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SOUTH AFRICAN LOCAL GOVERNMENT ASSOCIATION
SALGA
Inspiring service delivery

SALGA comments: IRP base case
Submission – Executive summary
March 2017

These comments and suggestions are submitted in the spirit of the IRP being a plan reflecting the realities, needs and resources of all key actors of the electricity sector including local government.

1. Priority requests

SALGA, on behalf of local government, suggests the following for inclusion in the IRP update:

1. Active collaboration in IRP planning between national-level team and those LG electricity distributors that currently have the capacity
2. A range of future demand forecast scenarios, in this IRP cycle incorporating:
    a. The modelling of different uptake rates of distributed technologies such as EE, DSM, load shifting, gas, SSEG and other disruptive technologies (e.g. storage or electric vehicles) and their impact on the demand curves.
    b. Price elasticity of demand for both electricity supply and substitutes.
    c. "Bottom-up" demand forecasts from those LG electricity distributors – and other actors – including municipal own supply where economically feasible.

    ⇨ All IRP-scenarios should demonstrate robustness within the range of demand futures.
3. Tariff impact studies and wholesale price path development for the different IRP scenarios and further spiral effects on demand. This is crucial to assess the most suitable options.
4. In medium term, bottom up load forecasting process for LG demand, with necessary technical assistance from national level.
5. In medium term, a methodology that integrates modelling of energy efficiency and demand side management, distributed and embedded electricity generation, storage and other energy services as supply options, on an equivalent footing to utility-scale scale electricity generation options.

These requests are based on the following analysis.

2. Context, Introduction and Background

The Department of Energy (DOE) has invited comments on the Integrated Resource Plan 2016 Update (IRP2016). Engagements have taken place between SALGA and several metropolitan, local and district municipalities, as well as other key stakeholders.

Municipalities account for more than 40% of South African electricity demand. Current global changes in the electricity value chain, particularly at distribution level, mean that electricity distributors have the opportunity to be a dynamic factor in the value chain, enabling local investment in energy services and electricity supply within a context of integrated supply and load management. Even if electricity distributors do not take a pro-active approach, disruptive technologies and behaviours are forcing changes, especially in a context of large structural electricity prices increases in South Africa.

Least cost energy services supply to consumers and affordability are the key concerns for local government. Decisions made in the IRP will substantially impact electricity price from the grid and enable, or disincentivise, implementation of energy services, and electricity supply solutions at electricity distributor level.

3. IRP2016 demand forecast

a. Total energy systems demand vs. demand on the transmission grid

LG recognises that the total supply of energy services has to increase to meet socio-economic development objectives. This does not have to all translate into resultant demand on the national grid. Portions of the most economical supply of energy services will in future be increasingly met by a mix of solutions at local distribution level, inter alia: Energy efficiency (EE); Small-scale electricity generation (SSEG) for own-supply and supply onto the grid; Distributor own-supply (DOS); Large customer own-supply and supply onto the grid; Storage and electric vehicles EVs in the medium to longer term.

b. Demand on the transmission grid – the need to include price effect

It is a plausible scenario that the increase since 2007 in electricity prices from centralised generation technology[1] could be a permanent structural phenomenon, with profound impacts on demand.

The EUIG made the following statements in its presentation to the IRP2016 hearings.

> "South Africa's electricity demand has not grown since 2007, due largely to structural (not cyclical) changes in commodity markets, weak economic growth and energy efficiency. The lack of generation capacity was not the main reason

[1] The technology options currently prioritized in the IRP2016 Base Case, for e.g. utlity-scale coal, nuclear, PV, wind etc.

for the drop in demand, meaning the availability of new capacity will not automatically cause renewed demand growth."

This is amplified by research[2],[3] that highlights "the need to study the effect of the price increases on demand", indicating that demand has "become much more sensitive to changes in the price of electricity". A significant portion of energy intensive industry could experience tipping points.

The research paper describing the model used for the IRP2016 demand forecasts[4] states that[5]: "Our chosen data-driven methodology has the disadvantage of not being able to model the effect of variables that did not play a statistically significant role in the historical data, or of causal factors which could not be quantified." Electricity price is plausibly one of these factors.

c. LG electricity distributors' demand on centralised system

In most municipalities, over the last ten years, electricity consumption has either decreased or increased marginally. Power demand has become more peaky: i.e. the ratio of peak demand to energy supplied has increased.

There are marked differences between municipalities in terms of the sectoral demand characteristics. Some important ones, among many, are that in some areas even though connection numbers are increasing, energy per connection is decreasing; demand in some cases is sensitive to commercial sector economic performance, and that while demand from existing customers is decreasing, in special cases new singular industrial developments (if they arrive) will boost electricity generation.

However, LG representatives that have engaged in these consultations (largely) agree that firstly, at least until around 2020, their demand will be decreasing or flat, and; secondly, that after 2020 it will most likely increase at a rate substantially lower than the IRP2016 Base Case forecast rate (low scenario).

d. The risk of over-building

The EUIG made the following statements in its presentation to the IRP2016 hearings.

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[2] Blignaut, J. Inglesi-Lotz, R. Weideman, J.P. 2015. Sectoral electricity elasticities in South Africa: Before and after the supply crisis of 2008. Afr J Sci. 2015;111(9/10), Art. #2014-0093, 7 pages.http://dx.doi.org/10.17159/sajs.2015/20140093

[3] Cameron, M. and Roussouw, R. 2012. Modelling the Economic Impact of Electricity Tariff Increases on Eskom's Top Customer Segment. International Journal of Energy Engineering 2012, 2(6): 315-331DOI: 10.5923/j.ijee.20120206.06.

[4] CSIR,2016. Forecasts for electricity demand in South Africa (2014 – 2050) using the CSIR sectoral regression model January 2016 Project report Prepared for: Eskom (as inputs into the IRP 2015 (sic))

[5] Koen, R. Holloway, J. 2014 Application of multiple regression analysis to forecasting South Africa's electricity demand. Journal of Energy in Southern Africa , Vol 25 No 4, November 2014.

> "Over-building, leading to over-capacity will result in severe price increases, stifling further growth and triggering a negative spiral, where above inflation price increases and falling demand feed on each other".

Impacts of over-building are of concern for LG because of potential unnecessarily high electricity costs and impacts on service delivery and economic development; and, second order effects: the interaction between unnecessarily high electricity prices and alternative supply options accelerating moves to own-generation and grid defection. That poses additional challenges to LG finances.

4. A rapidly changing industry

The electricity industry is undergoing rapid and unprecedented change. South African LG electricity planning documents, international reports, and discussions with LG indicate that these changes could significantly, and possibly radically, alter the 2050 picture painted by the IRP2016. This 'alternative' future could well be beneficial in a number of dimensions. This limitation in the IRP2016 Base Case poses specific risks in the areas of LG mandates in addition to those mentioned in the demand section.

Further considerations of LG, local level plans and opportunities

Given potential benefits of electricity industry developments and the linkages between energy, environment, economic development, basic service provision, local planning cannot avoid, and should not avoid, embracing change. Some municipalities have developed plans accordingly.

To ensure economically optimal uptake, municipalities have realised that they need to pro-actively integrate these developments, largely driven by private initiative and investment. In addition to being lower cost and hence providing lower cost services and stimulating the economy, these local solutions also make a substantial contribution to local industrial development as well as other co-benefits, creating much needed jobs in local economies.

For example, the City of Johannesburg views the central grid providing 66% of its electricity demand by 2050, while the rest will be supplied by a range of distributed local solutions. The City of Cape Town has calculated very substantial savings and economic benefits through municipal own supply, using a conservative projection of future national centralised generation technology system supply from the national grid.

5. Items suggested for incorporation in IRP2016

a. Planning for a "future of changes"

While the IRP should cater for a "recovery from load shedding"[6] it should also present for assessment a number of IRP-scenarios*[7] that each demonstrates it can robustly and prudently satisfy a range of future demand scenarios including those of much lower electricity energy demand on the national grid, potential higher peakiness (requiring specific supply technologies) AND recognise the role LG can play in local lower-cost energy services provision.

These would include analysis of the costs and risks that over-build might lead to and accordingly present plans which mitigates these risks, including the quantitative analysis of the value of deferred investments for technology options[8]. This would include explicit incorporation of the effects of electricity prices on demand, the impacts of over-build on prices, including feed-back effects (the spiral EUIG mentions) on demand and second order effects such as accelerating the move to SSEG and grid defection.

There is a need to model the positive contributions that the energy services and electricity supply options within LG can bring to the system as a whole. These include for example energy efficiency, SSEG, storage, own generation, as well as added flexibility and load management capabilities.

b. The basis for the plan: a least-cost base case

From the perspective of LG, in order to ensure that the sector moves towards affordable electricity prices, it is crucial that the basis for the IRP should be based on a credible least-cost base case, and that all deviations from this should be quantified and motivated. Least cost energy services supply to the consumer and affordability are the departure points and key concerns for local government.

- EEDSM and SSEG are substantial components of achieving least cost, including related integrated load management and grid services that will enable these least-cost solutions.
- The proportion of the national GHG emissions budget allocated to electricity is probably high compared to the relative costs of mitigation in electricity compared with other sectors. This should be addressed

[6] Presentation to IRP hearings by CT Gaunt: http://www.energy.gov.za/IRP/irp-presentaions/cape-town/IRP-2016-Reality-Check-University-of-Cape-Town.pdf

[7] *IRP-Scenarios are the centralised generation technology system "build plans" that are considered for adoption as "The IRP" informing Ministerial New Generation Determinations.

[8] Technologies with smaller unit sizes, shorter lead times, standard components and lower complexity present lower over-build risks and these can be quantified.

- Potential Structural changes require that a prudent IRP takes price effects into account
- Transmission costs associated with the chosen supply options should be integrated because they incorrectly skew the cost comparisons in favour of centralised generation technology system away from LG level solutions.

6. Consultation process - way forward

Electricity distributors should play a greater role in the IRP planning processes, given that LG represents over 40% of the demand, given the potential impacts of the IRP on LG, and given that over the IRP2016 timeframe until 2050 the electricity industry could well undergo radical transitions that are highly relevant to LG and the IRP.

Electricity distributors and resources in LG areas should move from being viewed as a passive receivers of electricity to being involved as a strategic planning, economic and investment partner and resource. As such, in the immediate IRP2016 processes, LG would like to offer to contribute specifically in that:

1. LG analyses and plans be thoroughly considered in the formulation of future scenarios and demand forecasts
2. Pro-active consultation processes with LG, driven jointly by SALGA and DOE, and covering the issues listed in this paper. This includes thorough consultation with LG on the least cost scenario(s), possible scenarios and policy adjusted plan.
3. That a number of possible “futures” be formulated and considered, especially with regard to the potential for fundamental changes in the industry by 2050.
    a. That some of these make use of a back-casting approach where a vision for 2050 is developed and then the pathways to that vision be used to inform the scenario process. This would assist to avoid locking in current configurations by only considering step-wise incremental changes when the mainstream literature and some LG analyses present compelling evidence of a number of disruptive factors that the IRP2016 needs to address for prudence.
4. The IRP thoroughly analyses the implications, especially for LG, of future price trajectories. Price elasticities of demand and the ‘negative spiral’, at both the national system level and within LG electricity distributors, should be included. These analyses should then identify and assess how a full range of relevant supply options might address a wide range of demand forecasts, and supply take-up (to incorporate over-build impacts and mitigation).

In the spirit of cooperative governance, the LG sphere looks forward to taking this discussion forward and being seen as a key resource in building a vision for the future of the electricity industry in South Africa.