh)	317	915	2 308	3 700	23.6	20.3	9.9

Indicator	2010	2015	2020	2025	Annual growth rate (%)		
					2011-2015	2016-2020	2021-2025
					Required generation capacity (MW)	56	155
Memo items:							
System losses (%)	25.0	20.0	15.0	12.0			
Load factor (%)	65.0	67.5	70.0	72.5			
Population ('000)	9 494	12 012	14 079	17 286			

Source: Tables 8.5c, 8.8 and Annex Table 1.4

3.4.4 Electric Power

The proposed Action Plan for the electric power sector has six key components for the decade ahead: (i) undertake a major program of expansion of the generation capacity from the current 50 MW to about 580 MW by 2025 in order to meet the current and projected power demand; (ii) expand the national transmission and distribution grid to link all ten state capitals and to the grids of Ethiopia, Kenya and Uganda; (iii) increase urban households access to electricity from the current 5% to 75% by 2025; (iv) complete a major restructuring of the South Sudan Electricity Corporation (SSEC) and convert it into a fully-fledged, and financially sound, state enterprise with the capacity to enter into take-or-pay contracts with private electric power suppliers; (v) strengthen the enabling environment for private investment in power generation and attract private investors to operate as Independent Power Producers (IPPs) within South Sudan; and (vi) strengthen the existing regulatory arrangements for the electric power sector. Even with this expansion program, the average consumption of electricity in South Sudan will only be expected to increase from a current low of 25 kWh to about 140 kWh per person per year by 2020. Clearly, by 2020 the levels of electricity consumption will still be low because of the very high costs of extending national grid to reach the large numbers of sparsely populated rural households and remote areas. The Action Plan therefore calls for a substantial expansion of off-grid arrangements

to supply energy to these rural households. The program for electric power and rural energy will cost roughly \$2.3 billion, over 2011-2020 period and an additional \$180 million will be spent on the extension of the national network and the rural energy program during 2021-2025. The plan therefore proposes to mobilize about \$870 million of private capital for the expansion of generation capacity, with the government and international donor community providing the balance of the required funding.

3.4.5 Water Supply and Sanitation

Water supply services. The proposed Action Plan for supply of improved water to urban and rural communities is built around the following three sets of activities: (i) rehabilitate very large number of rural water points that are not currently functional, and construction of about 11,000 new water points to provide 65% of rural residents with access to improved water by 2020; (ii) rehabilitate and construct new urban water supply facilities and increase water access from the current 15% to 70% by 2020; and (iii) provide technical support and training that will strengthen capacities to provide water services at the national, state and county levels. The capital cost of the proposed program to improve the water supply is estimated at \$1.1 billion for the period 2011-2020. In addition, \$150 million will be set aside to support capacity building and training in the sector as a whole which will have a direct impact on the quality of water supply services.

Table 3.6: Urban and Rural Access to Improved Water and Sanitation (% of total urban and rural populations)

Indicator	2010	2015	2020	2025	Annual growth rate (%)		
					2011-2015	2016-2020	2021-2025
					Access to improved water		
Urban	15	17	19	21	23	27	70
Rural	34	37	40	43	46	49	65
National	31	33	36	38	41	44	66
Access to improved sanitation							
Urban	37	38	39	41	43	45	60
Rural	9	11	13	15	17	20	40
National	14	16	18	21	23	26	45

Source: Annex Table 4.1 and Annex 10.

Sanitation services. The Action Plan for sanitation services proposes to : (i) rehabilitate most of the existing urban and rural sanitation facilities; (ii) construct new facilities in urban and rural areas sufficient to provide 60% of urban households and 40% of rural households with access to improved sanitation by 2020, thereby raising the national average sanitation access levels from a current low of 14% to 45% by 2020; (iii) implement a series of reforms that will strengthen coordination and implementation and expand funding of the sanitation programs; (iv) provide improved sanitation facilities for all health care centers and schools; and (v) develop hygiene education programs for urban and rural communities and introduce similar programs into school curricula. The capital cost of the sanitation services provision is estimated at \$700 million for the next decade. In addition, a substantial portion of the above-mentioned technical support program of \$150 million will be allocated to capacity building, training and hygiene education programs.

3.4.6 Communications

The proposed Action Plan for the communications sector

has six key objectives: (i) establish access to the global communication network of submarine cables; (ii) build a national fiber optic broadband network that is linked to the global network; (iii) improve and expand access to communications throughout South Sudan, including rural communities by implementing the universal access policy; (iv) promote competition among service providers to ensure that costs of service delivery are not inflated; (v) consolidate arrangements for regulation and oversight of the industry; and (vi) expand the range of E-applications that are available to the educational and other institutions and the population at large. Table 3.7 provides a summary of the key targets for communications activities by 2020. The target is to increase access to voice communications from the current 12% to almost half the population by 2020. And have 60%-70% of educational, health and government institutions access ICT services by 2020. The impact of much improved access to low cost communications will be profound. It will lay the foundations for widespread access to information in urban and rural areas, including education and health services in schools and community centers in rural communities. It will also provide improved access to information about market opportunities for farm products and other rural-based production activities.

Table 3.7: Selected Indicators for Access to ICT Services

Indicator	2010	2015	2020
Population covered by mobile phone network (%)	60	90	100
Mobile phone subscribers per 100 people	12	18	40
Internet users per 100 people		3	10
Localities/countries with public internet access (%)		30	50
Households with radio access (%)	25	50	80
Households with telephone (%)	15		
Educational institutions with ICT		30	60
Health institutions with ICT		30	60
Government institutions with ICT		40	70

Source: Table 10.5.

The total cost of the proposed ICT program for 2011-2020 is estimated at \$851 million, including capital expenditures on the ICT network of about \$813 million and roughly \$38 million for capacity building, technical support, development of various e-applications and various studies.

The development of the national communications network will be primarily funded by the private sector, along with modest outlays of public funds for public information centers, postal services, and the public radio and TV networks.

3.5 Building the Enabling Environment for Public and Private Investment

Strengthening institutional capacities in the country is at the heart of the proposed agenda for the infrastructure sector. Experience from several Sub-Saharan countries indicates that overcoming the large infrastructure deficit requires a combination of improving the performance of the relevant infrastructure-related institutions and mobilizing or raising the additional finance. In the past decade, there have been concerted efforts throughout Sub-Saharan Africa to move forward on institutional reform. These experiences are well documented.¹⁵ According to Foster and Briceño-Garmendia (2010), the greatest progress has been made in the telecommunications sector, while the transport sub-sectors lag far behind. In the design of its own program, South Sudan can therefore benefit a great deal from these various experiences.

3.5.1 Overview of the Program

Successful implementation of the proposed Infrastructure Action Plan (IAP) will require that priority is accorded to building institutional and human capacities for the design and implementation of the proposed program. There is a clear need to move beyond the emergency interventions of recent years by the donor community and governments and address the most glaring deficiencies in the basic infrastructure of the country. There has been limited donor coordination of these interventions with other activities within and across sectors.

There are four closely related sets of concerns that are built into the proposed IAP that will require early attention:

- Take initiatives that will strengthen the sector planning capacities of line agencies and government mechanisms for prioritizing project and program interventions in the infrastructure sectors. As the preceding discussion of funding arrangements for the infrastructure program indicates, the reality is that a substantial part of the required funding will continue to come from National Government sources in the decade ahead, with significant parts of the program being implemented through the central government budget rather than by public enterprises. As the discussion below indicates, the Government is aware of existing shortcomings in the planning, selection, and execution of these investment

projects and is taking action to address these concerns. However, much remains to be done.

- Strengthen the roles and capacities of state enterprises that will be responsible for or associated with the provision of infrastructure services in the country. These responsibilities may range from being owner of the infrastructure assets and provider of related services to a partnership with private sector investors in service provision under some form of PPP arrangement.
- Strengthen the policy framework for private investment in infrastructure services under partnership arrangements with a state enterprise or other government entity. Experience in Sub-Saharan Africa in the past decade has led to a more nuanced view of the role of the private sector. Experience suggests that the private sector can make a substantial financial contribution in certain key sectors (mobile telephony, power generation, civil aviation and ports), but its contributions in roads and water distribution have been more limited.¹⁶
- Strengthen the legal, regulatory and administrative environment applicable to the provision of infrastructure-related services. Analysis by Vagliasindi and Nellis (2009) suggest that there are links between the introduction of an independent regulator and subsequent improvement in service performance within sectors. Weak regulatory autonomy and capacity constraints have undermined the credibility of independent regulators. Most Sub-Saharan regulatory agencies are embryonic, lacking funding and in many cases, qualified personnel. Strengthening regulatory capacities is a long-term process; a first priority should be given to those sectors where private participation and competitive pressures can play a significant role in improving service provision.

3.5.2 Central Government Capacities for Infrastructure Planning and Execution

The institutional reform agenda set forth in this Report includes provision for strengthening sector planning capacities in the infrastructure line ministries to ensure that there is a rigorous project screening process in place to ensure that infrastructure investments are selected according to their expected costs and benefits. And that

¹⁵ See for example, Vagliasindi, Maria and John Nellis (2009), "Evaluating Africa's Experience with Institutional Reform for the Infrastructure Sectors." Working Paper 23, Africa Infrastructure Diagnostic, World Bank, Washington DC., 2009; and Foster, Vivien and Cecilia Briceño-Garmendia (2010), Africa's Infrastructure: A Time for Transformation. World Bank, Washington DC, 2010.

¹⁶ Foster, Vivien (2008), "Overhauling the Engine of Growth: Infrastructure in Africa." Africa Infrastructure Country Diagnostic, World Bank, Washington DC, Draft report, September 2008.

these investments are sequenced and synchronized with each other and with broader development plans. For many large infrastructure projects the lead times from project identification to completion are lengthy and extend well beyond the current three-year cycle for national development planning. For this reason, multi-year budgeting frameworks and greater capacity to plan and implement complex procurement processes will help ensure that budget execution ratios increase and projects are completed in time. As noted in Chapter 1 of this Report, in recent years budget completion rates for donor funded programs have been about 75% of the annual amounts budgeted by donors. In the case of the 2010 national budget, the budget completion rate for the infrastructure capital works program was 92%, although there was wide variation among the sectoral agencies concerned. Execution rates ranged from less than 40% for the telecommunications and postal services program and the urban water program, to a high of more than 100% for the information and broadcasting program and the transport sector program.

The Government of South Sudan is taking action to address the current shortcomings in the planning and execution of infrastructure projects and programs. As noted earlier, a major concern has been the highly fragmented nature of donor support for the rehabilitation and upgrade of the country's infrastructure. The Government has therefore proposed a shift towards a more programmatic approach to planning and financing of infrastructure programs in the country. Under this proposed approach, new infrastructure proposals – large and small – will be consolidated into infrastructure priorities programs. These programs will aim to ensure that project design includes linkages with other projects (feeder roads with trunk roads, electricity transmission with distribution, and so on). These sectoral priority programs will be designed with corresponding set of strategies and policy actions for each of the main infrastructure sectors and sub-sectors. The proposed programs will be approved by Sector Working Groups, which will include donors. The programs will include the following information:

- A priority infrastructure strategy that draws on the SSDP and that is translated into prioritized policy actions that can be implemented, with due regard for technical and administrative implementation capacities.
- For each ministry a prioritized portfolio of projects will be prepared based on extensive consultation and rigorous analysis of costs and benefits.

- Individual programs and projects will be prepared according to agreed common technical standards and designs.

These programs will then be translated into implementation plans within the framework of the government's annual planning and budgeting process. During the annual planning process, these programs will be translated into three-year sector investment plans, which will underpin the budget sector plans. The proposed Infrastructure Action Plan outlined in this Report is designed to fit within the Government's evolving framework for the planning, design and implementation of the infrastructure program for the country.

3.5.3 Strengthening the Role of State Enterprises

Responsibility the nation's infrastructure is divided among a range on government entities in South Sudan. Looking ahead, there is little doubt that state corporations will play an important role in the decade ahead and beyond in the development of the country's infrastructure network and provision of infrastructure services.

Currently, there are three entities designated as state corporations that have formal responsibilities for the development, operation and maintenance of particular parts of the infrastructure network of the country. These are the South Sudan Electricity Corporation (SSEC), the South Sudan Urban Water Corporation (SSUWC), and the Nile Petroleum Corporation (NilePet). In addition, there is the recently created South Sudan Roads Authority. At the time of writing this Report, these entities were corporations in name only. Their transformation into legally recognized state-owned corporations has not yet been completed, although it is underway for the SSEC.

Elsewhere in Sub-Saharan Africa, the internal and external governance of state corporations has lagged behind other aspects of institutional development (World Bank, 2010). Most countries have done better on internal governance than on external governance.¹⁷ Building on the experience of other SSA countries, this Report proposes a series of actions aimed at strengthening the role of these infrastructure-related state enterprises, the key elements of which are as follows:

- Legislative action required to provide government "corporations" with the required legal basis for

operating as public companies. African experience with this type of restructuring suggests that the owner of these corporations should be the Ministry of Finance and Economic Planning rather than an independent body.

- Strengthen the financial and operational monitoring of these state owned enterprises (SOEs), with particular attention being given to the financial performance of the SOE. Experience in many SSA countries is that the hidden costs of operations can be high. According to the World Bank (2010), the hidden cost of inefficiency coming from mispricing, unaccounted losses and collection inefficiency and on average it is equivalent to 0.6% of GDP in the water sector and 1.6% of GDP in the power sector for SSA countries' as a whole.
- The SOEs in SSA that have registered sustained good performance (for example, in Botswana and Uganda) have taken a number of additional initiatives that include the following: (i) introduction of boards or directors, selection of board members on a competitive basis rather than direct appointment by line ministries, and introduction of independent directors; and (ii) introduction of independent audits of operational and financial performance on an annual basis.

3.5.4 Private Investment and Public-Private Partnerships

The South Sudan Development Plan places considerable emphasis on the importance of private sector participation in the provision of infrastructure services in the decade ahead. It will be important to ensure that expectations about the possible benefits are kept realistic. According to assessments made by the World Bank (2010), the key lesson from past experience in SSA is that the approach should be applied selectively to those areas of infrastructure where it has a proven potential to contribute. The experience of countries in SSA during the past two decades has been mixed. In mobile telephony, power generation, civil aviation and ports, the private sector has made substantial financial contributions; but in sectors such as roads, power distribution, and water and sanitation services, the contributions have been more limited. In the case of roads, for example, traffic volumes have not been large enough to generate acceptable returns for private investment in the upgrade of trunk roads with toll-type arrangements for cost recovery. Experience has shown that an average

volume of 15,000 vehicles a day is required for financial viability of such tolling arrangements – a traffic volume that is not likely to be met on any trunk roads in South Sudan for quite some years to come.

Presently, private sector provision of infrastructure services is limited to mobile telephony, river transport services, and of course, road transport. (See Chapters 7 and 10 for further discussion of these services.) As the analysis in Part 2 of this Report indicates, in the decade ahead the best prospects for private sector participation in provision of infrastructure services are in telecommunications, power generation, port operations and civil aviation. As Table 3.1 indicates, the Report proposes mobilization of about \$3 billion of private investment during 2011-2020 for the Action Plan for Infrastructure. The largest amounts are for electric power, communications, irrigation and water supply and sanitation. Modest amounts are proposed for river transport and ports, and civil aviation. Among these activities, PPP-type arrangements will be most applicable for the power sector (using take-or-pay type contracts), and water transport, civil aviation and perhaps water supply and sanitation using some form of concession agreements. In the case of communications, private investors will own the assets and provide services direct to the public under an appropriate regulatory framework established by the government. In the case of irrigation, the investors will own and operate these facilities for private production of agricultural products, with government providing oversight on the utilization of these water resources.

International experience indicates that successful PPP programs require good public sector management systems, and especially transparent tender processes and enforceable contracts, the use of transactions advisors, minimal political interference, and a relationship of trust between the public and private sectors. South Sudan can benefit from the experience of other countries in developing successful PPP-type programs. Given the limited experience within South Sudan in negotiating PPP-type contracts, the Government will need to make use of teams of transactions advisors. Depending on the complexity of the proposed projects, these teams may include lawyers, financial specialists and technicians who would advise and assist the Government in the design and negotiation of PPP-related contracts, including take-or-pay contracts for the storage and transport (by pipeline or canal) of water, and power generation, and concession agreements for provision of railway and aviation services. An amount of \$64 million (at 2010 constant prices) is proposed to cover the cost of these teams.¹⁸

¹⁷ Internal governance relates to structures within the service provision utility, such as the extent to which its structure approximates standard corporate forms; the qualifications and autonomy of its senior management and board of directors; the nature, quality, and timeliness of the information it submits to its overseers; and the adoption of accounting and disclosure standards. External governance refers to external market disciplines: being subject to private rather than public sector accounting and auditing systems, contracting out non-core activities to private providers, and being obliged to raise debt or equity funds on domestic or international private capital markets.

¹⁸ Experience from the United Kingdom, which has had a large program of PPP-type private investments, suggests that the cost of these transactions teams are likely to be in the range of 2% of the capital cost of the projects.

3.5.5 Strengthening the Regulatory Environment

Regulation of activities in the various infrastructure sectors is at an early stage in South Sudan. One of the important challenges for the medium-term is to strengthen the regulatory framework of the country. To complement the designing of its regulatory framework initiatives, South Sudan can draw on a rich background of information and analysis of international experience over the past 50 years from both advanced industrial countries and middle and low income developing countries.

Some guiding principles for regulatory reform. International experience suggests that an essential element of an effective regulatory framework for the development of adequate backbone infrastructure in a liberalized competitive environment is to place the responsibility for regulation in an agency with the required independence, autonomy, expertise, and accountability. The agency must protect the interests of both users and investors, and must do so in a fair and transparent manner. The standard recommendations for the creation of such an agency are straightforward and revolve around the following three broad principles: (i) the regulator's sectoral breadth of authority; (ii) the desirable qualities of a regulator; and (iii) the division of labor between the regulator and the government. These principles have provided a basis for

proposals and recommendations related to regulatory reform that are set forth in this Report.

The regulator's sectoral breadth of authority can be industry-specific such as rail and electricity; sector-specific such as transport as in the case of Argentina and Peru; or multi-sectoral with a single regulatory agency for all or most infrastructure sectors as in Australia, Canada, Costa Rica and Jamaica. In the case of transport, it is often the case that a single government ministry is responsible for the sector, in which case a regulatory agency with the same coverage can be appropriate.

In determining the desirable qualities of a regulator, a few minimum requirements must be addressed for regulation to be successful. These include independence with a reasonable amount of discretionary powers; autonomy and expertise; and accountability. Regulators should have an arm's length relationship with ministries and with the business entities in the sectors being regulated and they must have a degree of discretion in making decisions. The rules pertaining to the role and responsibility of the regulator must be clearly spelt out in the charter or contract that establishes the regulatory agency. Autonomy can be facilitated by ensuring that the regulatory authority has access to its own sources of funding, and is not dependent on annual transfers from the national budget. In monitoring compliance and enforcement, the regulatory authority must be able to impose penalties according to clearly defined rules.

Table 3.8: Illustrative Division of Labor Between Regulator and Government

Features	Government	Regulator	Other entities
Legal framework and sectoral policy Planning Privatization design Decisions on taxes and subsidies Concessions and procurement auctions			
Pricing policy Control and penalties Technical regulation			
Quality standards Environmental regulation Safety Health Antitrust policy			

Source: Reported by Estache and de Rus (2000), p.48.

The effectiveness of a regulator also depends on the clarity with which the sector responsibilities have been divided between a regulator and other government agencies. Table 3.8, which was devised by Estache and de Rus (2000), provides some practical guidelines for such division of responsibility. They noted that the suggested framework entails a degree of subjectivity and that adjustments are needed for country-specific circumstances; for example, should the regulatory agency be involved in the design of privatization and concession contracts because it would have the main responsibility for overseeing implementation of these provisions.

Current situation in South Sudan. Table 3.9 provides a summary of the current arrangements for regulation of infrastructure services. With the exception of the newly established South Sudan Roads Authority, responsibility regulatory oversight rests with the same ministries that are responsible for service provision. In the case of water

supply and sanitation these responsibilities are also shared with state and county authorities. The basic findings of this Report are: (i) for the most part there is no clear separation of responsibilities for service provision and regulation; (ii) the legal framework that establishes the basis for regulation of infrastructure services is weak or unclear; and (iii) ministries, and in the case of water supply and sanitation, state and county entities, have little or no capacity to fulfill their regulatory responsibilities. Development of these regulatory capacities poses a major challenge for the country.

Proposed new arrangements. The Government has already embarked on a number of initiatives aimed at strengthening the regulatory framework for infrastructure-related services. The proposed Action Plan set out in this Report builds on these various initiatives and proposes an overall game plan for the further development of these regulatory responsibilities in the decade ahead.

Table 3.9: Existing Institutional Arrangements for Regulation of Infrastructure-Related Services

Sector	Service provider	Entity responsible for regulation			
		Regulatory entity	Governing Board	Autonomy in decision-making	Reporting arrangements
Water re-sources management	Directorate of Water Resources Management		No		Minister of Water Resources and Irrigation
Irrigation	Directorate of Irrigation and Drainage		No		Minister of Water Resources and Irrigation
Electric power	South Sudan Electricity Corporation	Directorate of Regulation	No		Minister of Electricity and Dams
Road transport infrastructure	South Sudan Roads Authority		Yes		Minister of Roads and Bridges
Road transport services	Ministry of Transport		Yes		Minister of Transport
River transport and ports	Directorate of River Transport		No		Minister of Transport
Railways	Directorate of Railways		No		Minister of Transport
Civil aviation	Directorate of Civil Aviation		No		Minister of Transport
Urban water supply	South Sudan Urban Water Corporation & state & county bodies		No		Minister of Water Resources & Irrigation & state & county bodies
Urban sanitation	Ministry of Housing & Physical Planning, & Ministry of Health		No		Minister of Housing & Physical Planning, & Minister of Health

Sector	Service provider	Entity responsible for regulation			
		Regulatory entity	Governing Board	Autonomy in decision-making	Reporting arrangements
Rural water supply	Local government councils		No		State and county bodies
Rural sanitation	Local government councils		No		State and county bodies
Telecommunications & postal services	Ministry of Telecommunications and Postal Services	Directorate of Telecommunications	No		Minister of Telecommunications and Postal Services
Information and broadcasting	Ministry of Information and Broadcasting	Directorate of Southern Sudan Radio and TV, and Directorate of Public Information	No		Minister of Information and Broadcasting

Source: Sectoral chapters in Part B of this Report.

In the case of water resources management there is no clear regulatory framework in place that can govern the use of the country's water resources. A substantial amount of work is needed to establish a sound basis for government oversight of the use of these resources.

As Chapter 5 indicates, authority over water resources at the national and local levels needs to be clarified, and coordination of governance arrangements among public and private entities and local communities needs to be strengthened. As one of the ten riparian countries of the Nile Basin, South Sudan is both an upstream country vis-à-vis Egypt and Sudan, and a downstream country with respect to the other seven riparian states (Burundi, DRC, Ethiopia, Kenya, Rwanda, Tanzania and Uganda). The country is at the heart of the complexities associated with the Nile Basin Initiative (NBI) and the related transboundary water management of the River represents an extraordinary challenge. The recent independence of South Sudan and its ambitious plans for the use of the water resources for irrigated agriculture and for large-scale hydropower projects on the White Nile put it at the center of the ongoing dialogue among the ten riparian countries. At this point there is a serious lack of detailed information about the amount of internal renewable water resources of the country and their annual variability; and the inflow, disappearance and outflow of external water resources associated with the Nile River. The Report therefore proposes that a substantial amount of work be undertaken to assess these water resources as a matter of priority. The results of these assessments can then provide a foundation for proposals for domestic development of these resources in a manner that is acceptable to the other riparian states. The eventual regulatory measures that may emerge from

this work may include, for example, creation of a national water resources regulatory authority with responsibility for the issue of water permits or water rights to various types of users within the country.

In the case of the power sector, a draft Electricity Bill is currently before Parliament. This Bill provides for the creation of the South Sudan Electricity Regulatory Authority (SSERA) that will be responsible for licensing and regulation of the generation, transmission, distribution and supply of electricity within South Sudan. The activities of SSERA will be overseen by a Board of Directors, but SSERA will report to the Minister of Electricity and Dams. Board members will be appointed by the Council of Ministers on the recommendation of the Minister of Electricity and Dams. Measured against the general principles outlined above, the main concern with these arrangements will be the degree of independence of the Board. Consideration could be given to enhancing the independence of the Board. This will avoid potential conflicts of interest between the Ministry of Electricity and Dams as a service provider and SSERA as the regulator also reporting to the Minister. International experience suggests that enhanced independence of the regulator will also enhance the confidence of potential investors and facilitate the mobilization of private investment in power generation.

In the case of the transport sector, the current approach in South Sudan appears to be aimed at creating separate regulatory entities for each sub-sector. This Report calls for a reconsideration of the approach in favor of creating a single regulatory authority that will be responsible for the entire transport sector, including roads, rail, river ports

and civil aviation. Creation of a single regulatory authority for the transport sector is not uncommon: for example, countries as diverse as Brazil, Argentina, Tanzania, and Singapore are served by authorities with broad sectoral responsibilities for regulation within the transport sector. New legislation will be required to create the proposed authority. In the event that the Government decides to set up a single regulatory authority for the transport sector, a detailed business plan will need to be prepared prior to the drafting of new legislation and supporting regulations. The business plan will set forth proposals for the structure of the authority, the specifics of the authority's responsibilities, staffing requirements for various units within the authority, and funding arrangements.

In the case of water supply and sanitation, concerted efforts are needed to develop the overall framework for water supply and sanitation services in the country. As Chapter 9 indicates, in 2011 the Government adopted the Water, Sanitation and Hygiene Strategic Framework, which serves as a roadmap for the further development of institutional arrangements for the sector. The paper recognizes the challenges pertaining to institutional fragmentation within the sector and calls for streamlining the responsibilities of all relevant institutions. It proposes two institutional initiatives: (i) creation of a Water Council to provide advisory services to national, state and country governments; and (ii) creation of a Water Supply and Sanitation Board at the national level to develop and enforce regulations for water supply and sanitation services. A first critical step in developing an appropriate institutional framework for the sector will be the preparation and promulgation of a Water Act for the country.

In the case of the communications sector, the substance of ICT regulation around the world has evolved rapidly in recent decades in response to advances in communications technologies. The liberalization of ICT markets has stimulated cumulative interacting innovations in products, services and technologies with a general convergence or blurring of distinctions between platforms, products and services. In South Sudan, the current thrust at the national level is to retain the current separation of regulatory responsibilities for telecommunications and postal services from that for information and broadcasting. Regulatory responsibilities at the state level are managed separately by state government entities. As Chapter 10 indicates, practice varies among Sub-Saharan countries regarding the design of regulatory responsibilities for ICT services (see Table 10.1). A number of countries, including Malawi and Rwanda, have established a single regulator for

telecommunications and broadcasting services. As noted earlier, the Report suggests that almost \$800 million of new investment by the private sector will be required in the decade ahead to bring ICT services to levels comparable to other countries in the region. Mobilization of this amount of funding will require that the regulatory framework for the sector is transparent and uniform with no duplication and overlap of responsibilities. Given the growing integration of communications services around the world, the proposed regulatory framework in South Sudan will need to promote competition among telecommunications and broadcast service providers.

3.5.6 Technical Support for the Program

Given the current limited capacities in many parts of government, an important part of the proposed program is support for capacity building, supporting technical services, and various technical studies. These activities are designed to improve capacities within the country to plan and implement major infrastructure programs and projects, and strengthen the operating environment for infrastructure-related investment and service provision by the business community. The various components of the proposed program of capacity building for the decade ahead are discussed in previous sections of this Chapter and in the various chapters in Part B of the Report.

Capacity building programs. Table 3.10 provides a summary of the proposed expenditures for capacity building and technical support, the total cost of which is estimated at about \$380 million for the decade as a whole. The bulk of the outlays are for capacity building in the individual sectors, but the Action Plan also calls for a number of initiatives that cut across all of the individual sectors (these are the national government programs referred to in Table 3.10). The details about these initiatives are discussed elsewhere in this Chapter. These include support for capacity building in the review and prioritization of infrastructure related projects and programs that are proposed for funding by the government or by the donor community, support for a major push to restructure and upgrade the performance of existing and proposed new state enterprises, as well as support for building the capacities of existing and proposed new regulatory authorities. In addition, the program makes provision for some \$60 million to finance transaction advisory services.

Table 3.10: Expenditures for Proposed Program of Capacity Building
(\$ millions at 2010 constant prices)

Program	Estimate	Projected						Total
	2010	2011	2012	2013	2014	2015	2020	2011-20
National government programs								
Review of project pipelines & priorities	-		1.0	1.0	1.0	1.0		5.0
Build regulatory capacities			1.5	1.5	1.0	1.0		7.0
Restructure and strengthen state enterprises			1.0	1.5	1.5	1.0	0.5	7.5
Transaction advisory services			0.5	5.0	8.0	10.0	5.0	63.5
Sub-total	-	-	4.0	9.0	11.5	13.0	5.5	83.0
Water resource management	2.7	2.0	2.3	2.0	1.7	1.2	1.2	16.4
Irrigation & agriculture infrastructure	-	-	-	2.0	2.0	2.0	-	10.0
Transport sector								
Roads	5.7	5.3	7.0	5.7	4.0	2.8	2.5	37.6
River transport and ports	-	-	0.6	0.5	0.5	0.5	0.1	3.2
Railways	-	-	0.3	1.2	0.5	-	-	2.0
Aviation	-	-	1.3	2.1	1.1	1.5	0.5	10.2
Sub-total	5.7	5.3	9.2	9.5	6.1	4.8	3.1	53.0
Electric power programs	-	-	3.8	4.7	4.2	3.1	3.0	30.7
Water supply and sanitation	0.7	3.2	19.6	34.5	34.7	30.3	2.0	151.9
Communications	3.9	2.9	7.1	4.8	3.6	2.3	2.3	32.2
Total	13.1	13.3	46.0	66.6	63.8	56.6	17.1	377.2

Source: Estimates by authors for the «National Government programs» and Annex Table 3.5.

As Table 3.10 indicates, the bulk of the spending on capacity building takes place during 2012-2015. A high priority is attached to early action that is required to build capacities at the national and state levels to design and oversee implementation of this ambitious development program for infrastructure. Delays in launching these capacity building programs will inevitably slow the design and implementation of the proposed investment of \$13.3 billion in rehabilitation and expansion of the basic infrastructure network of the country that is proposed in this Report.

Technical studies. In addition to these capacity building and technical support initiatives, the Action Plan proposes a series of technical studies in the various sectors that will collect basic information about the sectors (for example,

available water resources, road and air traffic flows), evaluate options for proposed infrastructure investments and related economic and financial costs and benefits, and fund the early stages of project identification and preparation. The various chapters in Part 2 of this Report provide detailed listings of the studies that will be required. Table 3.11 provides a summary view of the funding that will be required for this part of the program. A total of \$128 million (at 2010 constant prices) will be required for the various technical studies identified in this Report. About \$70 million will be required for the transport sector program, largely for engineering studies and technical design work for the proposed roads program, as well as basic collection such as regular traffic counts on the trunk roads of the country and in urban areas.

Table 3.11: Expenditures for Proposed Program of Technical Studies
(\$ millions at 2010 constant prices)

Program	Estimate	Projected						Total
	2010	2011	2012	2013	2014	2015	2020	2011-20
Water resource management	-	1.6	1.6	2.2	3.4	3.2	-	14.9
Irrigation for agriculture	-	-	0.5	3.5	1.5	-	-	5.5
Transport sector								
Roads	0.3	0.7	9.3	19.0	8.0	6.0	-	45.2
River transport and ports	1.1	0.8	4.0	1.0	2.0	3.0	-	10.8
Railways	-	0.6	1.0	1.0	3.0	3.0	-	8.6
Aviation	-	-	1.5	1.5	-	-	-	3.0
Sub-total	1.5	2.1	15.8	22.5	13.0	12.0	-	67.6
Electric power programs	-	0.8	5.6	4.6	4.6	-	3.0	30.6
Water supply and sanitation	-	-	0.2	1.0	1.5	0.4	-	3.5
Communications	-	-	2.2	1.9	0.6	0.3	0.2	5.9
Total	1.5	4.5	25.9	35.8	24.5	15.8	3.2	128.0

Source: Annex Table 3.5.

As with the capacity building initiatives, the Action Plan calls for an early launch of these technical studies as the information collected will be essential to policy decisions for individual sectors and it will also be central to the conduct of environmental and related assessments, the design of individual infrastructure programs and projects and the subsequent evaluation of the economic and financial costs and benefits of these proposed programs.

3.6 Implementation of the Action Plan

Successful implementation of the proposed infrastructure program will require close attention to the sequencing and coordination of actions across multiple fronts and in a phased manner. Table 3.12 sets out an indicative set of timelines for implementation of the proposed Action Plan.

3.6.1 Overall Management of Program Implementation

Successful implementation of the proposed Infrastructure Action Plan requires a carefully phased approach. There are three sets of priorities for the program:

- The first requirement is early action to strengthen the operating environment within which infrastructure assets will be created with public and private investment

as well as promote the provision of infrastructure-related services by the private sector and by government entities.

- Early action is also required on a wide range of capacity building initiatives related to the policy, regulatory and institutional environment within the public sector at both the national and sub-national level. Of particular importance is the urgent need to build the capacities of government entities to design and implement the proposed infrastructure programs.
- The Infrastructure Action Plan includes a large number of specific programs and projects to be designed and implemented in the decade ahead. Successful implementation of the program requires that there is an early start on the prioritization of these individual projects and programs and that detailed technical studies, where required, are undertaken as soon as possible, followed by feasibility studies and detailed project design and funding arrangements.

Without early progress on all three of these fronts, the risk is that there will be significant delays in mobilizing the required funding from the international donor community and potential private investors. Delays in improving the operating environment, for example, will result in continued uncertainty among potential private investors that will heighten investor perceptions about the risks involved in making major commitments in South Sudan. Comparable opportunities elsewhere in

Sub-Saharan Africa and other regions of the world will be viewed by potential investors as more attractive. Delays in mobilization of these resources will then create problems in the national and sub-national budget processes regarding priorities for public funding of the infrastructure

program. Successful implementation of the proposed program will require a close partnership that involves the national government, state enterprises, state and local governments, the international donor community and the private sector.

Table 3.12: Proposed Schedule for Implementation of the Infrastructure Action Plan

Activity	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Operating environment											
Strengthen regulatory environment											
Restructure state enterprises											
Improve operating environment for private investment											
Design & launch programs to promote domestic supply responses											
Award & implement PPP-related private investment contracts											
Capacity building at national & sub-national level											
Strengthen procurement procedures and capacities											
Strengthen line ministry project design & execution capacities											
Infrastructure development programs											
Technical studies											
Rehabilitation of existing facilities											
Investment in new capacity											
Water resources management											
Irrigation											
Transport											
Roads											
Ports											
Railways											
Civil aviation											
Electric power											
Water supply and sanitation											
Communications											

Source: estimates by authors.

3.6.2 Overview of the Program Implementation Schedule

Table 3.12 provides an indicative set of timelines for implementation of the proposed Action Plan. It provides details for the schedules required for the actions on the operating environment, on capacity building, and on the design and implementation of the proposed investment program. The Report proposes that the improvements in the operating environment are completed by 2015, thereby laying the foundations for a subsequent build-up in private investment in infrastructure assets and related services. It proposes that there is an equally large push on capacity building at the national and subnational levels during 2011-2015. As Tables 3.10 and 3.11 indicate, about \$350 million of the proposed \$500 million of capacity building and technical support – equivalent to 70% of the proposed program – is scheduled for disbursement during 2011-2015.

As Table 3.12 indicates spending on the technical studies needed for project identification and design, environmental assessments and so on will continue through the entire decade. However, the rehabilitation of existing infrastructure assets will be complete by 2015. Investment in new capacity will be an ongoing process for the entire decade, although in some sectors construction activities will only begin after detailed feasibility studies are completed in the next year or two.

A major concern of the Government is that to date the bulk of the infrastructure rehabilitation and upgrading has been funded and implemented outside the institutions of the state. The Government has indicated that increasingly in future investment in infrastructure will be prioritized and coordinated through national and state planning and budget frameworks. Funds for infrastructure programs will increasingly flow through the public financial management systems. As an interim measure, the Government has proposed the formation of the Rapid Infrastructure Development Fund (RIDF) for South Sudan.⁴⁵ The proposed Fund will be designed to channel funds from donors, multilateral banks, foundations and the government's own resources to priority investment programs in energy, water and sanitation, transport and telecommunications infrastructure. The Government proposes that donor funds be pooled in a common fund that will be managed jointly with representatives of the contributors to the Fund. Consideration is also being given to the creation of a Road Fund to finance road maintenance and some investment. The position taken in this Report is that the Road Fund will be managed separately from the RIDF.

Successful implementation of this ambitious program for development of the basic infrastructure of the country will require effective strategies for dealing with the wide range of risks and uncertainties that typically confront a program of this kind. These challenges are detailed in Chapter 4.

¹⁹ See Ministry of Finance and Economic Planning (2011), Development of Aid Instruments in South Sudan: The Rapid Infrastructure Development Fund. Ministry of Finance and Economic Planning Concept Paper, Juba, Revised Draft, December 4, 2011.