### 100 MW limit and associated Grid-Tie Considerations

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12 August 2021



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## The 100 MW Limit, why is this significant?

- The energy availability factor is currently at about 65%. This means that on average 35% of Eskom's power plants are standing idle at any particular time due to faults or maintenance.
- Eskom's available capacity is currently about 4,000MW lower than the peak demand level of about 34,000MW and significantly lower than its nominal capacity of about 45,000MW. This shortfall is the result of a gradual increase in unplanned capacity loss (now about 10,000MW) and a recent increase in planned capacity loss. Unplanned capacity loss, spread across power plants, is due to the high average age (more than 37 years) of the baseload generation fleet, requiring maintenance and large-scale retrofitting; running the power stations hard to meet increased demand; and declining coal quality, which affects plant performance.
- Risk Mitigation Independent Power Producer Procurement Programme. In theory, bidders are required to be able to generate electricity by August 2022. But given that solar and wind farms typically take two years to become operational, the stipulated rollout time is too short. Most of these projects will only be supplying the grid in 2023.
- The 2,600 MW added to the system in round 5 are with intermittent technologies. They only function when the sun is shining, or the wind is blowing. They will therefore only be adding, on average, slightly under 1,000 MW. That's too little to overcome the existing power deficit.

# What are some of the system implications?

- System stability concerns Pertinent issues such as voltage fluctuation, voltage rise, voltage balance, and harmonics and their effect on the system votage M
- Safety considerations issues of islanding, reverse power flow, etc.
- Dispatchable power reserves...spinning reserve



## Key Aspects of a Grid-tie embedded generation

- Compliance to legal and regulatory requirements,
- Compliance to Eskom and the South African Bureau of Standards (SABS) technical and contractual requirements,
- Ensuring the safety of people, assets/buildings, animals and equipment.
- Schedule 2 Gazette No 43151 of the Electricity Regulation Act (ERA) regarding licensing, registration or to be exempt from registration, for your generation facility.





# Generators requiring licencing

- Any Generator:
- Above 1MW, supplying more than one non-related party, irrespective of size will require licensing.
- Exceptions:
- A generator above 1MW used for demonstration purposes for no longer than 36 months,
- a generator producing electricity from waste heat.

## REGULATOR OF SOUTH A

### Licence Number: NER/

## **OPERATION OF A GENERATION FACILIT**

ed by the National Energy Regulator of South Afric ERSA", in terms of the Electricity Regulation Act, 200 cence is issued to:

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## Generators requiring registration

- Schedule 2 of the ERA states the following Generators must be registered with NERSA:
- The operation of a Generator with a capacity of no more than 1MW and a Point of Connection on the distribution power system, in circumstances in which:
  - the Generator supplies electricity to a customer or related customers with or without wheeling of that electricity; and
  - the Generator complies with the Grid Code(s) and has entered into a connection agreement with the holder of the distribution licence in respect of the power system over which the electricity is to be wheeled.
- The operation of a Generator for demonstration purposes only (not longer than 36 months),
- The operation of a Generator where the electricity is produced from waste or the residual product of an underlying industrial process,
- The continued operation of an existing Generator which, immediately prior to the date of commencement of this Schedule, was exempt from the requirement to apply for and hold a licence under the Act.

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## Different configurations

- Off-grid systems no NSP authorisation and no NERSA registration
- Grid-tie self-use NSP authorisation, Licensing as per ERA schedule 2
- Grid-tie export NSP authorisation, Licensing as per ERA schedule 2
- Grid-tie requirements
  - Apply to NSP, pay connection fees, sign an ESA and CUOSA connection and use-ofsystem agreement
  - Comply with Schedule 2 of the ERA, the various Grid Codes, NSP standards and SANS standards
  - a professionally registered competent person will complete the "embedded generation installation (EGI) compliance test report" which forms part of the Customer's connection and use of system agreement.

## Export power and wheeling

- May depends on NSP, but Eskom will compensate (credit) the customer for this energy at the Gen-offset tariff
- exported energy into the grid and this energy is wheeled to another Eskom customer or point of delivery (the off-taker). Eskom will credit the off-taker of the energy for non-Eskom energy at the Gen-wheeling tariff rates.
- Tariffs for wheeling are contained in Eskom's tariff book.

## Agreements to be signed (NSP dependant)

- A new electricity supply agreement if the existing agreement is old or if there is a tariff conversion or changes to the supply.
- Amendments to the electricity supply agreement to enable offset or wheeling or energy banking.
- A connection and use-of-system agreement setting out the conditions and obligations for the generator connection.

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## A look at the grid code

#### The SA Grid Code – An Overview





#### The SA Grid Code – Key Requirements for CO Declaration

#### **Network Code – Generator Connection Conditions**

Section 3 Connection Conditions: This section specifies the minimum technical and design requirements that customers shall adhere to when connected to or seeking connection to the TS/DS, or for embedded generators or co-generators.

- 3.1.1 Protection (GCR1)
- 3.1.2 Ability to perform unit islanding (GCR2)
- 3.1.3 Excitation system requirements (GCR3)
- 3.1.4 Reactive capabilities (GCR4)
- 3.1.5 Multiple unit tripping (MUT) risks (GCR5)
- 3.1.6 Governing (GCR6)
- 3.1.7 Restart after power station black-out (GCR7)
- 3.1.8 Black starting (GCR8)
- 3.1.9 External supply disturbance withstand capability (GCR9)
- 3.1.10 Deleted [2005/08] (GCR 10)
- 3.1.11 Emergency unit capabilities (GCR11)
- 3.1.12 Facility for independent generator action (GCR12)



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#### **Stakeholders and Responsibilities**



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#### A Review of the Process for Generators



Typical Interpretation of phases applicable to Generators for CO

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#### Exemptions how and why

**Why** : If noncompliance exist and have been identified during initial investigations or post testing, the Generator can apply for an exemption of that clause for a prescribed time whilst becoming compliant.

How: The exemption application is to be launched through the governance processes. The figure below provides the breakdown.



#### The Connection Process – Budget Quotes



## Thank You