

**UEGCL PRESENTATION
EXECUTIVE EXCHANGE
PROGRAM ON DAM SAFETY,
ASSET MANAGEMENT AND
HYDROPOWER BEST
PRACTICES**

**UEGCL BOARD AND
MANAGEMENT**

OCTOBER 2019



UEGCL
Generating for Generations



PRESENTATION OUTLINE

- 1 **UGANDA COUNTRY PROFILE**
- 2 **UGANDA ENERGY SECTOR**
- 3 **UEGCL COMPANY PROFILE**
- 4 **5 YEAR STRATEGIC OUTLOOK**
- 5 **AREAS OF SUPPORT AND COLLABORATION (USAID/POWER AFRICA/USEA/PAUESA)**



UGANDA: COUNTRY PROFILE



➤ Uganda located in East Africa

➤ 93,065 square miles in area

➤ Population: 39 million

➤ Nominal GDP: USD Bn 29.7

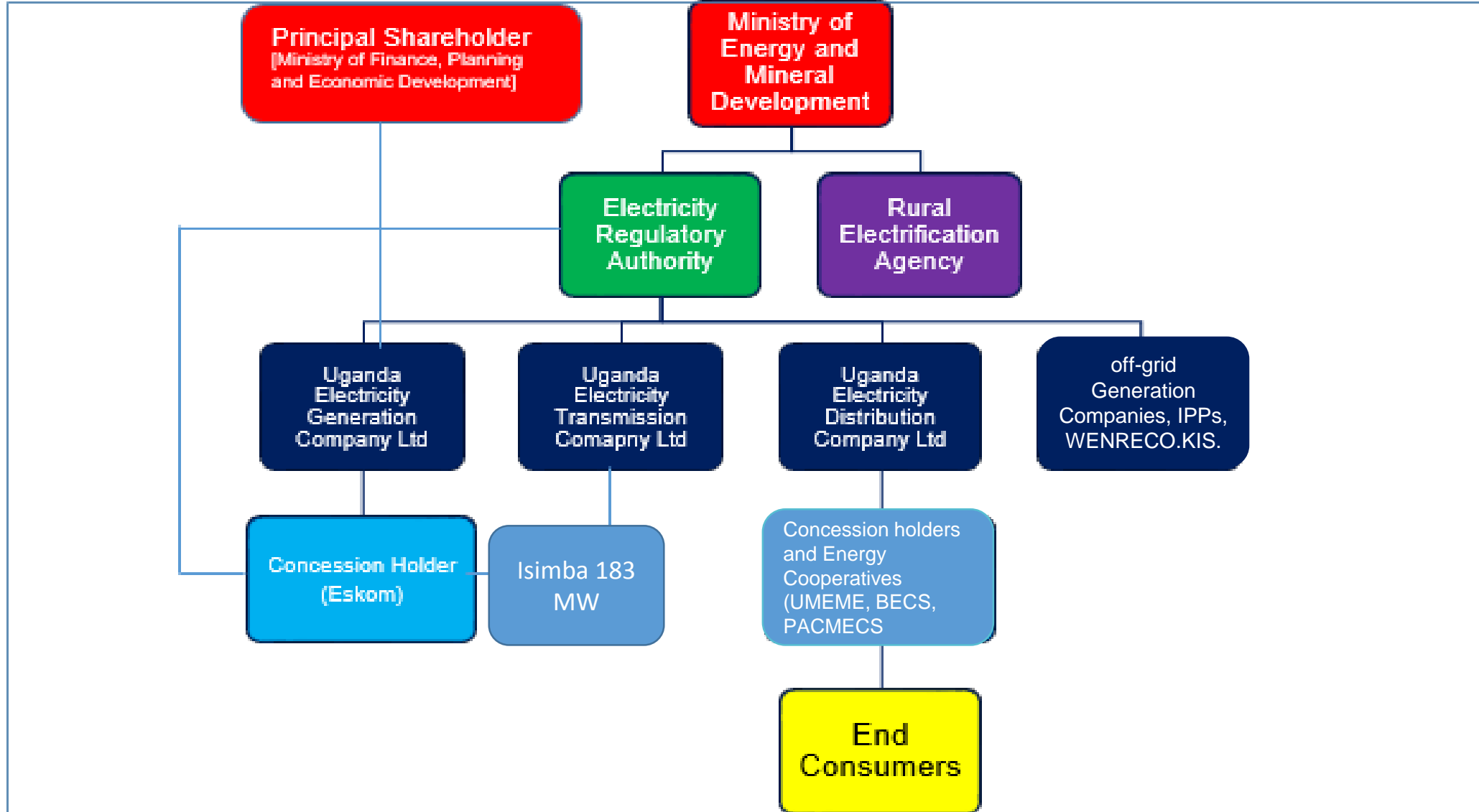
➤ GDP/Capita: 714 USD

PRESENTATION OUTLINE

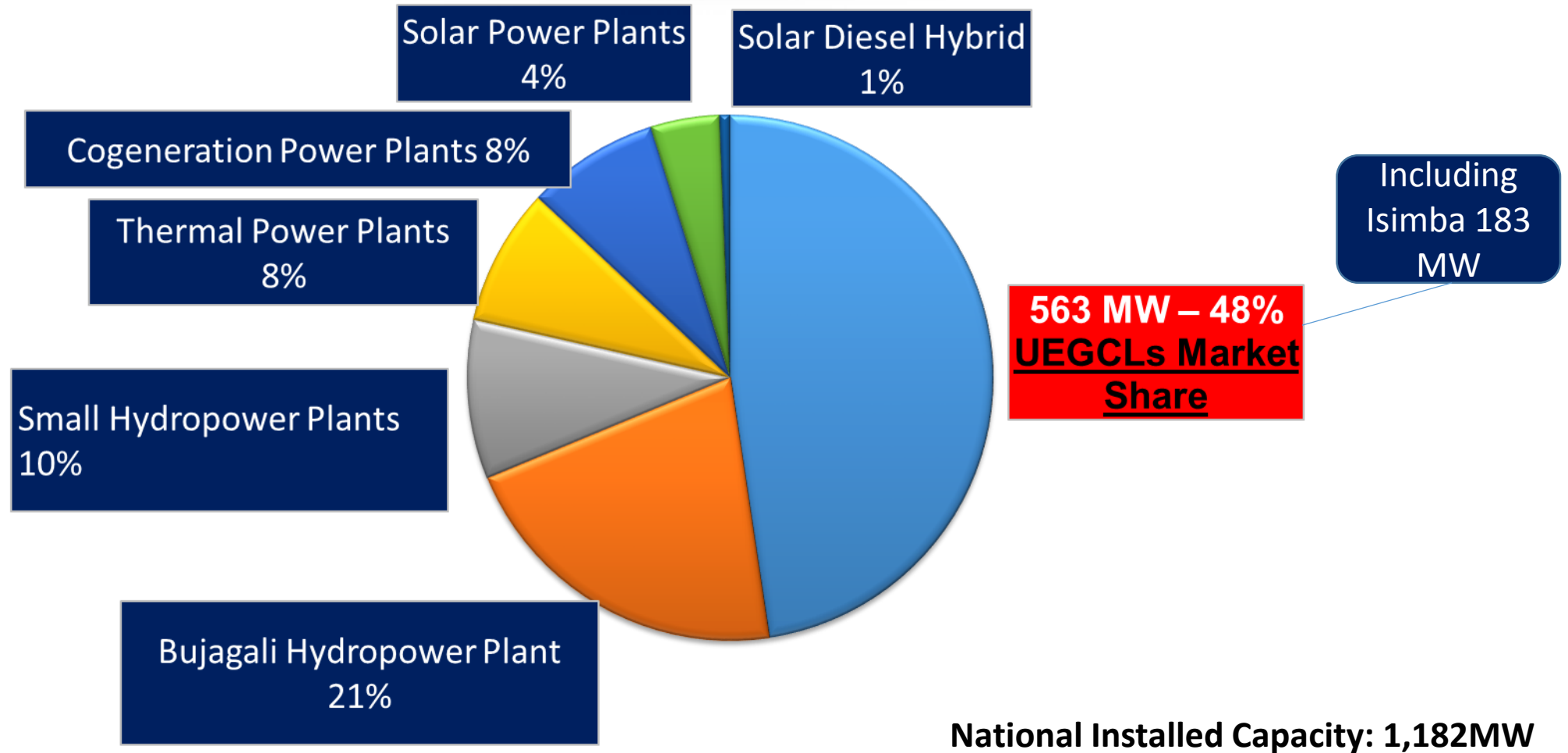
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ENERGY SUB-SECTOR INSTITUTIONAL SET UP



NATIONAL ELECTRICITY GENERATION STATUS



- Nalubaale & Kiira (UEGCL)
- Bujagali Hydropower Plant
- Small Hydropower Plants
- Thermal Power Plants
- Cogeneration Power Plants
- Solar Power Plants
- Solar Diesel Hybrid

DAMS IN UGANDA

- Total number of Hydropower Dams in Uganda- **44**
- Large Dams(>20MW) - **10**
- Small Dams(<20MW)- **34**



GOVERNMENT ELECTRICITY SUB-SECTOR TARGETS

Development indicator	Baseline Performance as at 2019	NDPII Target 2020	Vision 2040
Per capita electricity consumption (kWh)	150	578	3,668
% of population with access to electricity	22%	30%	80%
Installed capacity (MW)	1 182 (563 UEGCL)	2,500	41,738
Estimated Uganda's Population [Million]	39	43	71

- **Over 30 Million Ugandans have no access to Electricity.**

PROJECTED DEMAND

41,738 MW is required by 2040.



- Standard Guage Railway, 300
- Namanve Industrial Park, 107
- Mukono Industrial Park, 90
- Luzira Industrial Park, 60
- Iganga Industrial Park, 43
- Phosphate Factory, 200
- REA, 130
- Urban Centres, 130
- Power trade, 250
- Mining, 300
- Others, 100

Energy Demand will likely outstrip the current and medium term planned supply.

Unlock suppressed demand .

Source: UEGCL, 2018

PLANNED GENERATION PROJECTS

S/No	Project	Capacity (MW)	Status
1	Ayago	840	MoU signed between MEMD and potential investors
2	Oriang	392	MoU signed between MEMD and potential investors
3	Kiba	288	MoU signed between MEMD and potential investors
4	Uhuru	648	MoU signed between MEMD and potential investors
5	Geothermal	450	Exploration under Geological Surveys and Mines Department (MEMD)
6	Solar	1,000	Under development by both government and IPPs
7	Nuclear	30,000	Plans are underway by the nuclear unit in MEMD

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UEGCL PROFILE

UEGCL was incorporated in 2001 under a Companies Act and started operations on 1st April 2001

- ❖ 100% Government Company
- ❖ Governed by a Board
- ❖ 183 Employees

Mandate:

To establish, acquire, maintain and operate Electricity Generation facilities and to promote Research and Development in the Electricity Generation sector, While running the company on sound business principles.

VISION

To be one of the leading power producers in the Great Lakes Region

MISSION

To sustainably **generate** reliable, quality and affordable electricity for socio-economic development

CORE VALUES



Integrity



Sustainability



Safety

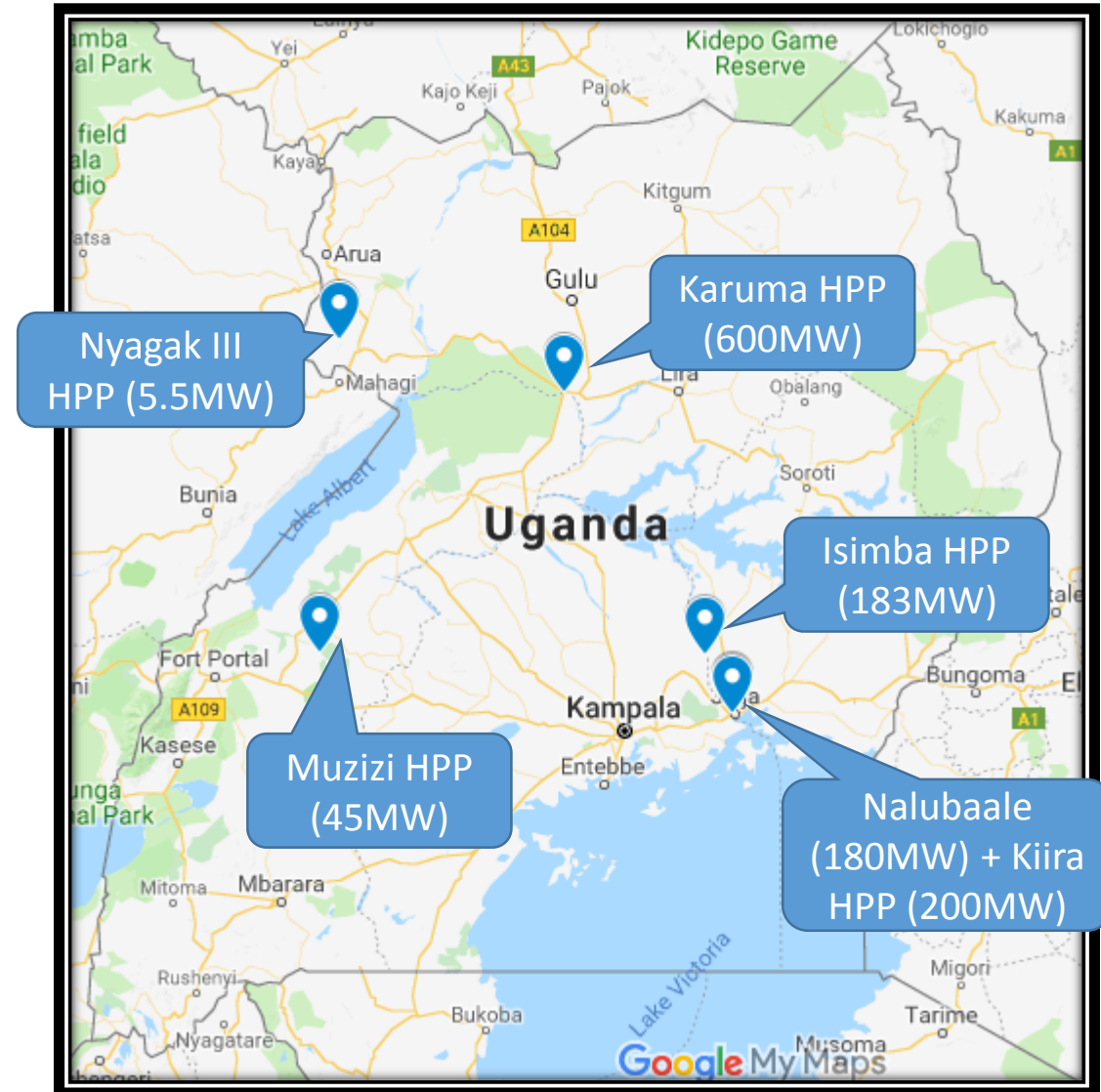


Innovation



Accountability

UEGCL ASSET PROFILE - LOCATION



KARUMA HPP (600 MW)



Installed Capacity :600MW

Type of Plant :Run of River

Contract Price :USD 1.7Billion

Project Financing :15% GoU, 85%

Exim Bank of China Loan

Project commissioning: June 2020

ISIMBA HPP(183MW)



Installed Capacity :183.2MW

Type of Plant :Run of River

**Contract Price :USD 567.7
Million**

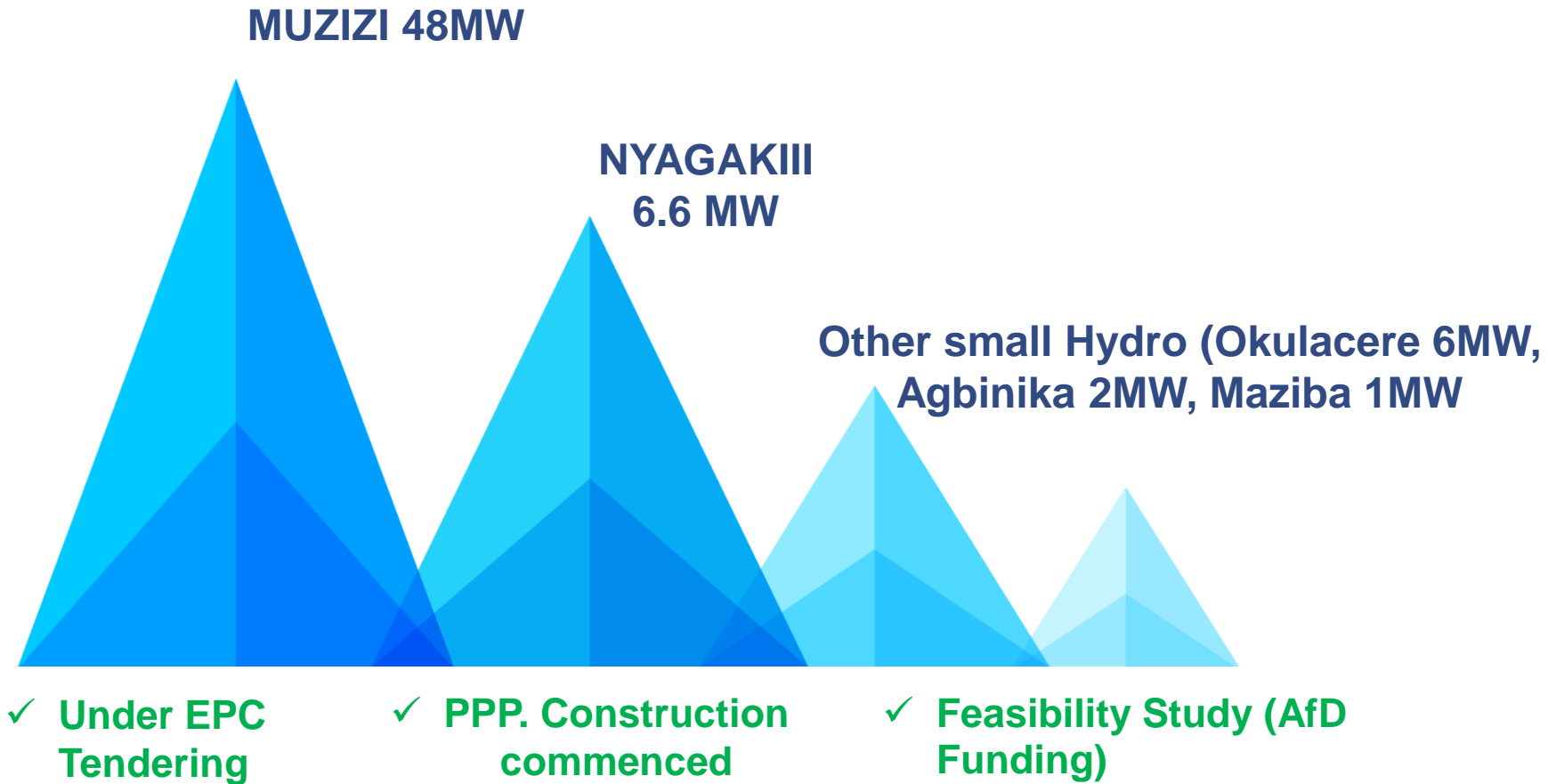
**Project Financing :15% GoU, 85%
Exim**

Bank of China Loan

**Commissioned on 21st March 2019
by H.E the President of the
Republic of Uganda**

UEGCL PROJECT PROFILE

PROJECTS UNDER DEVELOPMENT



UEGCL CONCESSION

NALUBAALE HPP- I 80MW



- **Constructed between 1949 and 1954 (Oldest Dam in Uganda)**
- **Power Plant under a 20-year Concession to Eskom Uganda Limited since 2003**
- **UEGCL does Concession Monitoring (since 2003 to 2023)**
- **Feasibility studies for its Optimization are underway**

UEGCL CONCESSION

KIIRA HPP-200MW



- **Completed in 1999 and commissioned in the year 2000**
- **Constructed in parallel to Nalubaale**
- **Under a 20-year Concession to Eskom Uganda Limited since 2003**
- **Feasibility studies for its optimization are currently underway.**
- **Study funded by KfW**

ENERGY DIVERSIFICATION EXPLOITS

❖ Solar

- Country Potential estimated at 1000 MW
- Exploring Solar/Hydro Hybrid Potential of 50MW plant in Hoima

❖ Geothermal

- Potential of about 450 MW
- Request is for all Geothermal activities transferred to UEGCL as an Energy source.

❖ Thermal

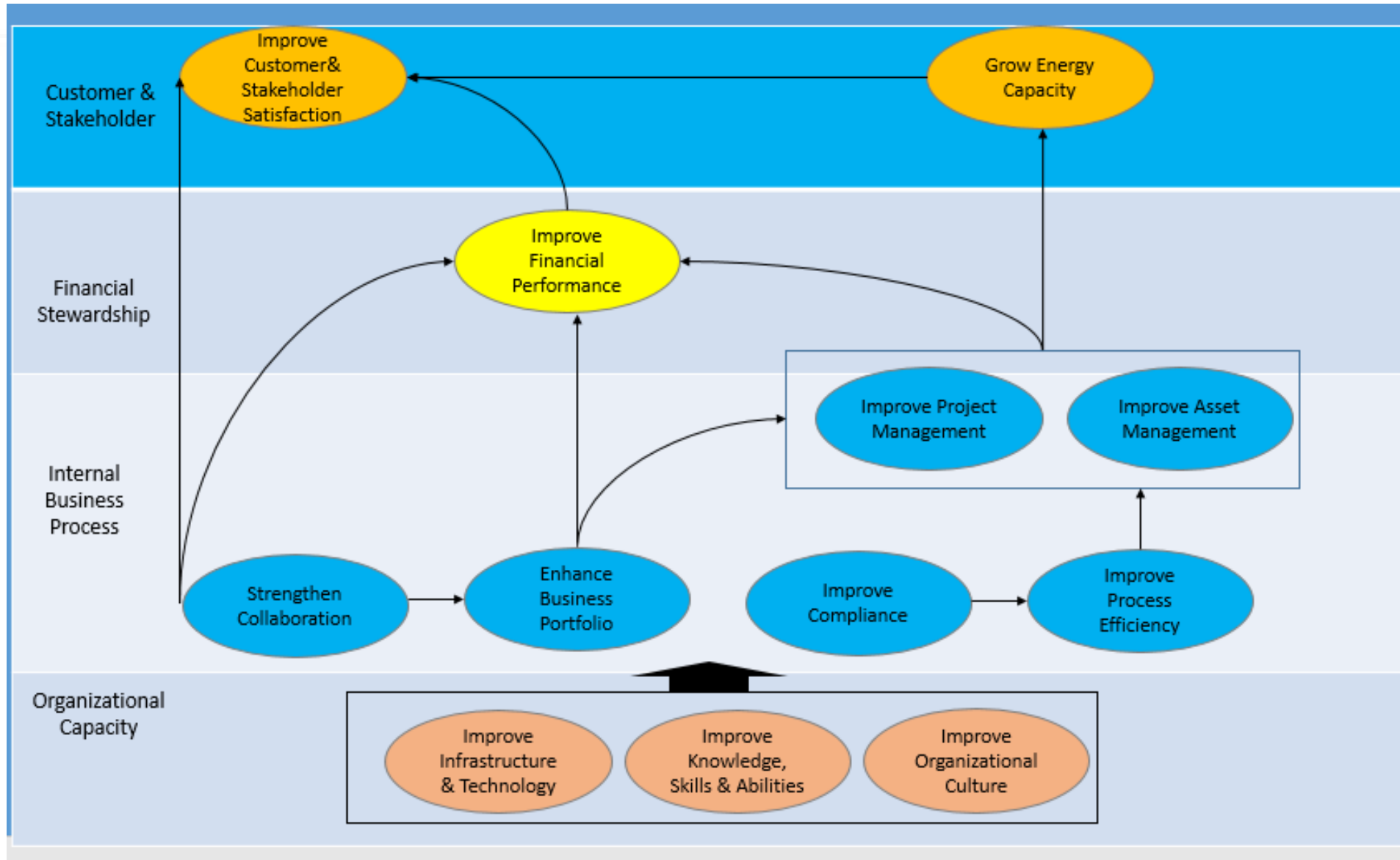
- UEGCL to take over 50 MW Namanve Thermal Plant in 2020.



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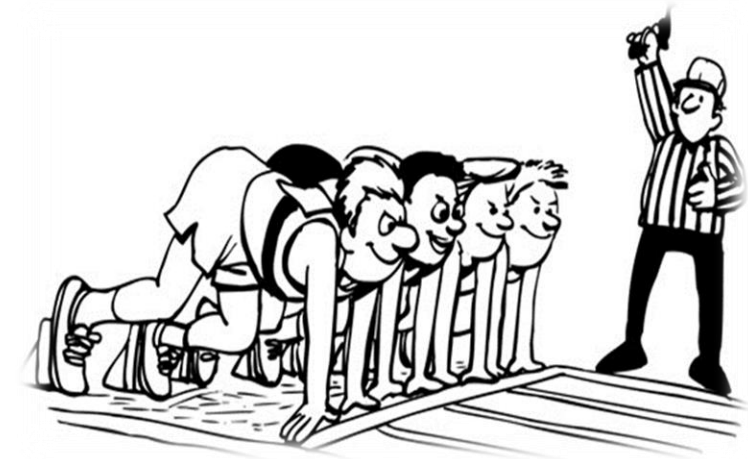
5 YEAR STRATEGIC OUTLOOK: BSC APPROACH



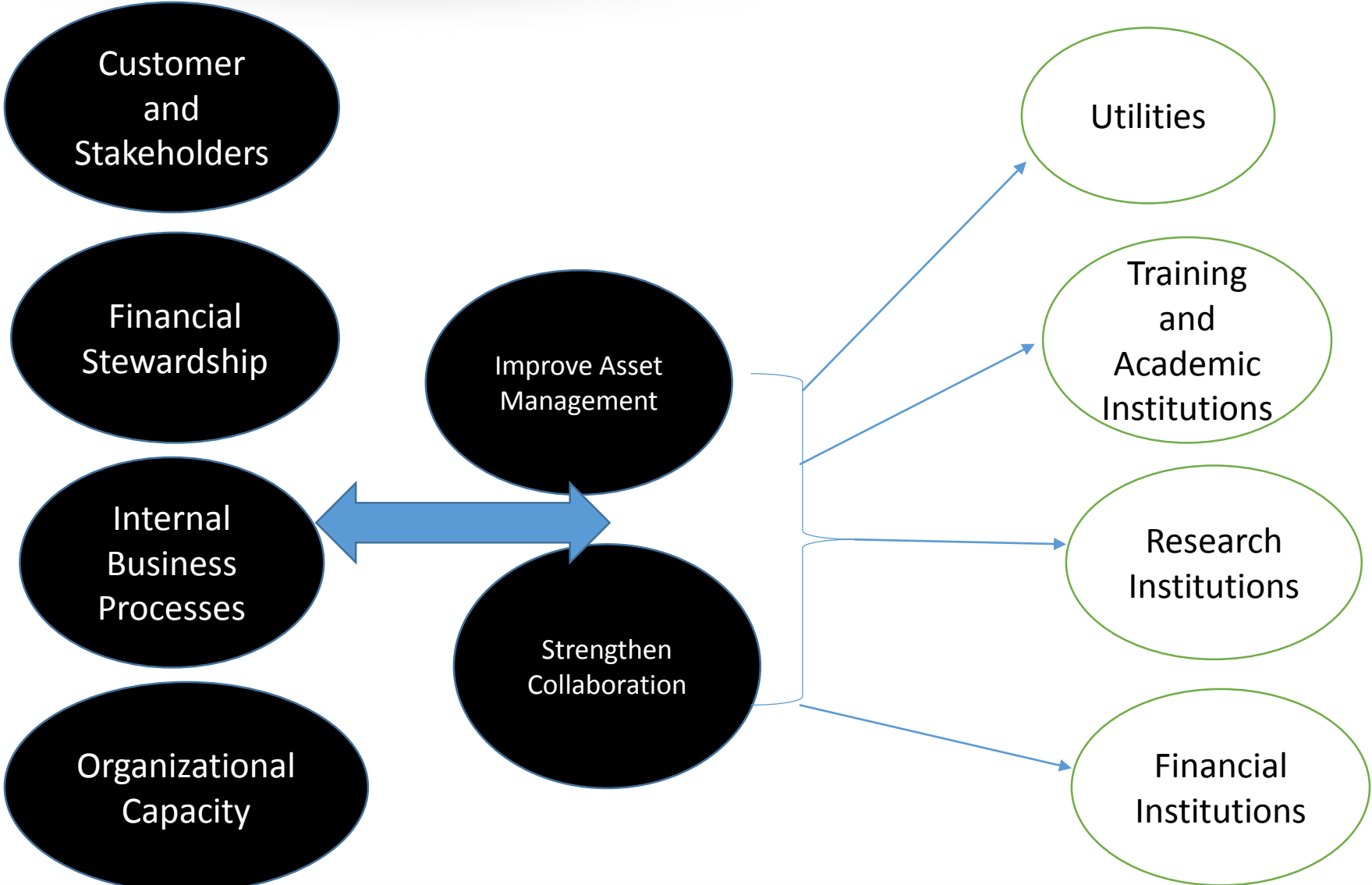
5 YEAR STRATEGIC OUTLOOK

Leverage Asset Management to achieve:

- ✓ **Expanded Generation capacity (From 380 to 1,300MW)**
- ✓ **Project completion (Commission Karuma 600MW)**
- ✓ **Efficient Operations (Plant availability of 97%, Plant reliability of 99%)**
- ✓ **Financial Sustainability (Profitability)**
- ✓ **Customer satisfaction (at least 80%) and Affordability.**



5 YEAR STRATEGIC OUTLOOK



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Thanks to
USAID/Power
Africa, USEA,
PAUESA



PAST SUPPORT USAID/POWER AFRICA/USEA/PAUESA)

Hydropower Operations
and Maintenance and
Asset Management
Training Conducted By
Chelan PUD:

Kampala, Uganda

21st -25th May 2018

Objectives;

Understanding the value of Asset
management and developing a
roadmap towards asset
management certification



PAST SUPPORT USAID/POWER AFRICA/USEA/PAUESA)

Contract Management, Procurement Practices, and Dispute Resolution

June 25-29, 2018

Kampala, Uganda



Program Goal:

The purpose of the workshop was to enhance capacity for effective and efficient contract and project management. The program also focused on procurement process, dispute resolution and claims management.

US EXECUTIVE EXCHANGE: 7TH – 19TH OCTOBER 2018

Objectives:

To obtain Insights and Strategies for effective Asset management and efficient operations that maximize value given the existence of aging and new Assets.

- Chelan PUD Washington
- Bonneville Power Administration
- Pacificorp: Portland Oregon
- Oracle
- CEATI: Asset Management Conference-California, Newport Beach
- Copper Leaf: C55 Asset Planning module



Achievements since the last Benchmarking visit

- Asset Management unit instituted. Manager and committee of certified staff
- With USAID/Power Africa support, USEA organized 5-day Training and Certification program for 15 UEGCL staff administered by Asset Management Consulting Limited (AMCL). **15th -19th July 2019**
- Asset Management policy reviewed and SAMP initial framework developed by the AM committee



Achievements since the last Benchmarking visit

1

CMMS procurement process ongoing

2

Support from Manitoba and EDF France enlisted to leverage O&M best practice, capacity building

3

Dam safety; Uganda now a member of ICOLD and dam safety team in place

4

Risk management policy and manual developed and approved

5

Integration of the Risk management process with asset management and all business functions such as strategic planning ongoing



Achievements since the last Benchmarking visit

6

Able to operate Isimba since April 2019 despite construction challenges

7

Initial Dam Surveillance conducted by in-house capacity

8

Muzizi (48 MW) HPP contract Drafting for Tendering

9

UEGCL actively participating in the development of the East Africa water regulatory framework

10

Head of research recruited to facilitate UEGCL's research agenda and collaboration



US EXECUTIVE EXCHANGE: 18TH – 30TH OCTOBER 2019

Objectives:

The purpose of this exchange was to discuss best practices in hydropower operations and maintenance, dam safety, remote monitoring of generation systems, asset management development, and risk management.

- Chelan PUD Washington
- Tacoma Power
- Tennessee Valley Authority (TVA)
- Federal Energy Regulatory Commission
- US Army Corp of Engineers



KEY LESSONS: Risk Management

Lessons:

- Risk based decision making is critical for optimized dam safety and asset management programs
- Risk identification based on asset classes more objective than criticality assessments

Action Plan

- Develop a comprehensive dam safety risk management framework to identify, analyze, assess and control risk
- Enhance quantitative risk assessments to include statistical modelling and scenario analysis
- Ensure integration of dam safety and asset risks with enterprise risk program
- Develop KRIs to monitor risk trends and effectiveness of controls



KEY LESSONS: Digital Transformation

1. Asset Data Management Programs

- Data governance structure and protocols
- Data management tools (e.g. CMMS)
- Data Analytics opportunities and tools
- Data backup systems and redundancy

2. Dam Safety Program

- Monitoring and surveillance
 - Telemetry and remote sensing
 - Automation and tools, e.g. river ware, water view, Canary, etc
- River cascade management tools

3. Cyber Security Program

- Physical and logical controls
- Capacity building and awareness programs



ACTION PLAN: Digital Transformation

1. Review and source software tools to support asset management and dam safety.

2. Build capacity in data analytics.



DAM SAFETY: Lessons Learnt

- Federal Entities are not regulated (e.g. USACE, TVA, USBR etc)
- Need for Legal and Regulatory frameworks
- Asset Inventory and Dam Classification is critical
- Dam Inspections, Surveillance and Monitoring
 - ✓ Construction and periodic inspections
 - ✓ Board of Consultants (BOC)
 - ✓ Concrete growth challenges and remedial plans (TVA)
- Emergency Action Plan Reviews and updates



DAM SAFETY: Action Plan

- Recommend to UCOLD to establish the National Dam Safety Legal & Regulatory Framework (Collaboration with FEMA and FERC)
- Establishing the Owner Dam Safety Plan (Collaboration with USACE – Hydropower National Program)
- Review of Dam Safety Surveillance and Monitoring Plan (Collaboration with FERC and BOC)
- Review existing Dam Safety Instrumentation and Data management (Capacity building by USACE – Hydropower National Program)



KEY LESSONS: Asset Management

LESSONS LEARNT

- Classification methodology of assets
- Risk Based Maintenance Strategy
- Implementation of Whole Life Cost Models
- Asset Documentation and Document Management
- Asset Management Performance and Review
- Hydropower Research Institute (HRI) – Collaboration and Experience sharing

ACTION PLAN

- Capacity building and Collaboration with US Utilities in Asset Management (Chelan PUD, Tacoma Power, TVA and USACE)
- Develop and Implement the Asset Management Framework



AREAS FOR CONTINUED PARTNERSHIP

1. Generation Planning
2. Optimal cascade scheduling
3. Dam Safety: For Asset posterity
4. Asset Management
5. Research and Development given the dynamic changes in the Renewable Energy Sector
6. Capacity building in Hydropower and alternative renewable energy sources
7. Effective Regulatory frameworks for operational and financial sustainability
8. Enterprise Cyber program
9. Automation of Business processes: Telemetry/remote sensing, data management and overall digital transformation



WAY FORWARD: POTENTIAL PARTNERSHIPS

1. Continued Exchange Programs with US Utilities

- Hands on management of O&M best practices Training programme
- Risk Management and mitigation measures
- Enterprise resource planning

2. US Army Corp of Engineers

- Generation Planning
- Optimal cascade scheduling
- Dam safety
- Asset Management
- O&M support

3. Construction Industry Institute (University of Texas at Austin)

- Best practices in planning, execution and delivery of capital facilities projects
- Identification of industry-driven, collaborative research at UEGCL



WAY FORWARD: POTENTIAL PARTNERSHIPS

4. **Support in participation in the Construction Research Congress (CRC)**
 - Similar to Asset Management (CEATI Training)
 - Interdisciplinary approach to research and innovation
5. **Design, Build Institute of America**
 - New construction procurement method.
6. **Federal Energy Regulatory Commission (FERC)**
 - Best Regulatory practice
 - Dam Safety legal and regulatory framework
 - Guidelines/Manuals for hydropower projects
7. **US Bureau of Reclamation (USBR)**
 - Guidelines and Manuals for design/O&M of Hydropower projects and Plants
 - Water Resources Management for Hydropower



WAY FORWARD: POTENTIAL PARTNERSHIPS

8. US Society of Dams -> Lessons for UCOLD

- Legal Frameworks, design, construction inspections etc.

9. American Society of Civil Engineers (ASCE)

- Research, specialized Annual conferences, Journal Publications access, Books for hydropower design, construction, O&M optimization.

10. RTI International (Centre for Water Resources e.g. support to TVA

- Engineering & Technology R&D
- Hydropower Planning
- Decision support Tools for improving operational Efficiency
- Enhance operational forecasting responsibilities to maximize hydropower revenues
- Emergence preparedness & risk mitigation





UEGCL
Generating for Generations

THANK YOU

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