



## U.S. Mission to Afghanistan

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# *Afghanistan USG Power Sector Update*

*5 August 2004*



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# Overview

- Power Sector Facts
- Challenges
- International Consensus
- USG Energy Priorities
- Related Donor Activities
- Funding Gaps
- Proposed Actions



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# *Power Sector Facts*

- Hydro-electricity is predominant power source
- Only 4-6% of population has access to electricity, one of the lowest in the world
- Approximately 30% of legal customers reside in Kabul
- Kabul, Mazar-e-Sharif, and Kandahar regions are top three concentrations of energy consumers
- Unknown number of customers illegally connected to public grid or own individual generators



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# Challenges

- Damaged Physical Infrastructure
- Lack of System Coverage over Most of Country
- Weakened Ministry and Utility Capacity and Staffing Resources
- Rugged Topography and Long Distances Drives Up Costs
- Dependence on Hydro-electricity Increases Drought Impacts
- Unclear Legal Framework for Direct Private Investment in the Sector



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### Kabul Region\* Power Balance:

- Total Estimated Potential Load: 260 MW
- Current Supply: 110 MW
- **Estimated Deficit: 150 MW**
- Reduced Economic Activity due to Shortfalls: > \$100 million/year

### Kandahar Region\*\* Power Balance:

- Total Estimated Potential Load: 60 MW
- Current Supply: 28 MW
- **Estimated Deficit: 32 MW**
- Reduced Economic Activity due to Shortfalls: > \$30 million/year

\* Kabul and Jalalabad

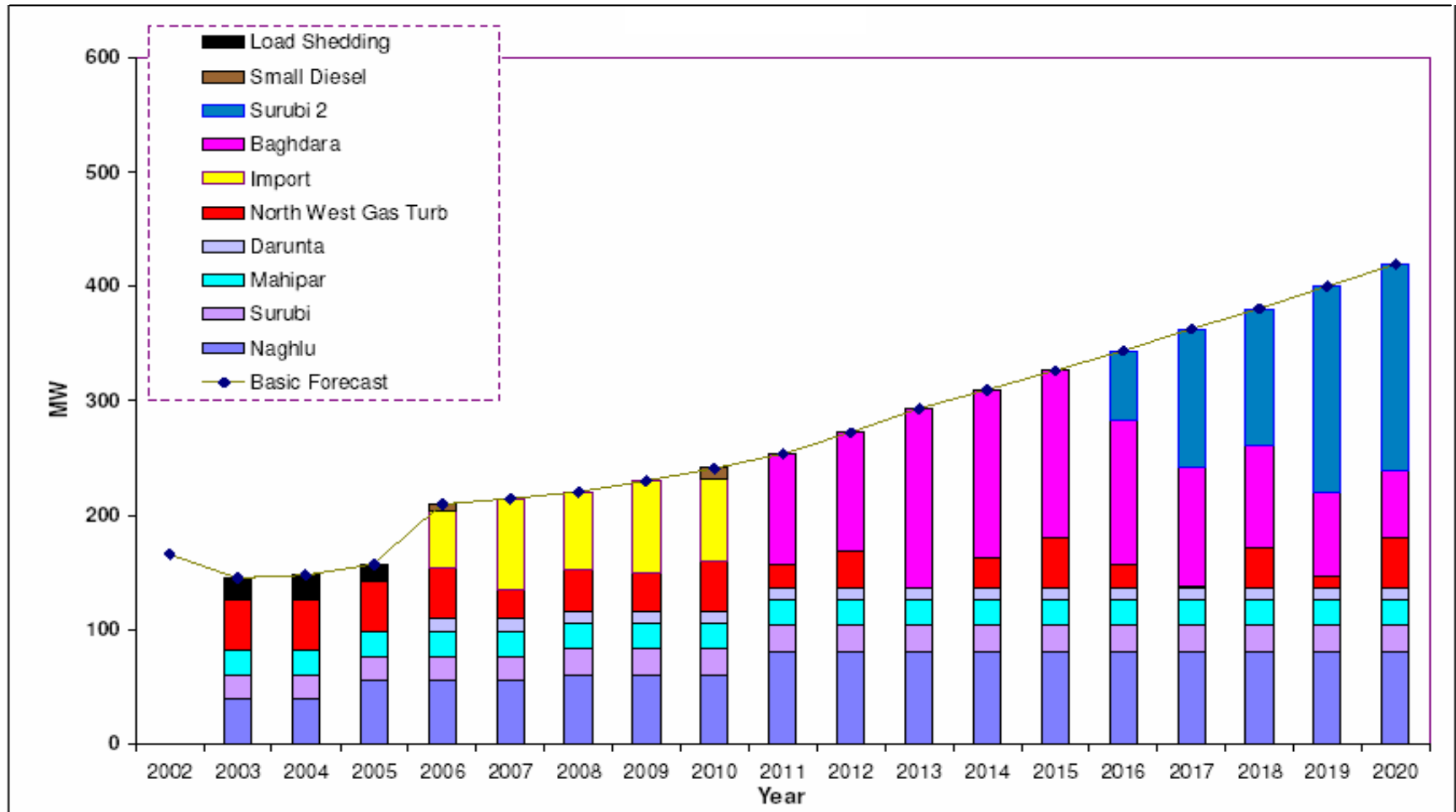
\*\* Kandahar, Lashkar Gah, and Grishk (Helmand River Valley)



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Imported Power from Uzbekistan is the Key to Meeting Power Demand in the Kabul Region, but Diesel Supplies are Needed in the Interim

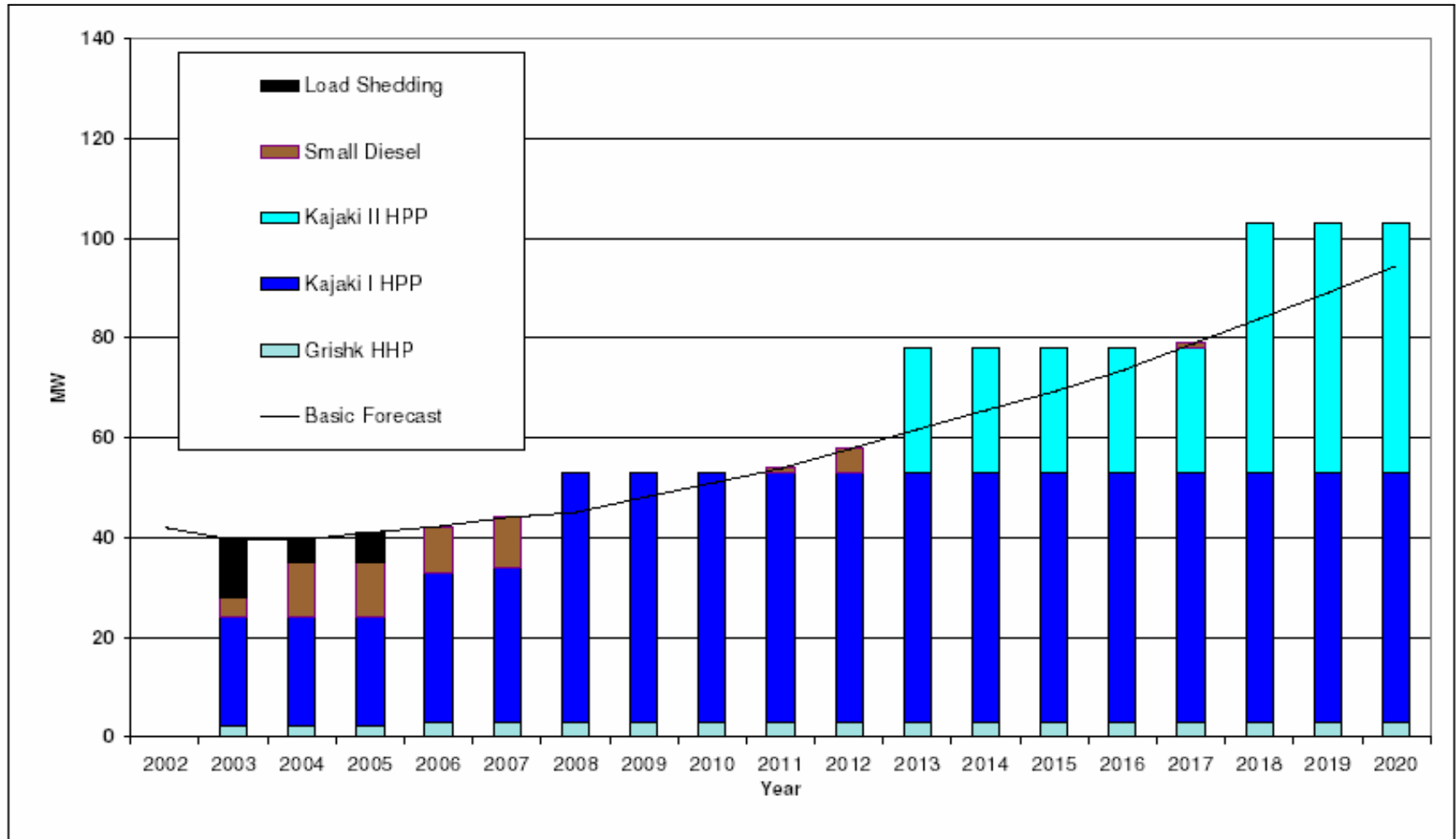




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Power from the Kajakai Hydroelectric Facility is Critical to Meeting Power Demand in the Kandahar Area, with Diesel Supplies in the Interim





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### *International Consensus on Power Supply Priorities*

- **REHABILITATION:** Key power generation, transmission, and distribution facilities must be repaired to maintain essential services.
- **IMPORTS:** Power imports from neighboring countries, particularly Uzbekistan, are needed to provide power to Kabul region.
- **NEW GENERATION:** New generation facilities (e.g., Sheberghan gas-fired plant near Mazar-e-Sharif) will create future domestic options.
- **INSTITUTIONAL DEVELOPMENT:** Rebuilding of key power sector institutions needed to sustain operations and maintenance of donor and Afghan invested services.





# Current USG Energy Priorities

1. Essential Fuel Supplies (Kabul and Kandahar)
2. Power Rehabilitation (Kandahar, Jalalabad)
3. New Power Generation (Kandahar Third Turbine Unit)
4. Feasibility Studies for New Generation (e.g, Sheberghan)
5. Institutional Development for Power Entities





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### **Kandahar Region USG Activities**

- Supplying Emergency Diesel Generators and Fuel in Kandahar, Qalat and Lashkar Gah (~\$1.1 million/month) Leasing for Kandahar is about \$300K/month [funded through 11/04]
- Rehabilitating Kajakai Hydro-Electric Plant Turbines 1 & 3 (cost: \$15 M) (funded)
- Installing Kajakai Hydro-Electric Plant Turbine 2 & raise water level (cost: \$25 M) (partially funded w/\$12 M)

### **Kabul Region USG Activities**

- Supplying Diesel Fuel to Kabul's Gas Turbines (cost: \$1.5-2.5 million/month) [funded through 11/04]
- Rehabilitate Darunta Hydro-Electric Power Plant near Jalababad (cost: \$16 M) (partially funded w/\$4 M)

### **National Level USG Activities**

- Strengthen Government of Afghanistan's Capacity to Operate and Maintain Power Infrastructure (cost: \$10 M) (partially funded w/\$1 M)



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### Related Donor Activities

#### Asian Development Bank

- Rehabilitation of transmission lines & substations in Northern Provinces
- Rehabilitation of Kabul distribution system
- Electricity Service Delivery Improvements (deter illegal connections)
- Load Dispatch center for Kabul
- **Rehabilitate Uzbekistan to Pul-i-Khumri Transmission Line (\$12 M shortfall)**

#### Government of India

- **Rehabilitate Pul-i-Khumri to Kabul Transmission Line (work proceeding slowly and a funding shortfall of up to \$50 M has emerged)**

#### Germany (KfW) -- Implementer also of Funds From the European Commission, and the Afghan Reconstruction Trust Fund (ARTF)

- Rehabilitation of the Kabul Region Transmission and Distribution Electric Grid
- Rehabilitation of Hydropower Plants Mahipar & Sarobi Serving Kabul
- **Replace Transmission Line from Kajakai to Kandahar/Lashkar Gah (\$35 M, Germany backed off this commitment because of security concerns)**

#### International Development Association/World Bank

- Distribution system repair in Kabul and 6 provincial cities
- Re-commission NW Kabul gas turbine plant
- Rehabilitate Naghlu hydroelectric station that serves Kabul



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### *FY05 Funding Needs*

- Additional diesel fuel supplies (Kabul/Kandahar): \$ 30 M
- Complete Kajakai Hydro work (Unit 3, raise water level): \$ 13 M
- Darunta Hydro rehabilitation (Jalalabad): \$ 12 M
- Critical Electric Utility (DABM) development support: \$ 9 M

**TOTAL = \$64 Million**

- Transmission line Kajakai-Kandahar-Lashkar Gah: \$ 35 M  
[If Germany Fails to Meet its Commitment]



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### *Proposed Actions*

- Press the Indians to accelerate the Pul-i-Khumri to Kabul transmission line and provide additional funding (\$50 M)
- Seek Other Donor Assistance to fill the funding gap for the Uzbek to Pul-i-Khumri transmission line (\$12 M)
- Encourage Germany to fulfill its commitment to rebuild the Kajakai to Kandahar/Lashkar Gah transmission line (\$35 M)
- Consult with the ADB, World Bank, and other donors on putting forward more resources



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*Questions?*



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### *2004-2006 Power Supply Priorities* *(Afghanistan Development Forum)*

- Rehab of existing hydro-plants.
- Reliable operations of gas turbines in Kabul.
- Construction of a third power generation unit at Kajakai Power Plant.
- Import electric power from Uzbekistan & Tajikistan to supplement domestic supply.
- Construction of new combined cycle capacity in Sheberghan based on natural gas.
- Construction of the Baghdara hydro-plant, possibly followed by Sarobi 2.
- Install small diesel generation in various cities for which no alternative for electricity is available (Possibly Private Sector).



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### *2004-2006 Power Supply Priorities* *(Afghanistan Development Forum)*

- **The Afghan government plans on creating an additional 730,000 connections by 2010**
  - **Urban areas - 27% to 77% by 2010**
  - **Country wide – 6% to 25% by 2010**
- **World Bank estimates say such a program would cost ~\$1.7 billion (2003 to 2010).**





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# Power Sector Key Donors Beyond USAID

### **Asian Development Bank (\$41M)**

- Rehabilitation of transmission lines in Northern Provinces
- Reconstruction of Khulm & Pul-e Khumri substations & transmission
- Rehabilitation of Kabul distribution substations, junctions, transformers, equip cables, and material
- Electricity Service Delivery (deter illegal connections)
- Load Dispatch center for Kabul
- Asset management and customer management

### **International Development Association/World Bank (\$15.5M)**

- Distribution materials for Kabul & 6 provincial cities
- Supply of essential tools & equipment
- Re-commission NW Kabul gas turbine plant
- Rehab of Naghlu hydro station
- Technical assistance for power sector Master Plan

### **KfW Implementer with Funds From Germany, the European Commission, and the Afghan Reconstruction Trust Fund (ARTF) – (Euro 46.65M)**

- Rehabilitation of Kabul Region Electric Grid (Euro 16.1M)
- Rehabilitation of of Kabul Region Electric Grid (Euro 9 M)
- Rehabilitation of Hydropower Plants Mahipar & Sarobi Serving Kabul (Euro 15M)



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### **USAID Program Built on Following Foundation**

- Program is to focus on repairing selected power generation facilities and on fuel supplies for the Kabul region as first priorities – efforts are to be coordinated with other donors working on generation facilities and taking the lead on transmission and distribution facility repair and rehabilitation.
- Reorganizing the institutions in the power sector, with a critical emphasis on revenue management and enhancement in cooperation with other donors is the second priority to sustain the improvements in facilities and services.
- The third priority is to expand future options through timely feasibility studies of prioritized new generation facilities (e.g., the Bagdhara hydro) and assessments of oil & gas and coal resources in concert with other donors.



**Total Funding  
\$85M**

**A. Helmand River Valley Power Supplies**

[> 31,000 residential & 5,500 other customers benefit]

[> Keep lights on, erase deficit, support future economic growth]

***Part 1 – Provision of Emergency Power Supplies***

- Lease Kandahar Diesel Gensets/Fuel (\$14.85M)
- Purchase Lashkar Gah Diesel Gensets/Fuel (\$4M)
- Purchase Qalat Diesel Gensets (\$2M)

***Part 2 – Rehab Kajakai Hydro Repair of 2 X 16.5 MW units  
(\$10-\$12M)***

***Part 3 – Expansion of Power Supplies***

- Rehab Kandahar Soviet Diesel Gen Set of 2 X 3.5 MW units (\$2.5M)
- Kajakai Hydro – New 3 rd unit 18.5 MW Turbine /Gen Set (\$17M)
- Kajakai Hydro Phase II – New 50-100 MW Power House Study (Un-funded))



## **B. Kabul & Jalalabad Area Fuel & Power Supplies**

[77,000 residential & 5,900 other customers benefit]

[Keep lights on while Uzbek-Kabul line erases deficit, support growth]

### ***Part 1 – Winter Fuel Supplies for the North Kabul Power Plant***

- 2003-2004 winter fuel for 2 X 22.5 MW Plus Summer 04 Hydro Cons (\$15M)

### ***Part 2 – Rehab the Darunta Hydro Facility***

- 3 X 3.8 MW Units (\$4M)
- Repairs & Preventive Maint Program

### ***Part 3 – Expansion of Power Supplies***

- Sheberghan & Mazir-e-Sharif Thermal Power project
  - 125 MW project feasibility Study (Un-funded)
  - Oil/Gas/Coal Resource Assessment (\$5 million)



## **C. Restructuring of The Power Sector**

**[Strengthen institutions & financial base to sustain services]**

***Part 1 – Power Sector Restructuring Roadmap***

***Development & Implementation.***

***Part 2 – Revenue Enhancement & Management (\$1 million)***



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### *USAID Program Assumptions/Dependencies*

- **USAID is assuming that KfW will honor its commitment to building a new transmission line from the Kajakai Hydroelectric Plant to Kandahar and Lashkar Gah and to refurbish the existing line. These transmission facilities are needed to transmit power from Kajakai to the load centers, especially the power from the new 3<sup>rd</sup> turbine unit.**
- **USAID (and other donors) are assuming that the Asian Development Bank (ADB) will complete its repair of the Uzbekistan to Pul-i-Khumri transmission line, and that the Indian Government will build the transmission line from Pul-i-Khumri to Kabul, thus allowing the power deficit in Kabul to be overcome in 2006.**
- **The ADB, working with the US Trade & Development Agency and the US Geological Survey, will complete its assessment of the natural gas reserves and resources at Sheberghan, and that these will turn out to be sufficient to support a gas-fired power plant.**
- **Funding will continue beyond 11/04 for essential fuel in Kabul and Kandahar.**



### *Kabul & Jalalabad Activities*

- **NW KABUL GAS TURBINES**

- > Supply diesel fuel; \$1 million/month (funded to 11/04)
- > Supply needs to continue through mid 2008 (unfunded)
- > Need O&M, consumables & spares, training (partially funded)

- **DARUNTA Hydro – multipurpose project**

- > Power supply to Jalalabad; ~ 12 MW
- > Assessment completed
- > Refurbishment needed now \$4 million; have \$2.5 million
- > Within 5 years will need additional refurbishment about \$12 million (high cost)



# *Power Sector Restructuring Activities*

- **NEW MINISTRY OF ENERGY**

- > Support the establishment and structuring of the new ministry (funded)
- > Develop institutional and regulatory framework (partially funded)
- > Restructuring and development of DABM (partially funded)
- > Development and pre-commercial exploitation of primary energy resources (gas, coal and hydro – not funded)

- **REVENUE MANAGEMENT**

- > Large customer revenue collection in Kabul
  - > Expand the program to other cities (partially funded)
  - > Install meters where needed (funded)
  - > Initiate institutional development (partially funded)
  - > Expand training (partially funded)





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### *Outstanding Issues/Concerns (con.)*

- **The Indians are starting very slowly on this critical project, delaying the completion of construction of the Pul-i-Khumri to Kabul transmission line from 2006 to 2008, and have indicated that they cannot cover increased cost (\$120 million versus \$70 million).**
- **The ADB has discovered that it underestimated the cost of repairing the Uzbekistan to Pul-i-Khumri transmission line (\$52 million versus \$40 million) , and is searching for additional Donor funding to fill the gap.**
- **Delaying the Uzbek to Kabul link requires additional donor funding to provide critical fuel supplies for the NW Kabul Thermal Station.**
- **Additional needs for local power are emerging (e.g., 4 MW for rebar factory outside Kabul to employ retired combatants & recycle military hardware as scrap).**



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### Opportunities – Significant Energy Potential

- Hydropower (large and distributed small systems)
- Natural Gas (was up to 2.5 million cubic meters/yr production)
- Coal (was up to 200,000 tons/year production)
- Renewables (solar, wind, geothermal)
- Import/Export Links to Iran, Uzbekistan, Tajikistan (12+ MW in use)
- Some Sound Partially-Completed Projects



## The Road Ahead

### *Current*

- Kandahar Emergency Generating Plant
- Lashkar Gah Emergency Generating Plant
- Qalat Emergency Generating Plant
- Kandahar Soviet Diesel Generating Plant
- Kajakai - Hydro Power Plant Turbine Refurb
  - Hydro Power Plant New Turbine
  - Dam Safety Assessment
  - Irrigation Diversion Valves
- Kabul Power Plant
- Fuel Supplies
- Power Station Operation & Maintenance

### *Next Step (2005-2007)*

- DABM "Commercialization"
- DABM Revenue Collection
- Imported Power
- Thermal Components (Mazar-e Sharif/Sheberghan)(+ Oil/Gas/Coal Assess.)
- Kajakai 2<sup>nd</sup> Powerhouse & Transmission
- Diesel Based Systems Throughout the Country
- NW Kabul GT Efficient Operation
- Donor Coordination

### *Future (2007-2010)*

#### *Build commercial capabilities*

- Government
  - Transmission Distro Reform
  - Hydro power
  - Regulate power
- Private -
  - Small hydro units
  - Diesel power units

USACE - under contract from USAID mapped significant portions of Afghanistan's electrical Grid Using the GIS database. This Information has been very useful To Ministries, USAID, and donors

**Current – Improve Availability & Reliability 2010 Goal – 77% Urban & 25% Country Wide**



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# *Related Donor Activities*

- **Revised Power Needs' Estimates**
  - Revised assessment of Kajaki Dam and Hydro-Electric Plant Costs (additional \$40 million needed)
  - Revised assessment of Darunta Hydro-Electric Plant costs (additional \$12 million needed)
  - Revised assessment of DABM needs (an additional \$9 million needed)
- **Donor Shortfalls**
  - Germany: Kajakai Hydro-Electric Plant to Kandahar/Lashkar Gah Transmission Line (\$35 million)
  - India: Pul-i-Khumri to Kabul Transmission Line (\$120 million)
  - ADB: Uzbekistan to Pul-i-Khumri Transmission Line (an additional \$12 million is needed)
  - As a result of shortfalls, US-funded fuel supplies need to be extended (\$30 million)
- **Increased Power Demands**
  - 4 Megawatts needed for rebar factory to employ reintegrated combatants (\$3 million)



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# *FY05 Critical Funding Needs*

- Complete Kajakai Hydro work: \$40 million
- Kajakai hydro to Kandahar/Lashkar Gah transmission line: \$35 million
- Additional diesel fuel (Kabul/Helmand): \$30 million
- Darunta Hydro repair (Jalalabad): \$13.5 million
- Critical DABM Institutional Support: \$10 million
- Emerging critical local power needs: \$22 million
- Possible co-finance Uzbek-Kabul Line: \$50 million

**TOTAL = \$200.5 million**