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A Case for Energy Diversification and Efficiency in Zambia

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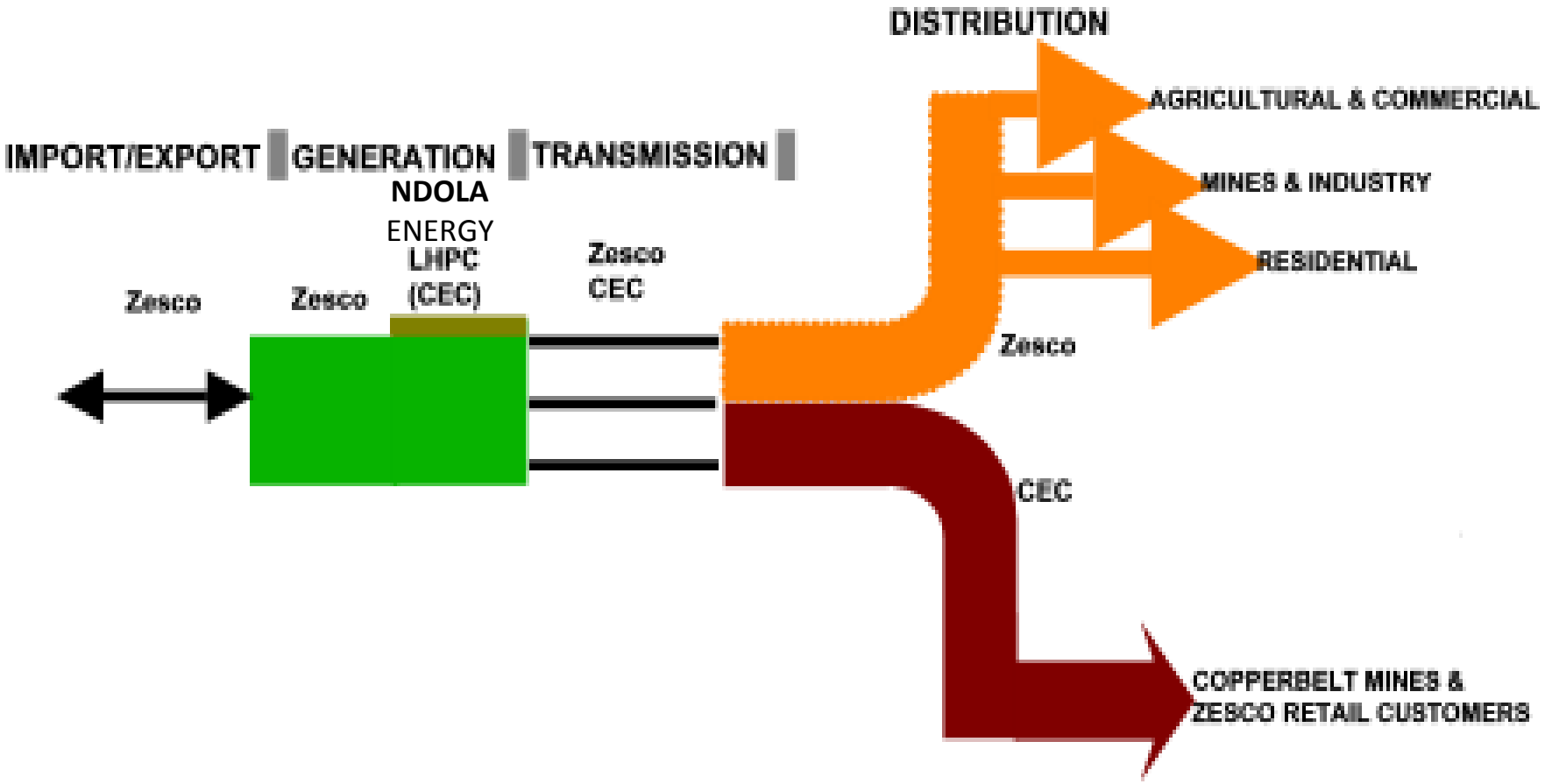
Structure of electricity industry



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- Source of electric energy: 96% hydro, 2.1% thermal (HFO and Diesel) 1.7% renewable comprising of solar and small hydros (up to 20 MW)

- Solar potential: 6-8 hrs/day; Coal power, over 300 MW by end 2016

- One bundled utility (ZESCO) owning **G,T,D and S** network

- Electricity Act allows other IPPs,
- now Grid Code allows for open access

ZESCO Installed capacity	2,216. 8 MW
IPPS (Lunsemfwa hydro and Ndola Energy - HFO)	116.0 MW
Total national Installed Capacity	**2,332.8 MW**
Available Average Generation (2015)	1,233.0 MW

Zambia is now experiencing a **power deficit** of approximately

- 1,000 MW in January 2016 and 760 MW April 2016

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Power Deficit - Vulnerability

- Reduced Generation - low rainfall in one season (2014/2015)
- Low water levels in the two main dams at Kariba and Itezhi –Tezhi dams.

Vulnerability and risk: 2 to 3 years to get back to normal

Social economic impact: 8 hours of load shedding; imports of expensive power; fiscal subsidy on imported power, etc

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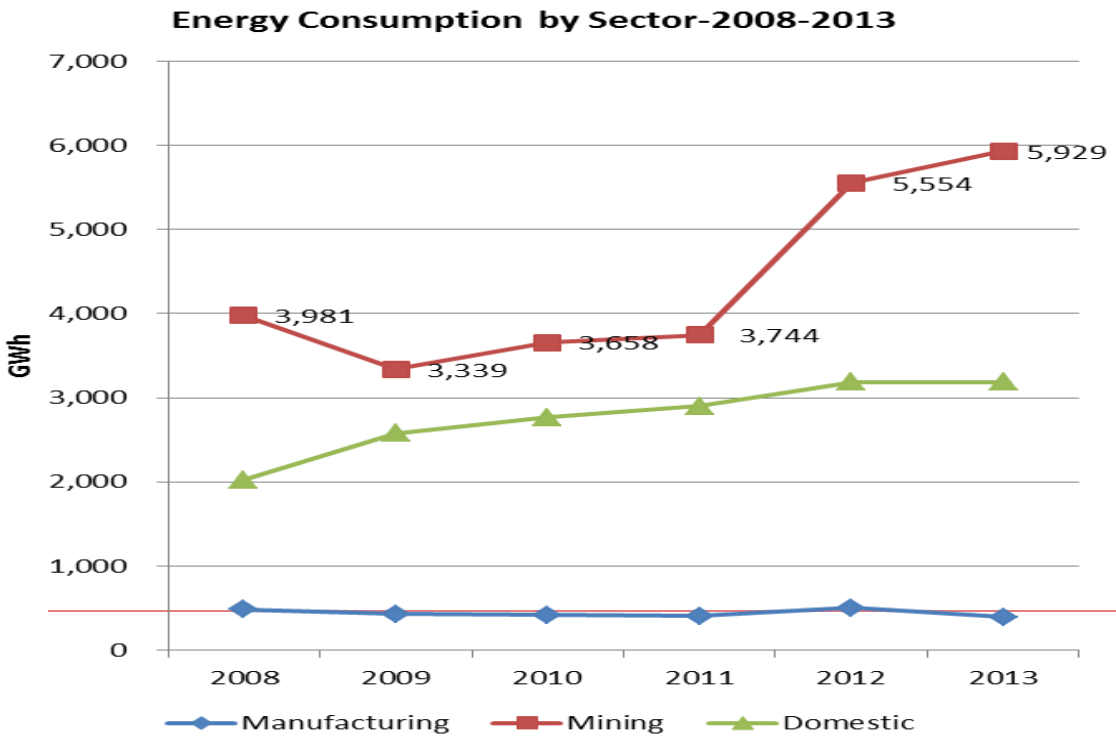
Current Electricity Access and Tariff level

Access to electricity	25% of population – (Urban 48% & Rural 4.5%) (most energy source for the majority is wood)

Average consumer tariff	→	US cents 6 (low investment over 50 years)
Average IPP tariff	→	US cents 10 to 12
Tariff differential (subsidy)	→	100%
Power consumption by mines	→	60%



Tariff Revenue Trap

- Mines consume over 60% of the power
- Mines can provide up to 80% of power revenue
- **But** pay the lowest tariffs, have long term Bulk Supply Agreements
- Residential customers carry the most tariff incidence

Opportunities for Diversification

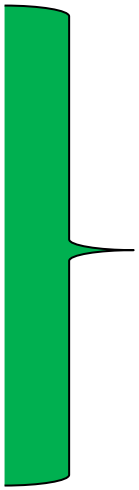
- Off Grid generation options
- Solar Options
- Biomass (small level, using sugar cane)
- Geo Thermal (under investigation)
- Waste to Energy (under investigation)

Quick Win

- Solar PV (100 MW by end 2016)
- Policy framework in place
- Regulatory framework in place

Supporting Solar PV option

- Renewable Energy Feed In Tariff (REFIT), model for indicative tariffs by size and framework for price discovery
- Standardize regulatory tools to address capacity problems:
  - REFIT Rules and Guidelines
  - Standard Power Purchase Agreement (PPA) Template
  - Standard Generation License
  - Standard Grid Connection Guidelines
  - REFiT for Solar Based Projects based on size
  - Standard Implementation Agreements
  - Procurement rules and guidelines



See www.erb.org.zm

- Integrated Resource mapping to guide new entrants
- Transparent and prudent tariff determination regime (methodology, RoR, dispute resolution, consumer involvement)
- Tariff subsidy support mechanisms (life line tariff; direct subsidy – GETFiT; Migration to cost reflectivity)

Electricity Demand Management

- **Tax waivers** for importation of energy efficient equipment such as Solar Photovoltaic modules; deep cycle batteries, solar water heaters, energy efficient lights, solar lights and solar pumps used for irrigation.

- Ban of importation and local manufacturing of **incandescent bulbs** with effect from 1st January 2016. Complete elimination by Dec 2016

- Energy saving **awareness campaigns**.

- Procuring light-emitting diode (**LEDs**) for free distribution across the country. Expected to save about 200MW.

- On regulatory side, **power factor correction surcharge** introduced.

Increasing access and efficiency

1. Rural Electrification (REA) : Grid Extension; Mini hydropower Development; Solar energy

2. Good planning and regulation for diversification; cross border power trade; transparent and competitive procurement; appropriate market structure and conduct? ; single buyer or unbundle).

3. Balance operationally and financially viable of utilities and tariff affordability

4. Promote access to reliable and affordable electricity services. e,g Remove connection fee barrier; low-cost grid electrification technologies; Scale up off-grids

5. Strengthen policy, legal and institutional framework for energy efficiency- Consumer sensitization campaigns, example LPG for cooking; energy efficient lighting; solar water heaters; construction of efficient energy houses, etc.

Energy diversification challenges

1. **High initial cost** for solar technology (mostly imported).

2. **Low tariffs** (limits investment especially in rural areas which have low economic activity and affordability is low)

3. **Lack of education (**Capability of solar technology unknown)

4. **Lack of financing –** banks unwilling, considered risky, policy uncertainty on tariffs, etc

5. Lack of capacity to access funding (**un-bankable proposals**)

6. **Grid capability** and stability (can the grid handle new renewable technologies?)

Conclusion – Is there a case for Diversification?

Yes!

1. **Over dependency on hydro power - very risky-** one bad rainy season has caused power deficit and 3 years to normalize.

2. **Quick wins**: alternatives available and can reduce the risk.

3. **Tariff determination and regulatory framework** is well developed

4. **Advocacy to unlock revenue** from major consumers (mines)

5. Commitment to **cost reflective tariffs** (national and regional – SADC; – a necessary evil - addressing social political challenges; hike resistance?)

6. Commitment to **energy efficiency** – market; legal and regulatory framework

7. **Environmental concerns** have to be addressed



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