Overview

• Context: this is a **development in progress** and as such we are busy with communication with stakeholders and role clarification. We are consulting as widely as possible and the number of partners will increase.

• Eskom and Duke Energy, with support from various organisations including Global Sustainable Electricity Partnership (including Eletrobras) and the Southern African Power Pool, are developing an **Electrification (E°) Roadmap** for the Southern African Development Community (SADC), Africa and developing countries.

• The initiative will focus on assistance with consolidation of existing national electrification plans, plan finalisation as needed and securing resources for accelerating implementation. **The goal is to connect 500 million people to modern energy services by 2025.**
Preview

- Sustainable Energy for All
- African Reality
- Big Picture – Electrification Roadmap
- Energy Access Partnership
- Example of Connections required in the SAPP
- Future Plans
Overview – SE4ALL

- Sustainable Energy for All initiative – High Level Group
- Vision and three objectives
- Framework for Action and Global Action Agenda
- Country Studies
- Commitments – Private, Public Sectors, Civil Society
- Electrification Roadmap and Goal; Duke Energy, Eletrobras and G-SEP.
- Action going forward:
  - UN – country level plans and commitment implementation
  - Monitoring progress and fostering partnerships
  - **Eskom and G-SEP engage with the SAPP and all other stakeholders to contribute to the development of National Electrification Action Plans**
  - Eskom and G-SEP engage with EAP – rural and grid Electrification in African and other developing Countries
The rationale for this focus is based on the situation of the African people as reflected in the following information:

- **average electricity costs of US$0.18 per kilowatt-hour are about double that of other developing countries**;
- **power outages are responsible for a loss of between 1% and 6% of potential GDP every year**;
- **almost 42% of those who lack access to energy live in Sub-Saharan Africa**;
- **78% of those living in Sub-Saharan Africa use traditional biomass for cooking and heating**;
- **forecasts “show that more than a 10-fold increase in installed generation capacity would be required to provide for full access to electricity**;
- **Africa’s population has been growing at 2.3% per year**, more than double the rate of Asia’s population
Electrification Roadmap Components

- **Stakeholders:**
  - Governments and regions
  - Utilities
  - Financiers
  - Academics and Energy Planners
  - OEMs and Suppliers

- **Technologies**
  - HV Grid Expansion / Grid-extension
  - LV / Reticulation - Electrification / Connections
  - Off-grid / Micro-grids
  - Generation Supply Options

- **Processes:**
  - Agreements
  - Governance Mechanisms
  - Solution-matched Technical Best Practice
  - Electrification needs - research and analysis
  - Innovations required
  - Financial models and de-risking
  - Lowest cost technologies to accelerate electrification
  - Smooth learning curve
  - Accelerate technology transfer and capacity building
Macro-structure of Roadmap

Regional Plans

Country Plans – From SE4All Country Visits (those that “buy-in”)

Implementation Partnership
EAP / E3A

Analyse Opportunities

Volunteer Support against a Standard Model:
1. Buy in
2. Plan / Resource / Finance
3. Rollout
4. Monitor and Report
Development of local capacity
<table>
<thead>
<tr>
<th>Year</th>
<th>Period</th>
<th>Event</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td>2012</td>
<td>June</td>
<td>Duke Energy/ Eskom – Electrification (E°) Roadmap; SE4All Endorsement</td>
<td>Commitment to develop Electrification Roadmap submitted to UN</td>
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<tr>
<td></td>
<td>Jul-Aug</td>
<td>SE4All SADC E° Team Consultations; E3A Model and GSEP efforts integrated into Roadmap</td>
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<td></td>
<td>Jul-Dec</td>
<td>Country Analysis / E° Planning for 100m connections</td>
<td>Detailed assessment of SADC National Electrification Plans (to Country levels of Municipality/Province) Commitment fully populated with all Partners and Timelines</td>
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<td></td>
<td>Dec</td>
<td>SE4All Closing Event: SADC E° Roadmap Presented; SG Endorsement;</td>
<td>SE4All/SADC Energy Ministers/SAPP/AU Declaration</td>
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<tr>
<td></td>
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<td>SADC E° Roadmap Ambassadors appointed</td>
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<td>2013</td>
<td>Jan-Jun</td>
<td>SE4All SADC E° Team Formalised and Commitments accepted</td>
<td>Consultation with African and Developing Country stakeholders</td>
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<td>2014</td>
<td></td>
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<tr>
<td></td>
<td>Jun-Dec</td>
<td>SADC Country Plans Finalised</td>
<td></td>
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<td>2014</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Monitoring, Measurement, Verification and Reporting Standards</td>
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<td></td>
<td></td>
<td>Electrification Standardisation</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Electrification Training, Capacity Building and Technology Transfer</td>
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<td></td>
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<td>Quick Hits Identified and Implemented</td>
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<td></td>
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<td>Analysis of Country Plans of other African and Developing Countries</td>
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<td>2015</td>
<td>Jan-Dec</td>
<td>Gear up</td>
<td></td>
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<td></td>
<td></td>
<td>Electrification Planning Finalised</td>
<td></td>
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<td></td>
<td></td>
<td>Electrification Teams deployed</td>
<td></td>
</tr>
<tr>
<td>2016 - 2025</td>
<td>Implementation</td>
<td>Monitoring, Measurement, Verification and Reporting</td>
<td>Analysis of Supply and Demand</td>
</tr>
</tbody>
</table>
• Energy Access Partnership is a Section 21, ‘not-for-profit’ Company, registered in 2010 in South Africa, in accordance with the South African Companies Act.

• Through the acceleration of energy access, EAP seeks to contribute to economic growth and human development in the most environmentally sustainable way possible.

• Activities
  • project identification and design;
  • assistance in resource mobilization;
  • assistance with project implementation; and
  • monitoring and analysis of energy access activities.
EAP shareholder structure (2011)

- World Business Council for Sustainable Development (Switzerland)
- South Africa National Energy Association (SANE)
- Eskom (South Africa)
- Vattenfall (Sweden)
- Energy Services Alliance of Manitoba (ESAM) (Canada), currently headed by Manitoba Hydro International (Canada)
- Swedfund (Sweden)

EAP history 2005-2011

- ‘EPA’ (Energy Poverty Action) was initially created by nine energy companies for the purpose of accelerating energy access in rural areas in Africa
- This Energy Poverty Action partnership has been parented through its early stages of development by the World Economic Forum
- ‘EPA’ membership varied over the years from 9 to 3 to 6 shareholders currently
- EAP was formed through incorporation of the Energy Poverty Action Partnership and registered as a ‘not-for-profit’ company in South Africa end of 2010
EAP Development Concept

<table>
<thead>
<tr>
<th>EAP vision and mission</th>
<th>EAP Concept</th>
</tr>
</thead>
</table>
| • The vision of the EAP partners is to improve:  
  – human development  
  – economic growth  
  – environmental sustainability |
| • Energy access will be accelerated by implementing solutions which are:  
  – sustainable  
  – scalable  
  – ‘business’-orientated | • Rural electrification has never been, and will never be a financially viable proposition, therefore funding from commercial investors cannot be expected. Funding for power systems must be subsidised and obtained from non-commercial sources |
|                         | • Local operation and maintenance of power systems through electricity associations, electricity cooperatives, private power companies, etc. |
|                         | • Revenues from local end users should cover for the costs of operation and maintenance of the power system and the ‘local electricity utility’. |
EAP’s role and responsibilities centre around the identification, facilitation, development, assistance in resource mobilisation, implementation assistance, monitoring and reporting of investments to be made that accelerate energy access in Sub-Saharan Africa.

EAP does not invest themselves in any of the investment opportunities identified and developed, nor does it actively identify and develop investment opportunities for any of its shareholders.

EAP does not expect and accept any returns for their assistance provided – for example in the form of an equity position in the investment project – except for the right to abstract and share lessons learned with a wider audience.

All donations received by EAP are properly documented and accounted for following the South African tax and company accountancy practices through engagement of chartered accountants.

EAP does not get involved in politics in any of the countries, areas they are involved in, but they will inform themselves in detail about the political environments they plan to work in, especially since rural electrification is very politically influenced.
#### Operationalisation of the EAP Concept

**EAP area selection**
- Opportunities in countries where governments are willing to champion new approaches and have in place conducive policies and regulations
- Countries where progress of accessing electricity has been elusive
- Areas likely to remain unconnected to grid supply
- Preference for areas where use can be made of locally available, renewable energy sources
- Notwithstanding, grid extensions may sometimes offer the best solution

**EAP Financial Issues**
- Funding from EAP shareholders/members
- Funding from Government Budget
- Funding from the Donor community
- Funding from the Development Banks
- Combination of the above

**EAP Institutional issues**
- Identify most appropriate local set-up for the operation and maintenance of the power system
- Legally establish the local electricity utility and build the necessary capacity
- Assist with all necessary licenses to run the local electricity utility (generation license, distribution license, tariff setting, EIA, etc.)

**EAP Technology issues**
- Pre-feasibility study for different technology interventions to generate and supply electricity
- Focus on power systems with low operational and maintenance costs (no permanent diesel generators)
- Select most appropriate and cost-effective technology for the power system and design transmission and distribution network
### EAP Operations in Lesotho – ongoing

#### EAP area selection
- Area selected in close collaboration with the Government of Lesotho
- Mphaki district with the need for creating energy access for an approximate 2,000 connections (an approximate 10,000 people)

#### EAP Technology issues
- Pre-feasibility studies were done for micro-hydro; solar PV; and grid extension
- Final outcome a combination of grid extension and solar PV systems
- 121 km 33 kV transmission lines with 30 step down transformers (33/0.4) and 70 km distribution grid for 1,500 connections
- 350 Solar PV systems (100 Wp)

#### EAP Institutional issues
- The Mphaki Electricity Distribution Association (MEDA) was set-up based on local council representation
- MEDA was legally established and extensive capacity building was started (still ongoing)
- MEDA receives assistance with all required licenses (generation license, distribution license) and negotiations on tariff and connection fees

#### EAP Financial Issues
- Loan from the African Development Bank was successfully applied for, but from concept to actual disbursement of the first tranche has taken a long time
There will always be a need for funding from non-commercial sources and this is a big limiting factor in what can be achieved in terms of creating energy access for over half a billion Africans – investment required is no less than 1 trillion USD (at USD 2,000 per connection).

Firm belief that the two pillars of the EAP concept (local empowerment and management; local revenues to cover for local costs and maintenance) are sound. We need to mobilise local resources!

Creating local capacities is not to be done in a vacuum; i.e. funding for the rural power systems needs to be secured prior to mobilising future local electricity utilities. If done in the reverse way disappointment, frustration and lack of interest result from the delays and unsuccessful attempts to secure funding.

Systematically assessing technology options (focus on renewables where possible) results in the most cost-effective power generation systems; i.e. the less costly option – but still expensive!

There is a need for existing (political) systems to accept other approaches to increase energy access. For example ‘one tariff for all’ does not allow for making use of local willingness and ability to pay for real operation and maintenance costs – locally available cash is very much needed to accelerate energy access.
Electrification Roadmap

- **Energy Access Partnership**
- **SE4All**
- **National Governments**
  - A
  - B
  - C
  - D
- **Regional SAPP**
- **Financing**
- **Execution Standards**
- **Training Plans**
- **Access to 500 Million by 2025**

**Contributors:**
- Eskom
- Duke Energy
- Eletrobras
- G-SEP

**Support:**
- McKinsey Technical Support Centre of Expertise
- Regional Energy Access

**Funding:**
- G-SEP
- AfDB
- World Bank
- Bank of America

**Countries:**
- A
- B
- C
- D
Example of implementation: Working towards a baseline (SAPP)

1: [https://www.cia.gov/library/publications/the-world-factbook/fields/2119.html]; 2: Assumption of 5 people per connection; 3: unconfirmed

<table>
<thead>
<tr>
<th>Country</th>
<th>Utility</th>
<th>Population</th>
<th>Total Country Connections Required</th>
<th>% E° from SAPP</th>
<th>Country Connections Required</th>
<th>Number of people connected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Botswana</td>
<td>BPC</td>
<td>2,098,018</td>
<td>419,604</td>
<td>28</td>
<td>302,115</td>
<td>1,510,573</td>
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<tr>
<td>Mozambique</td>
<td>EDM</td>
<td>23,515,934</td>
<td>4,703,187</td>
<td>18</td>
<td>3,856,613</td>
<td>19,283,066</td>
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<td>Angola</td>
<td>ENE</td>
<td>18,056,072</td>
<td>3,611,214</td>
<td>10</td>
<td>3,250,093</td>
<td>16,250,465</td>
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<td>Malawi</td>
<td>ESCOM</td>
<td>16,323,044</td>
<td>3,264,609</td>
<td>7.6</td>
<td>3,016,499</td>
<td>15,082,493</td>
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<td>South Africa</td>
<td>ESKOM</td>
<td>48,810,427</td>
<td>9,762,085</td>
<td>80</td>
<td>1,952,417</td>
<td>9,762,085</td>
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<tr>
<td>Lesotho</td>
<td>LEC</td>
<td>1,930,493</td>
<td>386,099</td>
<td>10</td>
<td>347,489</td>
<td>1,737,444</td>
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<td>Namibia</td>
<td>NamPower</td>
<td>2,165,828</td>
<td>433,166</td>
<td>34</td>
<td>285,889</td>
<td>1,429,446</td>
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<td>Swaziland</td>
<td>SEC</td>
<td>1,386,914</td>
<td>277,383</td>
<td>15</td>
<td>235,775</td>
<td>1,178,877</td>
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<td>Democratic Republic of the Congo</td>
<td>SNEL</td>
<td>73,599,190</td>
<td>14,719,838</td>
<td>9</td>
<td>13,395,053</td>
<td>66,975,263</td>
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<td>Tanzania</td>
<td>TANESCO</td>
<td>43,601,796</td>
<td>8,720,359</td>
<td>10.5</td>
<td>7,804,721</td>
<td>39,023,607</td>
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<tr>
<td>Zimbabwe</td>
<td>ZESA</td>
<td>12,619,600</td>
<td>2,523,920</td>
<td>39.7</td>
<td>1,521,924</td>
<td>7,609,619</td>
</tr>
<tr>
<td>Zambia</td>
<td>ZESCO</td>
<td>14,309,466</td>
<td>2,861,893</td>
<td>25</td>
<td>2,146,420</td>
<td>10,732,100</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td>258,416,782</td>
<td>51,683,356</td>
<td></td>
<td><strong>38,115,007</strong></td>
<td>190,575,037</td>
</tr>
</tbody>
</table>
Notes

- Work with existing SAPP / Eskom streams
- Follow up on SE4All Country Studies.
- Include supply and demand with focus on economic development
- Regional workshop – couple with the planned SAPP meeting (include the parties that have made SE4All commitments)
  - SAPP
  - PIESA
  - Electrification Roadmap Utility Partners (G-SEP)
  - NEPAD / AU
  - AfDB
  - BoA
  - DBSA
- Ongoing communication with all parties (Duke, McKinsey, EAP, Eletrobras, SAPP Utilities)
The following ten years will be a period of increasingly accelerated, electrification actions.

The success of the plans will be highly dependent on:
- the monitoring, measurement, verification and reporting of the efforts.
- A systemic matching of the supply and demand, of the areas in the countries, with the developmental needs and the actual achieved growth; leadership and commitment by all levels of participants and the sustained intent to achieve universal access.

The Global Sustainable Electricity Partnership (GSEP) is a consortium of some of the largest electric utilities in the world. CEOs from its 13 members approved this commitment along with two additional projects at their annual meeting in May 2012.

The vision remains, firmly, to achieve universal access by 2030.
From now to 2015 - we will ….

- Use **seed funding** to forge partnerships and engage with the relevant partners to secure commitment, human and financial resources and finalise plans for the implementation phase
- **Analyse** the electrification need;
- **Use existing** plans where they exist;
- **Assist with development** of such national plans where needed;
- Facilitate **training and human and institutional capacity building**;
- Dynamically **match supply and demand** while being cognisant of developmental needs;
- Encourage and assist with:
  - regional electrification **strategy** formulation,
  - appropriate **financing** for the implementation and
  - **execution** of quick hits.
- Simultaneous **sharing of knowledge and experience** with counterparts in the rest of Africa and other developing Countries
"This is very bad and is something that the energy community and others should be ashamed of"

Fatih Birol (IEA's chief economist).

The amount of electricity consumed in one day in all sub-Saharan Africa, minus South Africa, is about equal to that consumed in New York City, an indicator of the huge gap in electricity usage in the world.