

DEPARTMENT OF ENERGY

# Symposium on Energy Poverty

8-9 December 2009

South Africa, Jhb



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REPUBLIC OF SOUTH AFRICA

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Electrification

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# PRESENTATION OUTLINE

- Background
- Mandate of INEP
- Legislative/Regulatory/Policy Framework
- Progress to date, Backlog & Challenges
- Issues for thoughts & deliberation
- Bonus slides



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# BACKGROUND

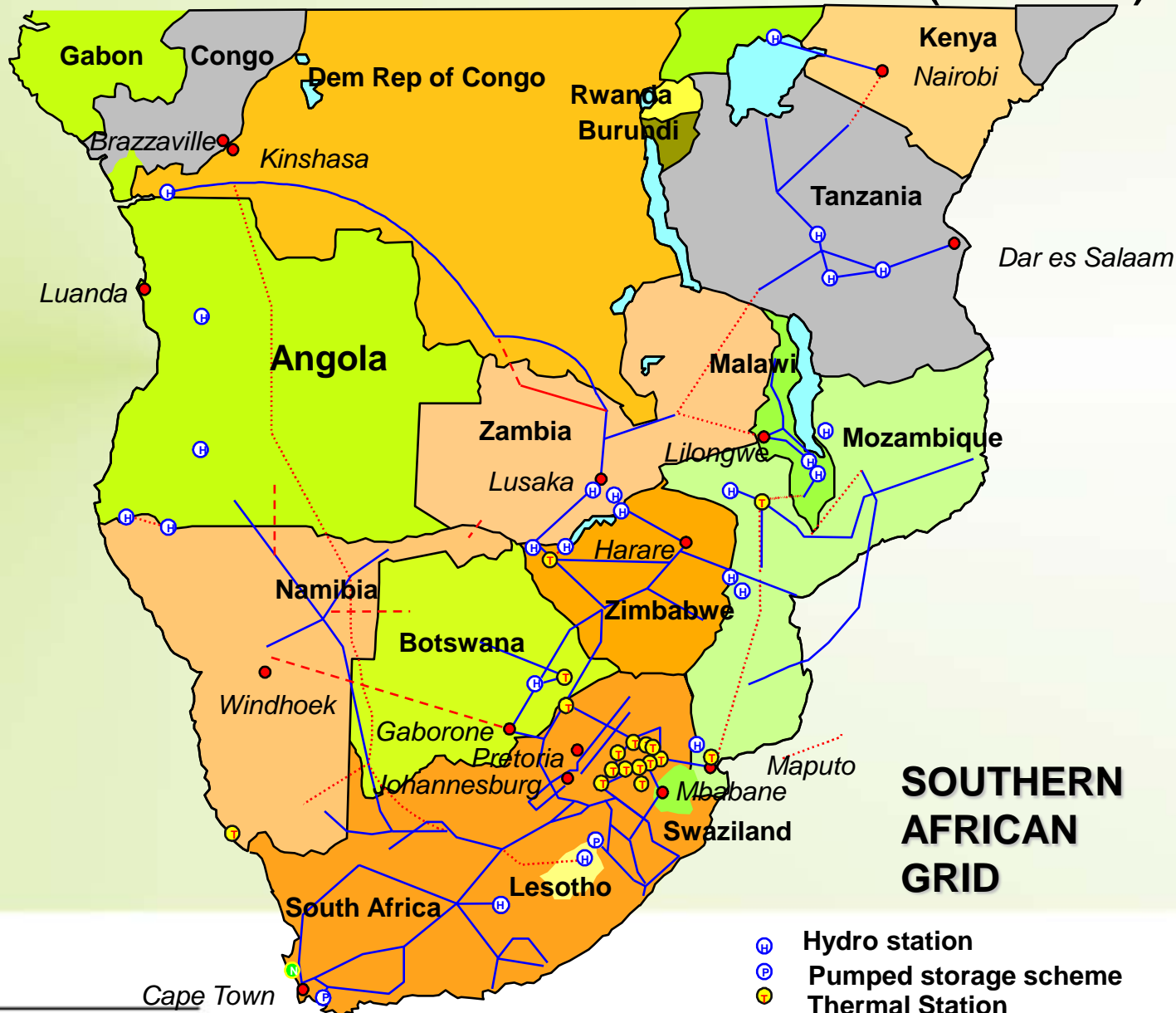


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# Southern African Power Pool (SAPP)



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# ELECTRICITY VALUE CHAIN

## POWER STATIONS GENERATION

Coal, Wind, Solar

Transmission  
Lines

**TRANSMISSION**  
(765/220 kV)

Transmission  
Substations

**Reticulation**  
(132/33 kV)

Reticulation Lines

Distribution Substations

Reticulation HV-Line  
(11 & 22kV)

Reticulation  
LV Line  
(380/220V)

**SERVICE CONNECTION**

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# Plant mix



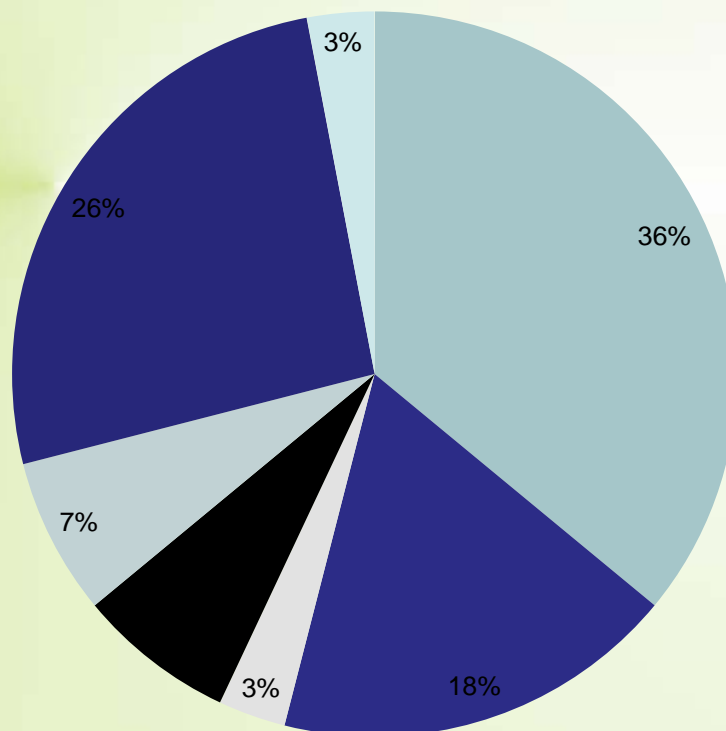
TYPE	NUMBER	NET MAX CAPACITY
Coal fired	13 stations	32 066 MW
Gas turbine	2 stations	342 MW
Hydroelectric	6 stations	600 MW
Pumped storage	2 stations	1 400 MW
Nuclear	1 station	1 800 MW
<b>TOTAL</b>	<b>24 Stations</b>	<b>36 208 MW</b>



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# Electricity Usage by Sector



- Industry
- Residential
- Agriculture
- Commerce
- Mining
- Transport
- Other



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# MANDATE OF INEP



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# MANDATE OF INEP

To manage the electrification planning, funding and implementation process, in order to reach universal access by 2014 with the view of halving poverty by 2014(MDGs).

## **Our Focus areas**

- Access to modern energy sources i.e. connection to HHs
- Bulk Infrastructure i.e number of substations
- Socio-economic benefits such as
  - Income Generation,
  - Local Job Creation,
  - Local Skill Transfer,
  - Educational and health benefits
  - Local Community Benefits & Ownership
- Equity ownership in terms of SMMEs, BWO, BEE



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# PROGRESS TO DATE & BACKLOG



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# Progress



- Access being 6 % in Africa for the past 15years
- In SA contrary for the past 16 years access increase from 30% to 75% HHs
- Urban HHs from 36% to 90%
- Rural HHs from 12% to 52%



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# Electrification Status March 2009

PROVINCE	Total number of households	Backlog	Households not electrified (%)	Number of electrified households	Electrified households (%)
<b>EASTERN CAPE</b>	1,667,435	669,421	40%	998,014	60%
<b>FREE STATE</b>	823,972	201,919	25%	622,053	75%
<b>GAUTENG</b>	3,127,991	740,569	24%	2,387,422	76%
<b>KWAZULU NATAL</b>	2,405,165	818,708	34%	1,586,457	66%
<b>MPUMALANGA</b>	879,082	231,485	26%	647,597	74%
<b>NORTHERN CAPE</b>	272,958	50,405	18%	222,553	82%
<b>LIMPOPO</b>	1,250,716	329,440	26%	921,276	74%
<b>NORTH WEST</b>	914,070	196,605	22%	717,465	78%
<b>WESTERN CAPE</b>	1,333,886	191,366	14%	1,142,520	86%
<b>TOTAL</b>	<b>12,675,275</b>	<b>3,429,918</b>	<b>25%</b>	<b>9,245,357</b>	<b>75%</b>

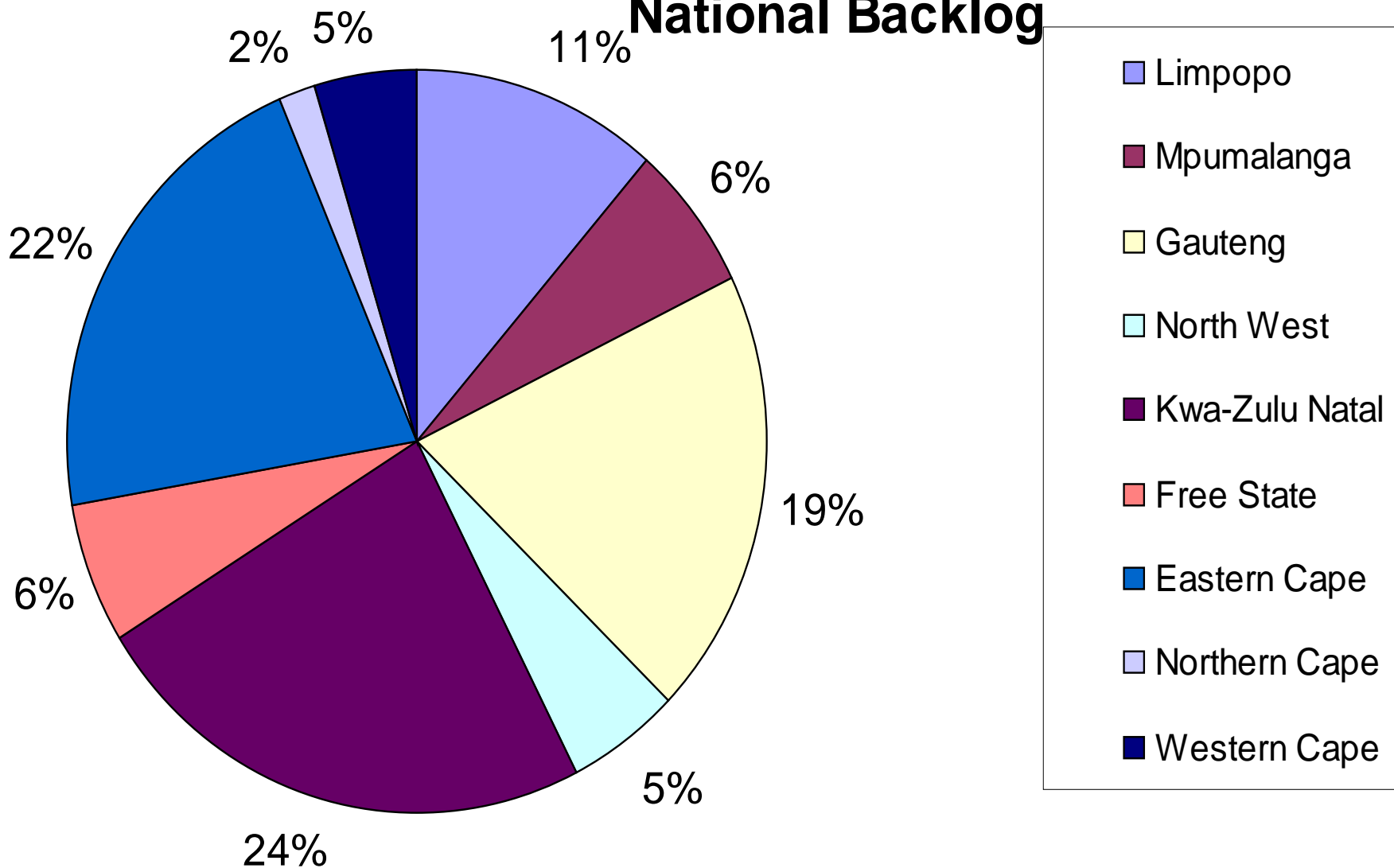
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# National Backlog



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# MV Infrastructure (11kV and 22kV lines)

## Legend

### Province

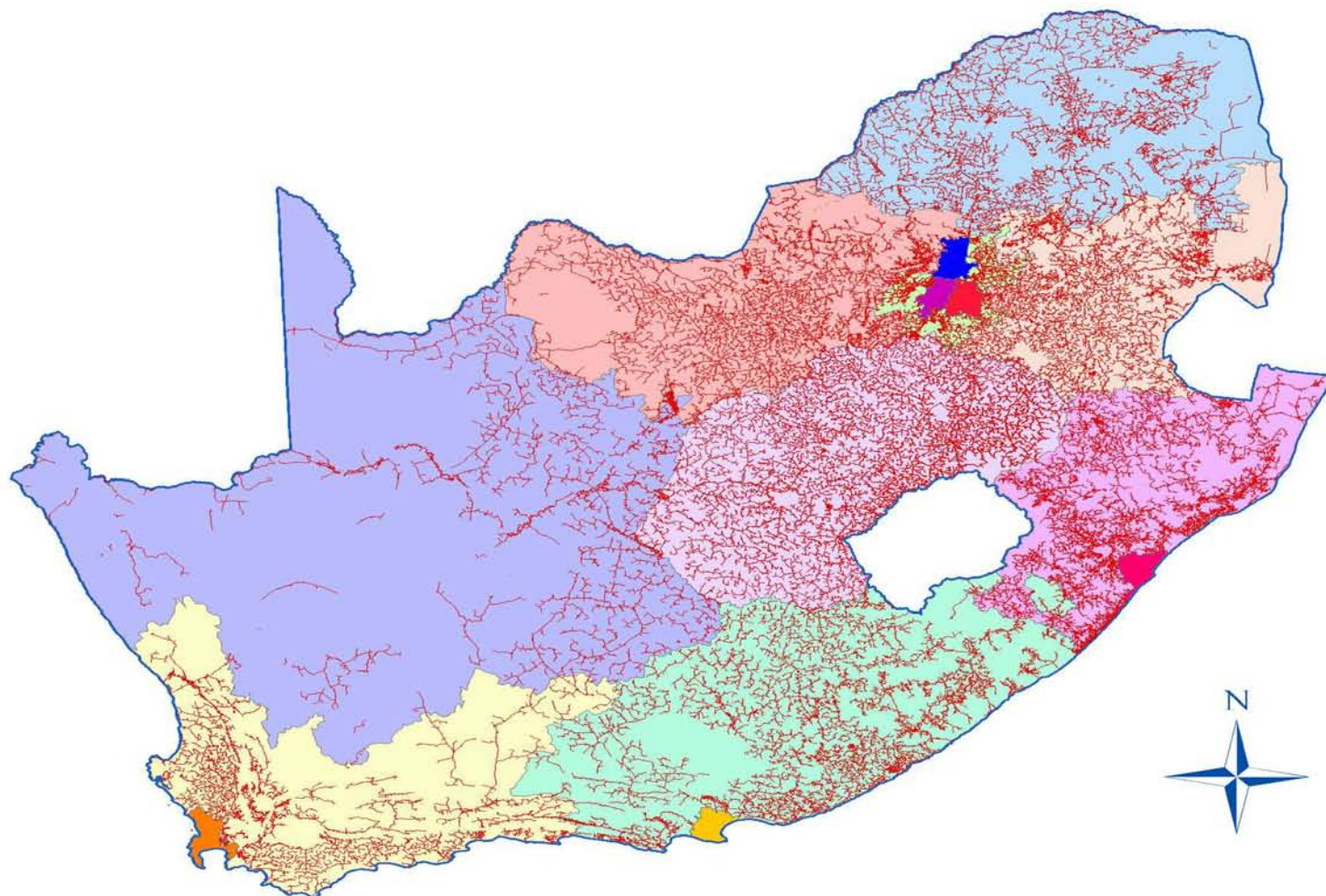
- EASTERN CAPE
- FREE STATE
- GAUTENG
- KWAZULU-NATAL
- LIMPOPO
- MPUMALANGA
- NORTH WEST
- NORTHERN CAPE
- WESTERN CAPE

### District Munics

- DC's

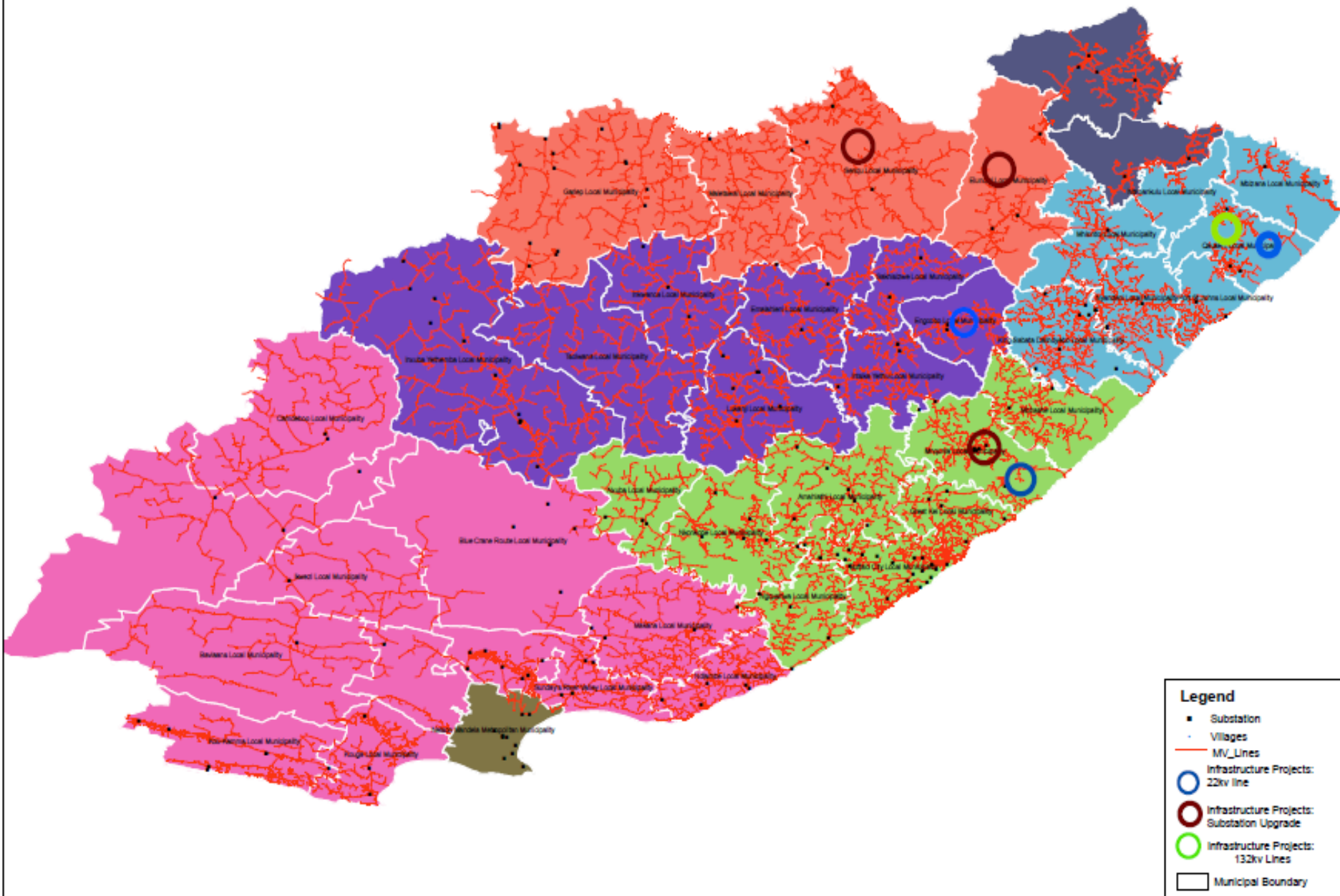
### METRO

- Cape Town
- Durban
- East Rand
- Johannesburg
- Port Elizabeth
- Pretoria



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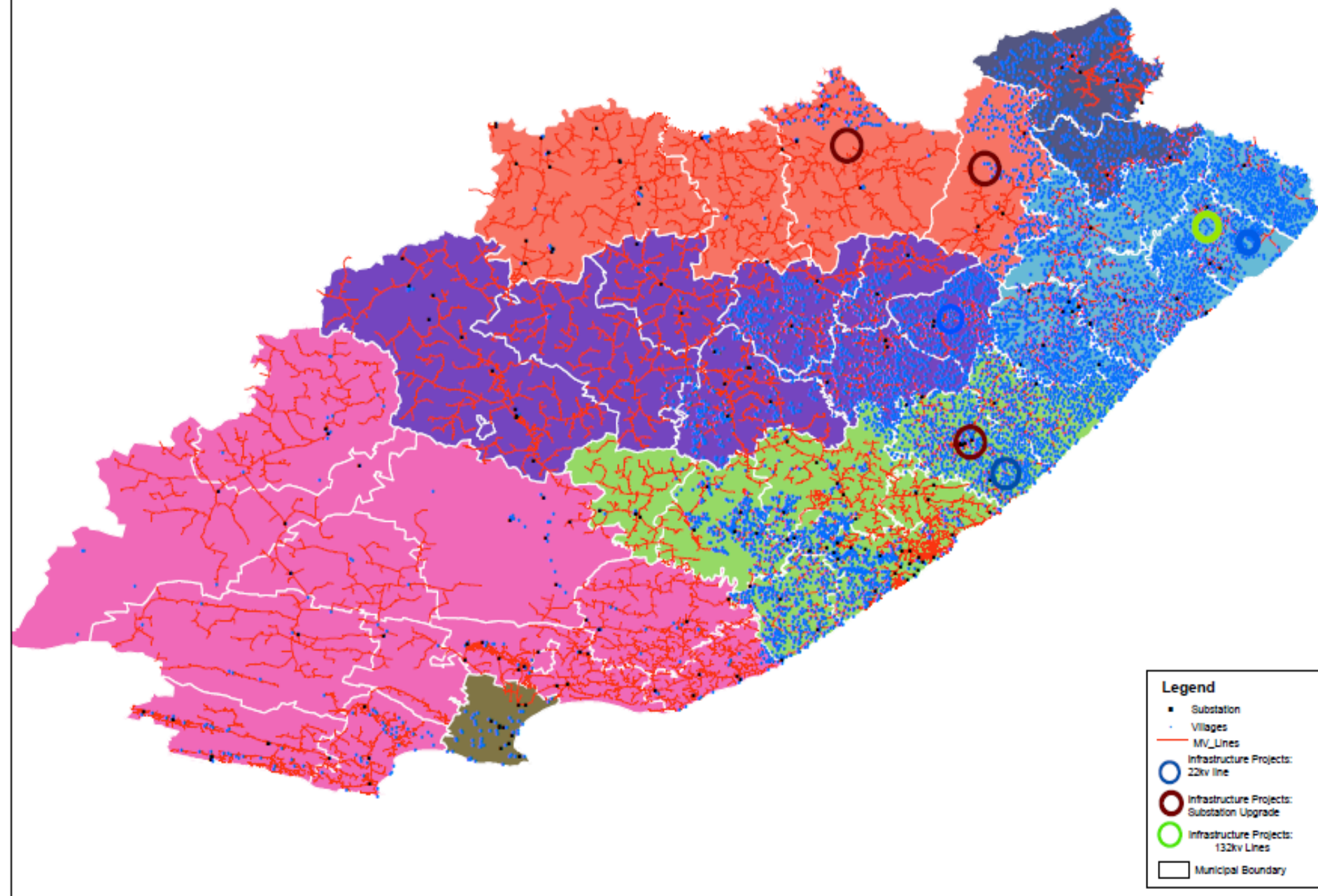
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# EASTERN CAPE PROVINCE





# O.R.TAMBO DISTRICT MUNICIPALITY ELECTRICITY BULK INFRASTRUCTURE PLAN

## Legend

▲ Existing Substation

### Planned Substations

YEAR



Existing MV\_Lines

MV\_Lines

Constrained

Slightly Constrained

HV\_Lines

▲ Substation\_Strengthening Projects

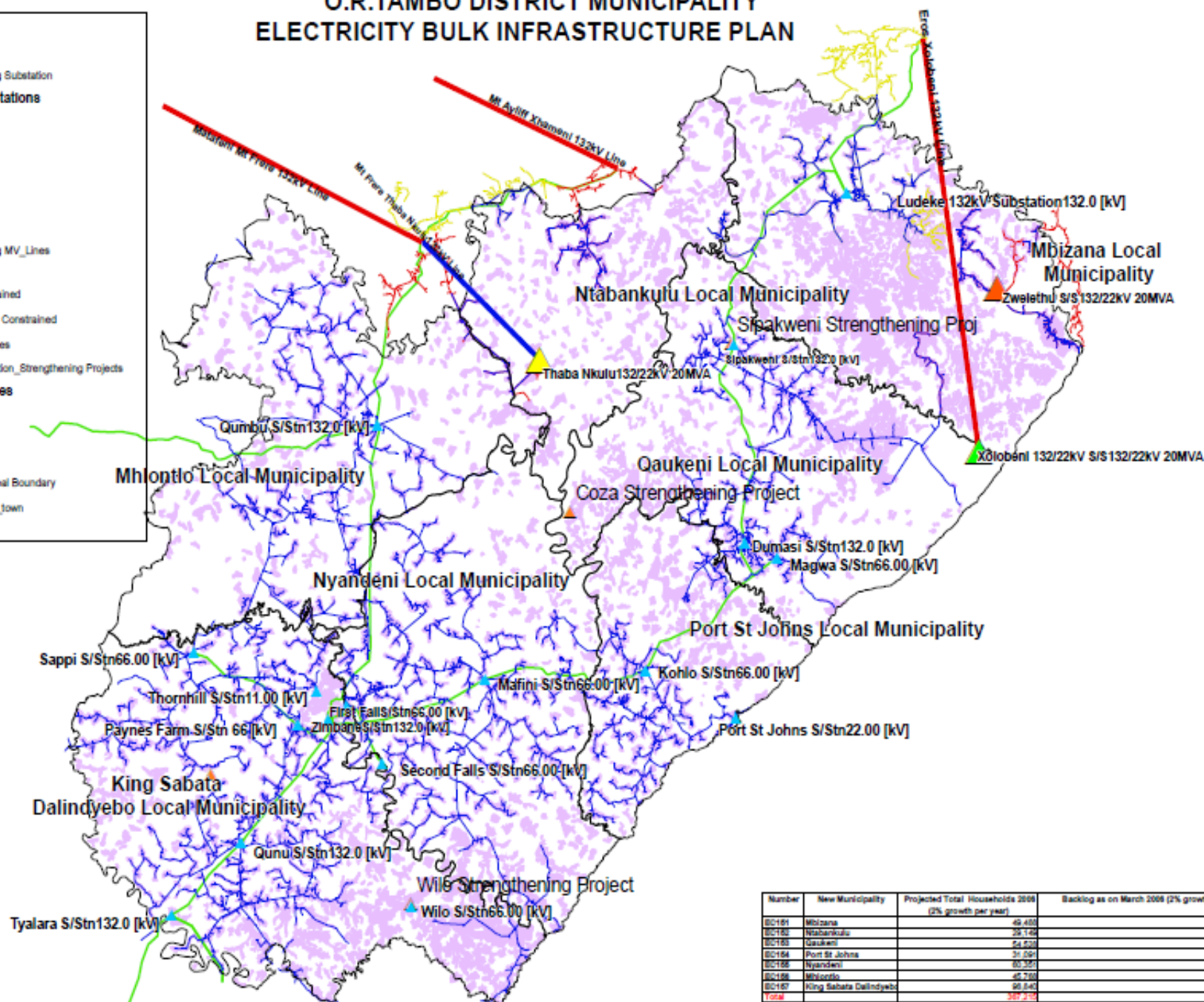
### Planned\_Lines

YEAR



Municipal Boundary

Village\_town



Number	New Municipality	Projected Total Households 2008 (2% growth per year)	Backing as on March 2008 (2% growth per year)
00181	Mbizana	49 400	36315
00182	Ntabankulu	29 149	22525
00183	Qaukeni	54 600	30200
00184	Port St Johns	31 091	20801
00185	Nyandeni	80 251	35170
00186	Mhlontlo	45 700	24130
00187	King Sabata Dalindyebo	96 840	39640
<b>Total</b>		<b>387 210</b>	<b>212081</b>

# CHRIS HANI DISTRICT MUNICIPALITY ELECTRICITY BULK INFRASTRUCTURE PLAN

## Legend

▲ Existing Substations

Planned Substations

YEAR

▲ 2006\_7

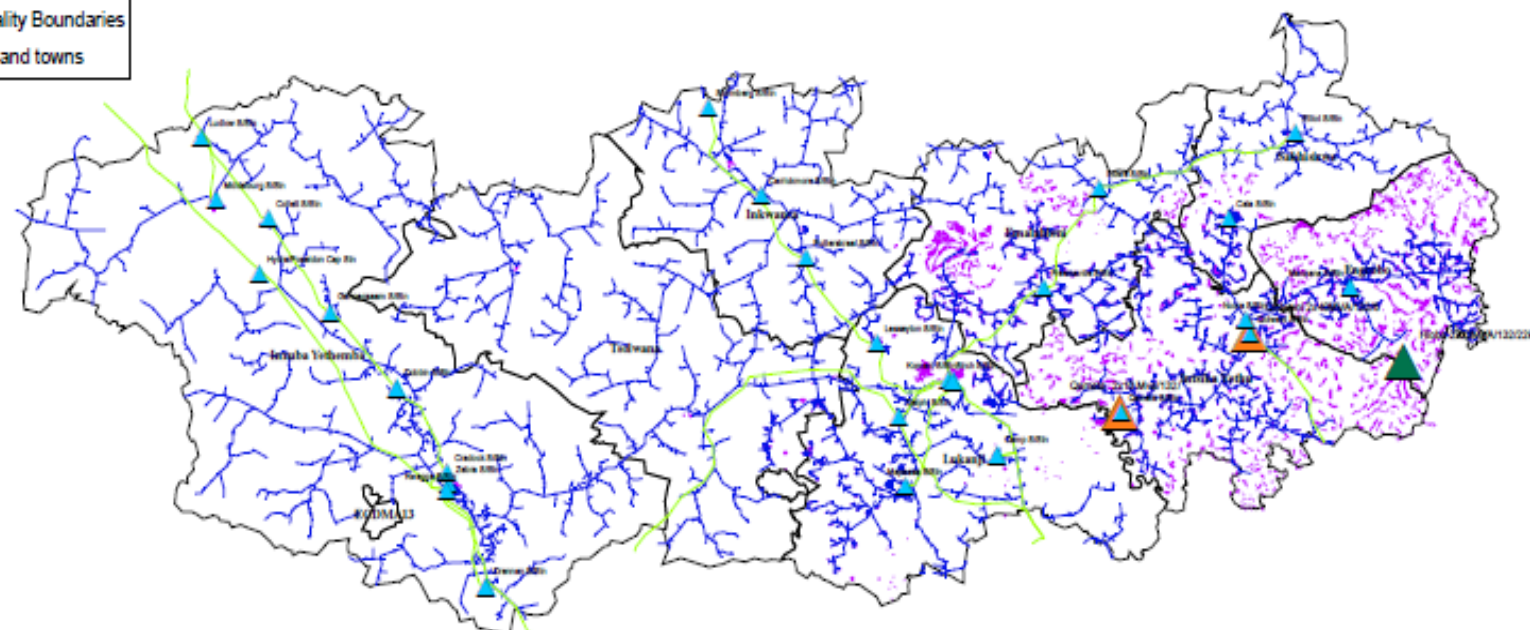
▲ 2010\_11

— High voltage lines

— Medium voltage lines

— Municipality Boundaries

— Villages and towns



Number	New Municipality	Projected Total Households 2008 (2% growth per year)	Existing as on March 2008 (2% growth per year)
000000	Chris Hani District	17,200	17,200
000001	Buffalo City	17,200	17,200
000002	Buffalo City	17,200	17,200
000003	Buffalo City	17,200	17,200
000004	Buffalo City	17,200	17,200
000005	Buffalo City	17,200	17,200
000006	Buffalo City	17,200	17,200
000007	Buffalo City	17,200	17,200
000008	Buffalo City	17,200	17,200
000009	Buffalo City	17,200	17,200
000010	Buffalo City	17,200	17,200
000011	Buffalo City	17,200	17,200
000012	Buffalo City	17,200	17,200
000013	Buffalo City	17,200	17,200
000014	Buffalo City	17,200	17,200
000015	Buffalo City	17,200	17,200
000016	Buffalo City	17,200	17,200
000017	Buffalo City	17,200	17,200
000018	Buffalo City	17,200	17,200
000019	Buffalo City	17,200	17,200
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000026	Buffalo City	17,200	17,200
000027	Buffalo City	17,200	17,200
000028	Buffalo City	17,200	17,200
000029	Buffalo City	17,200	17,200
000030	Buffalo City	17,200	17,200
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000092	Buffalo City	17,200	17,200
000093	Buffalo City	17,200	17,200
000094	Buffalo City	17,200	17,200
000095	Buffalo City	17,200	17,200
000096	Buffalo City	17,200	17,200
000097	Buffalo City	17,200	17,200
000098	Buffalo City	17,200	17,200
000099	Buffalo City	17,200	17,200
000100	Buffalo City	17,200	17,200



# Clinics & Schools Electrification Status

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- Universal access to clinics reached March 2009 by both Grid and Non-Grid(solar power)
- Universal access to schools planned for October 2010(Grid and Non Grid)

## Non-Grid Electrification Status

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*Concessionaire Approach with 20 year contract*

- In addition to grid status to date we have installed 50 000 SHS (solar home systems) in EC, KZN, & LP
- 39 000 SHS in the pipeline planned in EC for 3 years to date 1 279 HHs active



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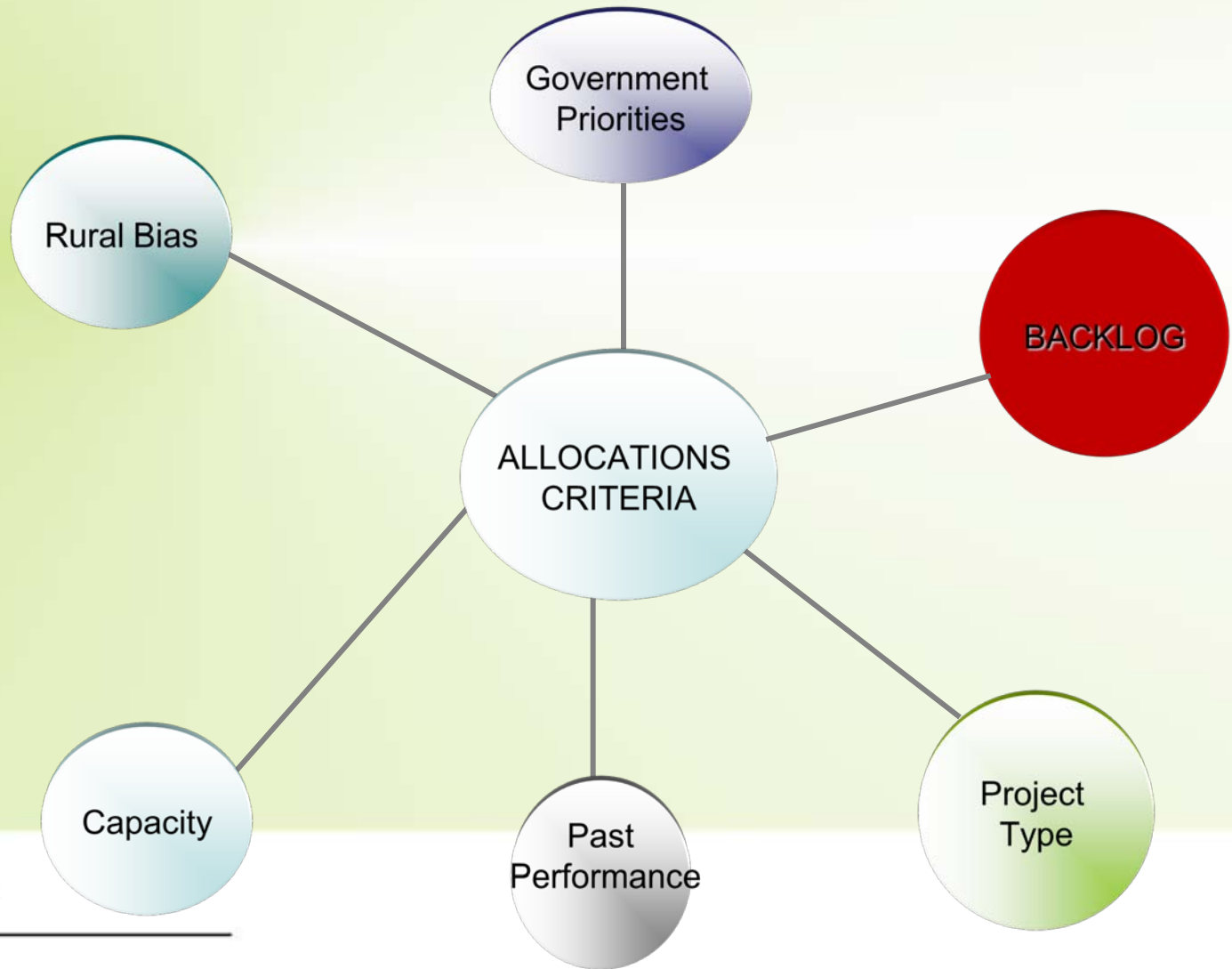


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# Allocation Criteria



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# SERVICE LEVELS

## BASIC LEVEL OF SERVICE

- 20 amp connection no connection fee and receive up to 50kwh FBE per month
- 50w, Solar Panel no connection fee and receive monthly FBAE depending on their indigent status( full subsidy, half subsidy or no subsidy)

## BELOW BASIC LEVEL OF SERVICE (FBAE)

- Gas
- Fuel
- Coal
- Paraffin



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# Composition of Electrification cost

Electrification project consist of the following components:-

- Base connection costs (Reticulation of village)
- Reliability of electrical network (as per NERSA requirements)
- Sub-Transmission strengthening (Bulk infrastructure)
- Densities (MVA/km)

*Total subsidy = Base + Future Density + Reliability + Sub transmission Strengthening.*



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# Legislative/Regulatory/Policy Framework



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# Regulatory framework

National Energy Regulator of South Africa



Energy Regulator Act

Regulator  
repealed

Gas Regulator

Gas Act

Regulator  
repealed

Petroleum  
Regulator

Petroleum Pipelines  
Act

Regulator  
repealed

Electricity  
Regulator

Electricity Act



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# Summary legislative/policy



Act	Policies	Programmes
Constitution	Electricity Pricing Policy	AsgiSA
Bill of rights(rights to basic service)	FBAE	EPWP
Energy White Paper(access to modern energy sources)	FBE	URP
Electricity Act  Division of Revenue Act (DoRA) Public Finance Management Act (PFMA)  Occupational Health & Safety Act Skills Development Act,  Preferential Procurement Policy Framework Act (PPPFA)	Electrification Policy Guidelines  Indigent Policy(Local Munic)  Pro- Poor Electricity Tariff Framework- in progress	ISRDP

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# Electricity Pricing Policy

- **General Tariff Principles**
- **Generation Pricing**
- **Wholesale Electricity Pricing**
- **Transmission Pricing**
- **Distribution Pricing:**

*Domestic tariffs to become more cost-reflective, offering a suite of supply options with progressive capacity-differentiated tariffs and connection fees*

*Poor customers shall be subsidised through the application of a life line tariff*



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# FBE & FBAE Policy

- **Targeting approach:-**
  - allocation to 20Amps customers
  - allocation to customer consuming <120 KWh
  - Indigent HHs
- **Local Municipalities develop an indigent policy**
- **Local Municipalities register indigent households**



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# IMPLEMENTATION OF THE FBAE

External service provider

Service provider should:

- Implement the indigent policy
- Report on indigent HHS receiving FBAE

Local Municipalities should:

- Monitor agreement
- Communication
- Verification
- Change



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# Electrification Policy Guidelines

- Farm Dweller Houses
- Suite of Supply
- Un-Proclaimed Areas
- Non-Grid
- Schools and Clinics
- Bulk Infrastructure Framework



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# CHALLENGES



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# UNIVERSAL ACCESS (CHALLENGES)

- Topography, no bulk infrastructure/ lack of infrastructure, dispersed of HHs, & HHs growth
- Insufficient programme funding
- Building of new bulk infrastructure in rural areas
- Refurbishment and rehabilitation of electrical infrastructure
- Technology Innovations (integration of other sources of energy)
- Non- grid regarded as second best (information campaign)
- Informal settlements electrification



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# UNIVERSAL ACCESS (CHALLENGES)

## Challenges in the Electricity industry in South Africa

- Ageing electricity infrastructure
- Minimum or no investment by respective distributors (municipalities) in the operation and maintenance of the electricity infrastructure to date, hence lack of maintenance.
- Increased blackouts and brownouts in the country, concern for quality and security of supply
- Limited or lack of adequate skills at local government level for operation and maintenance electricity infrastructure.



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# Food/Issues for Thoughts



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# What should we think about

## Project level

- All African power pools - large scale regional projects
- Involvement of the targeted countries/communities- best understanding – best suite model or approach
- Manufacturing of material needed done locally by local people & local companies( e.g. solar panels)
- Country specific medium and small scale self sustainable projects mini stand alone generation (e.g. distributed generation, mini hydro, mini animal dung generation, solar, wind, etc) – economic spin-offs for rural community



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# ELECTRICITY VALUE CHAIN Reverse

## POWER STATIONS GENERATION

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Reticulation  
LV Line  
(380/220V)

**SERVICE CONNECTION**

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# What should we think about

## Funding

Private sector(inverstors, banks, corporate social responsibility, etc),  
Donor funders, & development banks/agencies

- Loan- high interest rate- more debts for African countries
- Funding model to be revised (Mr Davies suggestion China Africa corporation
- Regulation, processes & procedures guideline country specific taking into account country development initiatives and policies

## Governments

- Develop legislation, regulations and policies: SA case, Developed

Nations cases

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# Bonus Slides

## Socio-economic Impact Study: HH Perspective



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# DME PROJECT - SOUTH AFRICA

Namibia

Botswana

Zimbabwe

Mocambique

Swaziland

Lesotho

Gave data at EA  
level

Used LSM1-3 (R0-  
R1600)

CAPE TOWN

PORT ELIZABETH

BISHO

BLOEMFONTEIN

KIMBERLEY

UPINGTON

PIETERMARITZBURG

DURBAN

NELSPRUIT

JOHANNESBURG

PRETORIA

MMABATHO

POLOKWANE



0 200 400 Km

# Main Energy Source - Summary

	Electrified			Non-electrified		
Energy source	Light	Cook	Heat	Light	Cook	Heat
Electricity	96	63	34	0	0	0
Candle	3	0	0	78	0	0
Firewood	0	28	37	0	53	65
Paraffin	1	7	9	20	39	22
Coal	0	2	3	0	1	2
Gas	0	1	0	0	4	2
Animal dung	0	0	0	0	2	0
Generator	0	0	0	1	0	0
Solar system	0	0	0	0	0	0
Car batteries	0	0	0	0	0	0
Batteries	0	0	0	0	0	0
Other	0	0	0	0	0	0
No energy source	0	0	16	0	0	9
Total	100	100	100	100	100	100



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# Mean Household Income Spent on Energy (%)

	Electrified	Non-electrified	All Households
<b>Province:</b>			
Eastern Cape	28	24	26
Free State	19	33	25
Gauteng	20	36	25
KwaZulu-Natal	18	17	18
Limpopo	14	18	15
Mpumalanga	20	16	19
North West	17	27	18
Northern Cape	12	10	12
Western Cape	17	27	19
<b>Location:</b>			
Rural	21	21	21
Urban formal	20	21	20
Urban informal	17	35	24
Farm	13	12	12
<b>Total</b>	<b>20</b>	<b>22</b>	<b>21</b>



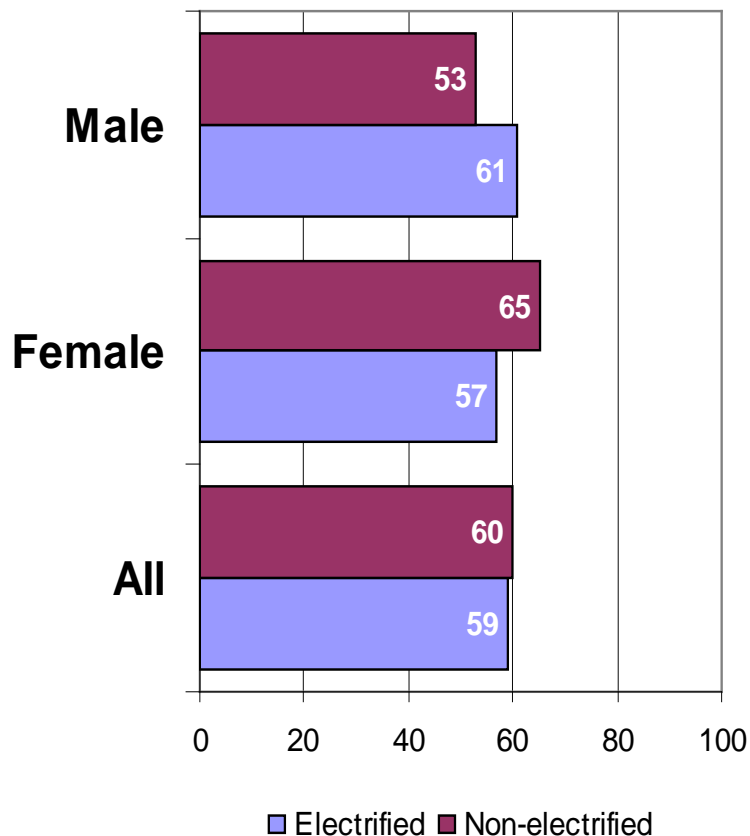
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Energy expenditure% of total monthly household income

# Energy Poverty – by Gender of Household Head (%)

Energy Poverty Incidence



Energy Poverty Shares

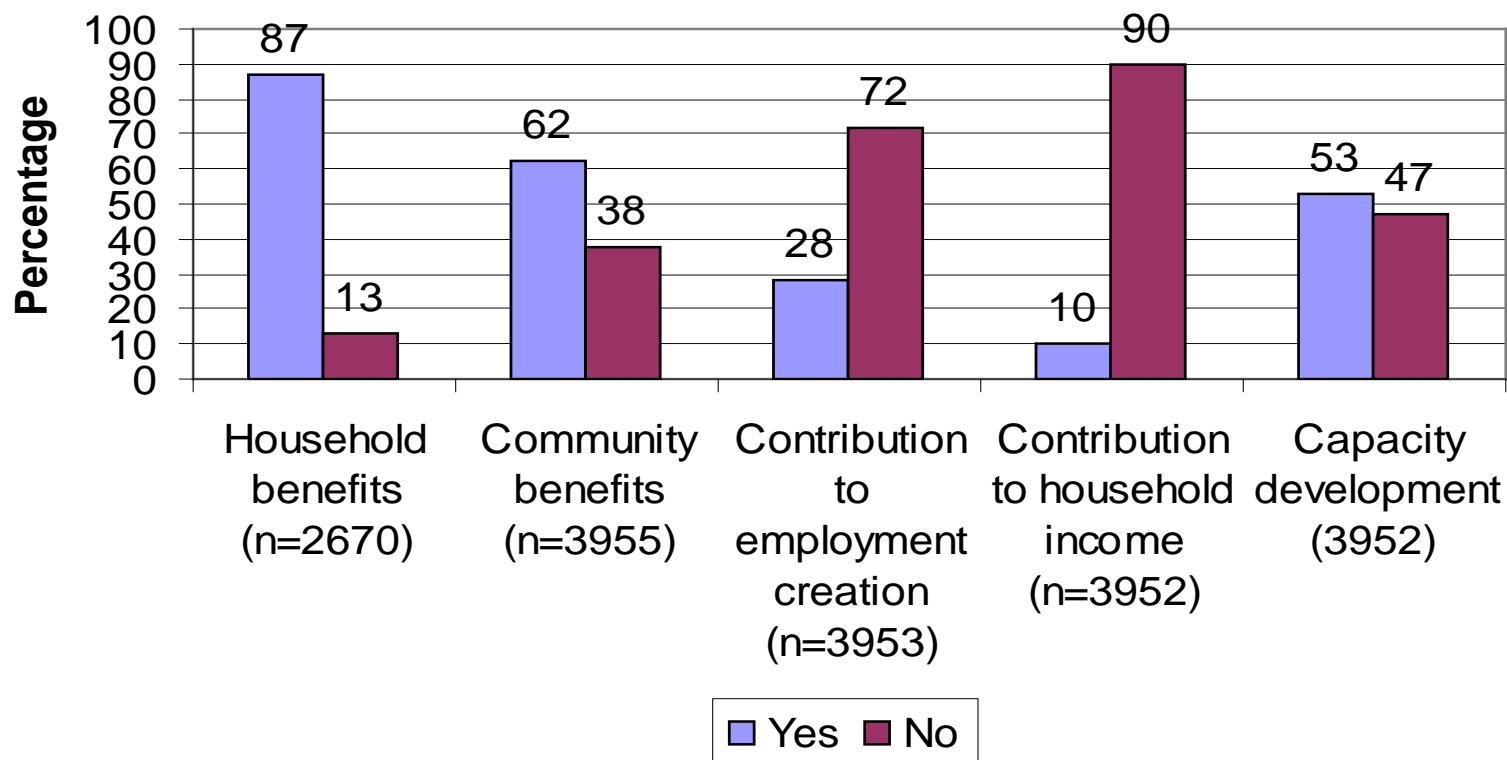
	Electrified	Non-electrified
Male	44	40
Female	56	60
Total	100	100



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# Summary: Impact of electrification



Household benefits only asked to electrified households, other benefits asked of all households, regardless of electrification status



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**THANK YOU**  
**Questions....?**



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