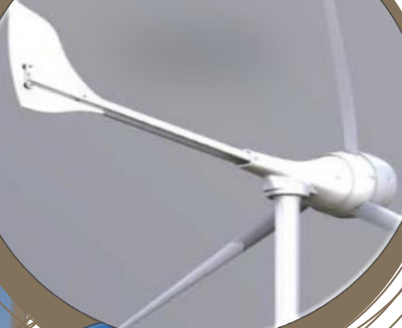
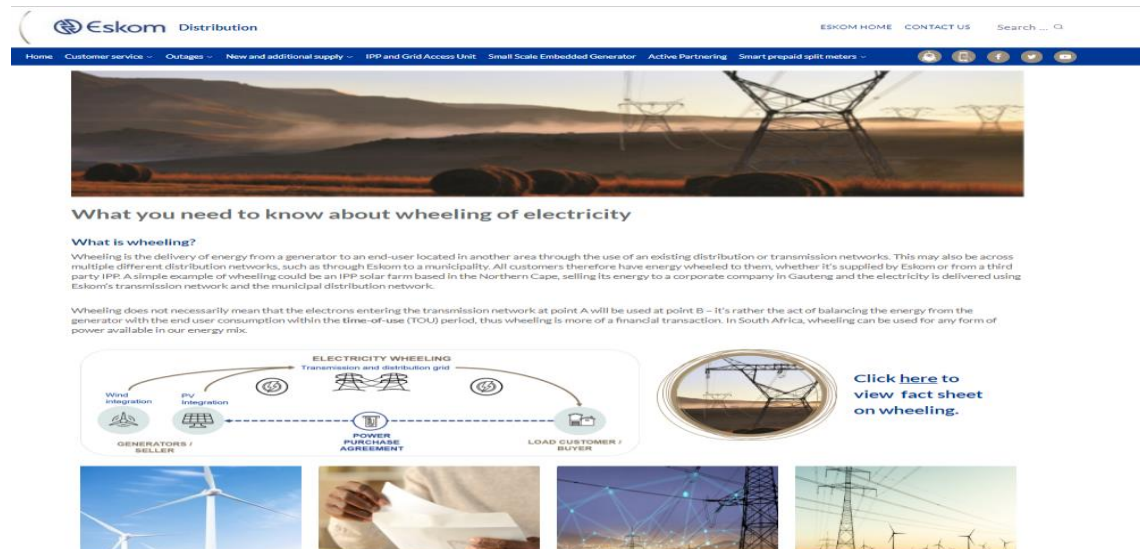


Wheeling of energy Offset (net-billing) of energy


Eskom Distribution ESKOM HOME CONTACT US Search ...

Home Customer service Outages New and additional supply IPP and Grid Access Unit Small Scale Embedded Generator Active Partnering Smart prepaid split meters

What you need to know about wheeling of electricity

What is wheeling?
Wheeling is the delivery of energy from a generator to an end-user located in another area through the use of an existing distribution or transmission networks. This may also be across multiple different distribution networks, such as through Eskom to a municipality. All customers therefore have energy wheeled to them, whether it's supplied by Eskom or from a third party IPP. A simple example of wheeling could be an IPP solar farm based in the Northern Cape, selling its energy to a corporate company in Gauteng and the electricity is delivered using Eskom's transmission network and the municipal distribution network.

Wheeling does not necessarily mean that the electrons entering the transmission network at point A will be used at point B - it's rather the act of balancing the energy from the generator with the end user consumption within the time-of-use (TOU) period, thus wheeling is more of a financial transaction. In South Africa, wheeling can be used for any form of power available in our energy mix.




ELECTRICITY WHEELING
Transmission and distribution grid

Wind integration PV integration

GENERATORS / SELLER POWER PURCHASE AGREEMENT LOAD CUSTOMER / BUYER

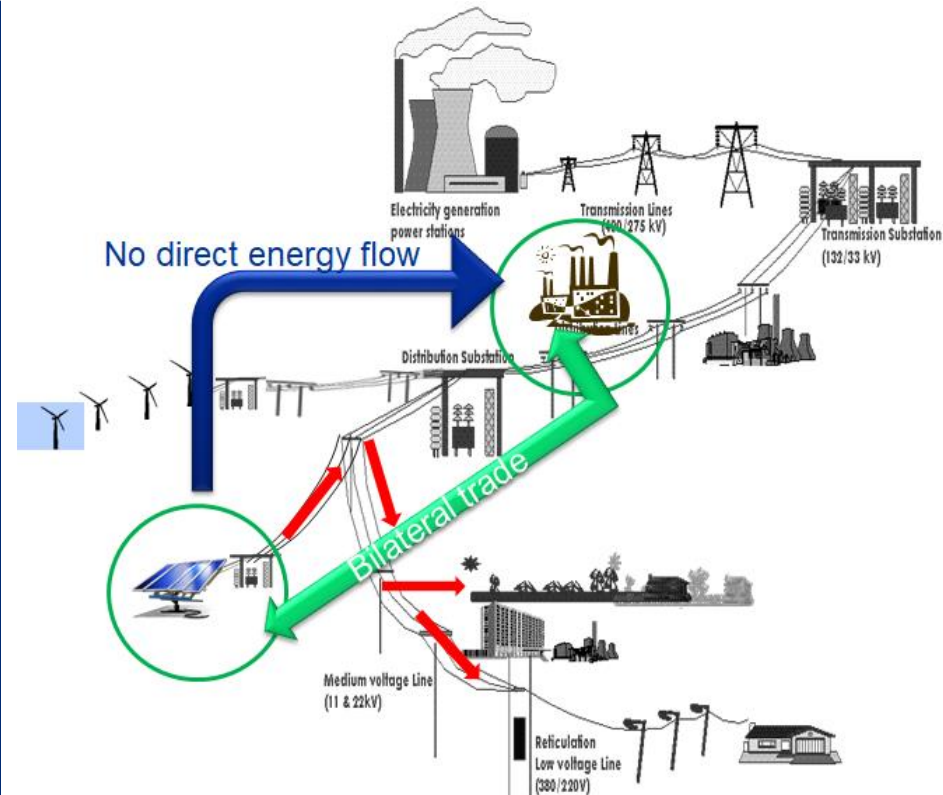
[Click here to view fact sheet on wheeling.](#)



Refer to [Wheeling - Distribution \(eskom.co.za\)](http://Wheeling - Distribution (eskom.co.za))

Wheeling

- When a customer receives energy from a private generator, it is not feasible for the IPP/generator and consumer to have their own transmission and distribution lines;
- They have to rely on Eskom and/or municipality owned transmission and distribution networks to deliver the energy produced by the IPPs.
- This action of transporting energy from a private generator to an end user located elsewhere on the network through the use of an existing distribution or transmission system is called **third party wheeling**.
- Third party wheeling does not imply that the electrons entering the network at point A (generator) will be used at point B (off taker), it's more of an accounting transaction balancing the energy from a generator with the energy consumed by the end user/ off taker taking losses into consideration.
- It enables IPPs to generate renewable energy where the resources are located and supply end users in other locations.



- All energy delivered over the grid is wheeled whether supplied by Eskom or a non-Eskom generator
- All customers (Transmission and Distribution connected generators and loads) are provided non-discriminatory access to the grid to allow for energy to be delivered or exported
- Standard tariff charges are payable for such access being provided.

Wheeling – How it works

The generator gets an approved connection i.e. apply to Eskom for grid connection and pay the applicable connection charges as quoted and signs the connection and use of system agreement and obtains the required registration / licence from NERSA

The generator nominates the buyer (or offtaker if the buyer is in a municipal area of supply) in their connection and use of system agreement

A Generator use of system service agreement is created on the billing system to raise charges based on the MEC. Whatever energy amount nominated that is exported, is then credited on the buyer's account

The buyer (or offtaker), signs an amendment agreement to their supply agreement to account for the wheeled energy

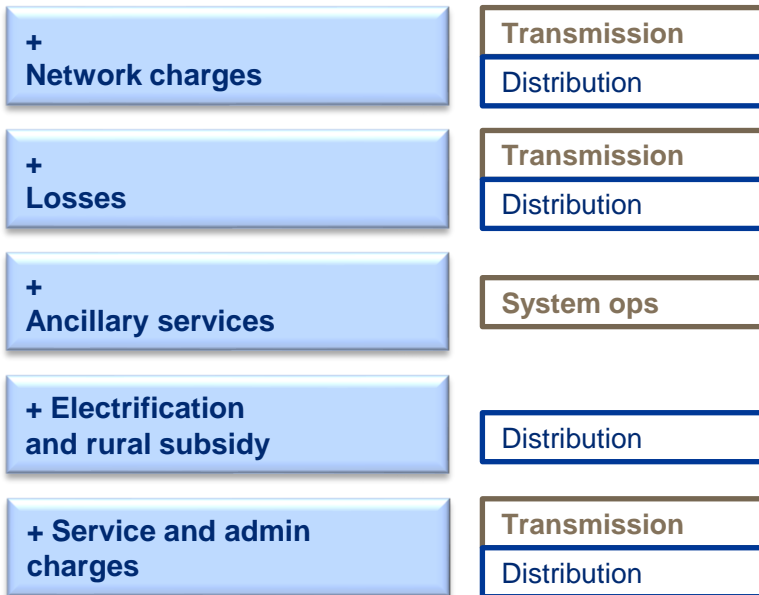
A separate service agreement is raised on the load account to subtract the wheeled energy at a rate excluding losses – using the NERSA approved Gen-wheeling tariff. This is a separate service agreement, and the existing load service agreement is not impacted (customer will still pay normal load tariff).

No need for a quote on the load side because a wheeling arrangement does not reduce (or increase) the capacity required on the network – unless if an upgrade or downgrade is required then normal process for change in supply will apply.

Having a wheeling agreement in place does not avoid load shedding.

Published standard use-of-system charges

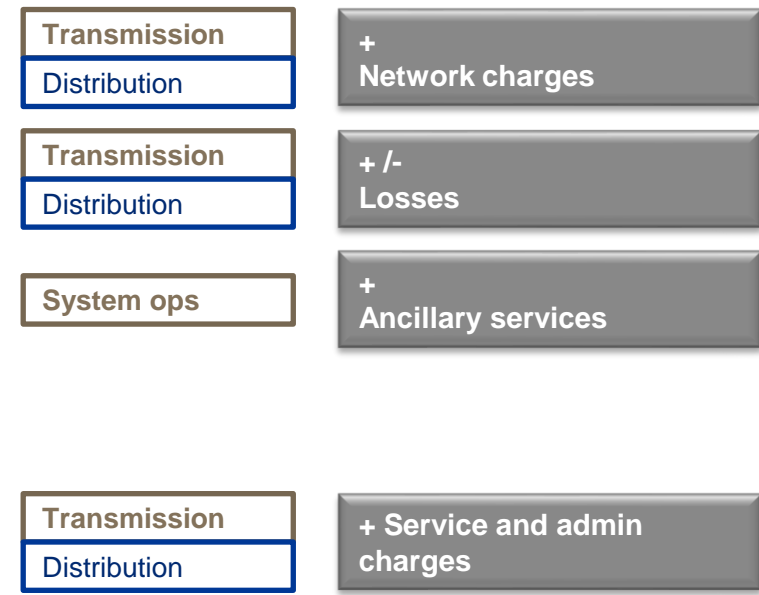
Loads



For load's use of system = standard tariff charges

1. network charges are based on voltage and urban/rural differentiation and tariff
2. Ancillary service charge
3. Losses
4. Contribution to subsidies
5. Service and administration based on NMD

Generators



For Generator's use of system = Gen-DUoS (Rural or Urban) and Gen-TUoS

1. Network charge (current only for >22 kV connected)
2. A network losses charge (positive or negative)
3. An ancillary service charge
4. Service and administration based on MEC

Wheeling is not allowed for generators/loads connected at low-voltage (<1 kV)



Under investigation

Eskom allows wheeling based on the principle of non-discriminatory access to the grid, subject to the buyer being connected at MV or higher and being on a TOU tariff and:

The generator having a licence/ registration from NERSA to generate and for the wheeling transaction.

The generator must apply to Eskom for grid connection and pay the applicable cost estimate fee for the cost estimate letter to be issued, then pay the quotation fee to request the budget quote and pay the connection charges quoted in the budget quote.

The account(s) where the energy will be wheeled to, must sign an amendment agreement to have the account adjusted based on the Gen-wheeling tariffs

The generator must sign the connection and use of system agreement and agreement to nominate the off-taker/s.

The buyer/off-taker can be another Eskom customer, a municipality or a customer within a municipality network. The buyer/off taker will be required to sign an amendment agreement and pay for updated security deposits

Eskom does not allow wheeling to a customer that is in debt..

Where one of the parties buying the energy are located within a municipal network, the municipality would have to agree to allow the wheeling transaction.

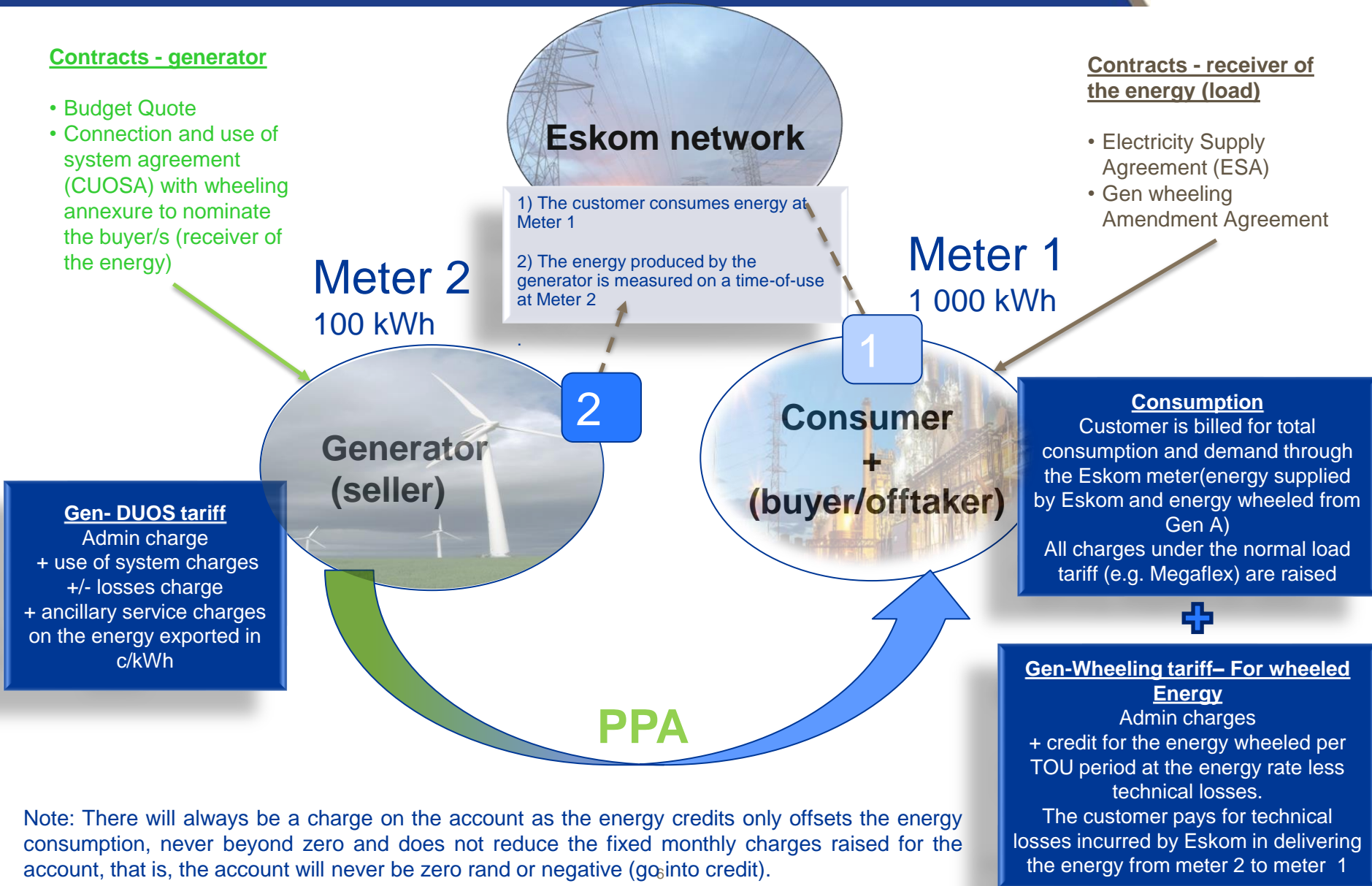
Illustration of a wheeling transaction

Contracts - generator

- Budget Quote
- Connection and use of system agreement (CUOSA) with wheeling annexure to nominate the buyer/s (receiver of the energy)

Contracts - receiver of the energy (load)

- Electricity Supply Agreement (ESA)
- Gen wheeling Amendment Agreement



Note: There will always be a charge on the account as the energy credits only offsets the energy consumption, never beyond zero and does not reduce the fixed monthly charges raised for the account, that is, the account will never be zero rand or negative (go into credit).



Generator checklist:

- The generator must have a compliant connection to the grid
- The generator must be connected to an Eskom grid and have a signed connection and use of system agreement. Eskom contracts only with the Eskom customers (generators and buyers), and not with a trader.
- The generator will pay use of system charges for energy exported under the Gen DUOS or Gen TUOS (Generator distribution/transmission use of system) tariff approved by NERSA
- Generators can nominate more than one buyer (subject to the required agreements being in place), but Eskom may reserve the right to limit the numbers
- The energy exported by the generator (“the wheeled energy”) is then allocated to the buyer to be credited on the buyer’s account based on the generator’s nomination, on a TOU basis consolidated at the end of the month per TOU period.



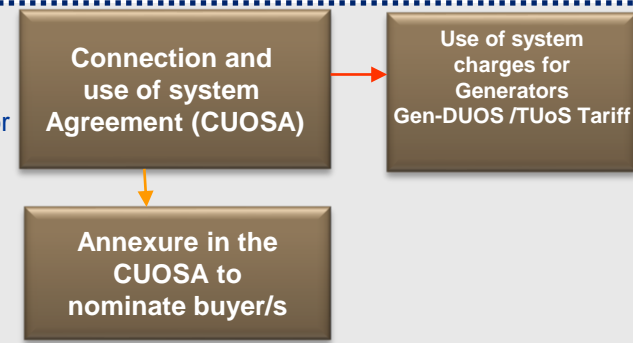
Buyer or load customer checklist :

- The customer must be on a TOU tariff
- In order to enable wheeling, an amendment agreement must be in place
- A separate service agreement is raised on the customer’s account to subtract the wheeled energy at an energy rate excluding losses under the Gen-wheeling tariff approved by NERSA.
- Energy is credited in the same TOU periods as what is generated e.g. there is no swapping of energy produced in standard periods for energy consumed in off-peak periods. Any wheeled energy that is greater than that consumed shall be ignored.
- Customers that receive wheeled energy from private generators are not exempted from load-shedding as load shedding is a system requirement for all participants in the industry.
- A wheeling arrangement does not reduce the capacity required on the network

Contracts required to facilitate wheeling

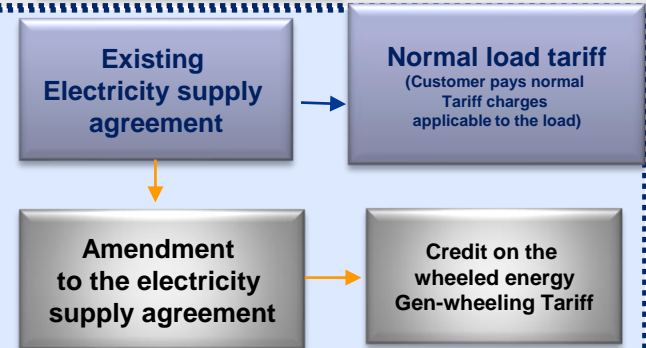
For the generator (must be connected to the Eskom network):

- The generator will contract with Eskom (the network provider) to provide network services.
- This is done through a connection and use of system agreement (CUOSA). Eskom will raise charges for the used of the system based on the maximum export capacity (MEC) under the Gen DUOS tariff.
- The generator will also sign an Annexure to the CUOSA, where the nominated party(ies) is listed (the Eskom customer(s) to whom the energy must be delivered)
- There is **no separate** “wheeling agreement”

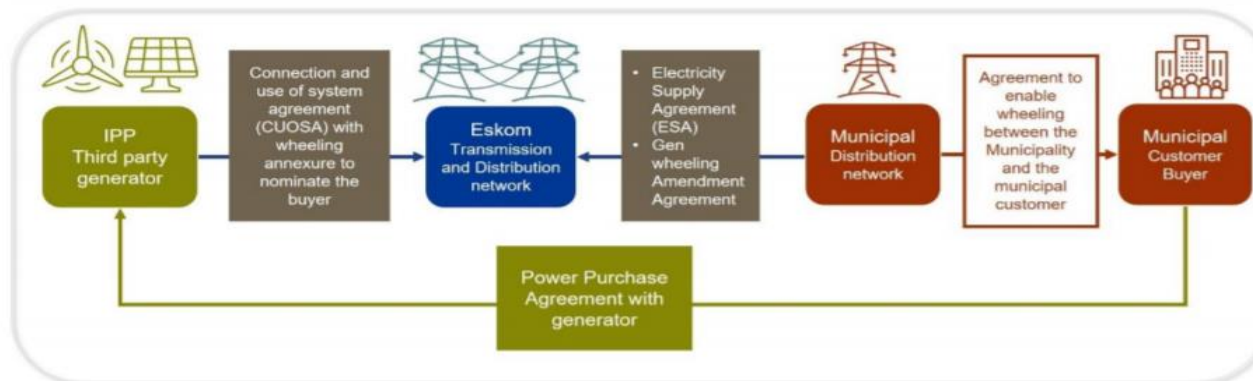


For the receiver of the energy (not a Trader but the existing Eskom customer to whom the energy is wheeled)

- The nominated party (buyer/offtaker) to whom the energy is to be delivered will need to sign the Gen-wheeling amendment agreement to the Electricity Supply Agreement, where Eskom applies the Gen-wheeling tariff to credit the wheeled energy.
- This is a separate contract dealing only with the adjustment on the account to credit the customer for the wheeled energy. The customer will pay the standard tariffs on the normal load tariff (e.g. Megaflex, Miniflex, Ruraflex tariff etc).

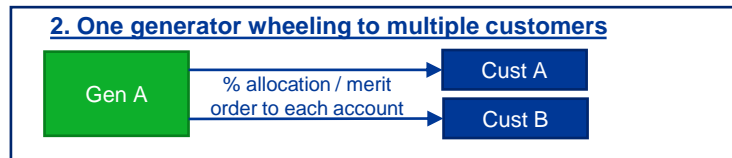
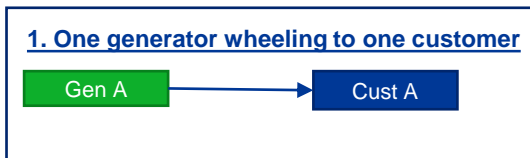


Contractual agreements involved in Eskom and Municipality wheeling





Scenarios allowed



1. One generator to one offtaker	2. One Generator to multiple offtakers	Wheeling to offtaker/s within municipality
<ul style="list-style-type: none"> The generator will have a Gen DUOS SA A Gen wheeling SA is loaded on the offtaker's account 	<ul style="list-style-type: none"> The generator will have a Gen DUOS SA Percentage allocation to each offtaker or as agreed A Gen wheeling SA is loaded on each offtaker's account 	<ul style="list-style-type: none"> The generator will have a Gen DUOS SA The municipality must give consent for the wheeling transaction (consent letter from the Munic to be provided to Eskom) The wheeled energy credit will be provided to the municipality, the Munic will then credit the offtaker The Gen wheeling SA is loaded on the Municipal account

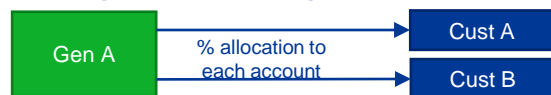
Example 1 – One generator wheeling to one offtaker

	Generator A production (kWh)	Customer A consumption (kWh)	Energy to be used to credit customer A under Gen wheeling	Surplus energy (to be forfeited or can be sold to Eskom)
Peak	40 000	50 000	40 000	0
Standard	85 000	100 000	85 000	0
Off-peak	10 000	6000	6 000	4 000

Rule: Always compare the generation production with consumption, credit allocated generation but cannot exceed consumption

Wheeling scenarios allowed

2. One generator wheeling to multiple customers



Example 2 A – One generator wheeling to two offtakers - merit order allocation - rule is first allocate to cust A then remainder to cust B

	Generator A production (kWh)	Customer A consumption (kWh)	Customer B consumption (kWh)	Allocation to customer A (kWh)	Allocation to customer B (kWh)	Energy to be used to credit customer A under Gen wheeling	Energy to be used to credit customer B under Gen wheeling	Surplus energy (to be forfeited or can be sold to Eskom)
Peak	40 000	20 000	25 000	20 000	20 000	20 000	20 000	0
Standard	90 000	50 000	50 000	50 000	40 000	50 000	40 000	0
Off-peak	10 000	4000	5000	4 000	5 000	4 000	5 000	1 000

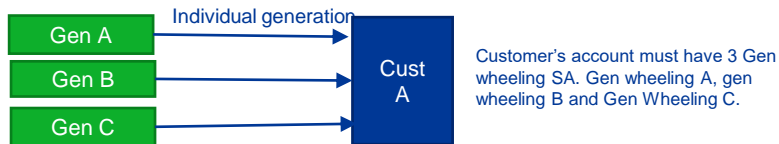
Example 2 B – One generator wheeling to two offtakers - percentage allocation

	Generator A production (kWh)	Customer A consumption (kWh)	Customer B consumption (kWh)	%Allocation to customer A	%Allocation to customer B	Allocation to customer A based on percentage	Allocation to customer B based on percentage	Energy to be used to credit customer A under Gen wheeling	Energy to be used to credit customer B under Gen wheeling	Surplus energy (to be forfeited or can be sold to Eskom)
Peak	40 000	20 000	25 000	60%	40%	24 000	16 000	20 000	16 000	4 000
Standard	90 000	50 000	50 000	40%	60%	36 000	54 000	36 000	50 000	4 000
Off-peak	10 000	4000	5000	50%	50%	5 000	5 000	4 000	5 000	1 000

Rule: Always compare the allocated generation with consumption, credit allocated generation but cannot exceed consumption

Wheeling scenarios allowed

3. multiple generators wheeling to one customer



4. multiple generators wheeling to one customer



3. Multiple generators to one offtaker (individual generation)

- Each generator will have a Gen DUOS SA
- Each generator's wheels separately to the offtaker
- Multiple Gen wheeling SA are loaded (One for each generator) reflecting the name of each generator on the offtaker's account
- Will require prioritization rules e.g pro-rating / merit order on comparison between consumption and production

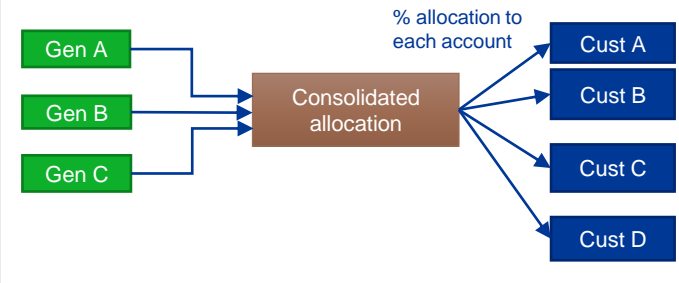
4. Multiple generators to one offtaker (consolidated generation)

- Each generator will have a Gen DUOS SA
- The generator's production data is consolidated - one name for the consolidated account, could be the name of trading/aggregating company
- One Gen wheeling SA is loaded on the offtaker's account (reflecting the name of the consolidated account) to credit the **consolidated generation**

5. Multiple generators to multiple offtakers (portfolio wheeling – subject to system readiness)

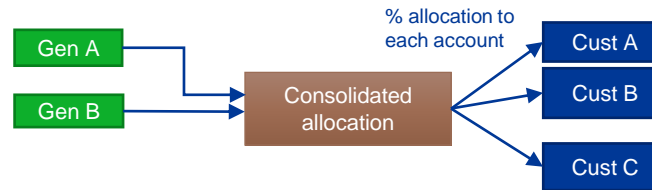
- Each generator will have a Gen DUOS SA
- The generator's production data is consolidated – one name for the consolidated account, could be the name of trading/aggregating company
- One Gen wheeling SA is loaded (reflecting the name of the consolidated account) **on each offtaker's account** to credit the consolidated generation per allocated percentages/order

5. multiple generators wheeling to multiple customers (portfolio wheeling)



Portfolio wheeling example

Example: multiple generators wheeling to multiple customers (portfolio wheeling)



Example 4 – Two generators wheeling to three offtakers (portfolio wheeling)

	Generator A production (kWh)	Generator B production (kWh)	Total Generator production (kWh)	allocation to customer A based on percentage	Customer A consumption	Energy to be used to credit customer A	allocation to customer B based on percentage	Customer B consumption	Energy to be used to credit customer B	allocation to customer C based on percentage	Customer C consumption	Energy to be used to credit customer C	Surplus energy (to be forfeited or can be sold in another programme or to another party)
Peak	40 000	70 000	110 000	55 000	40 000	40 000	22 000	40 000	22 000	33 000	40 000	33 000	15 000
Standard	85 000	90 000	175 000	87 500	20 000	20 000	35 000	40 000	35 000	52 500	40 000	40 000	80 000
Off-peak	10 000	50 000	60 000	30 000	30 000	30 000	12 000	10 000	10 000	18 000	40 000	18 000	2 000

% allocation cust A 50%

% allocation cust B 20%

% allocation cust C 30%

Examples of wheeling bills

Generator use of system under Gen-DUOS tariff

GENERATOR PRODUCTION DETAILS		
Energy production Standard kWh		49,450
Energy production Peak kWh		19,620
Energy production Off Peak		71,851
Energy production – summated kWh		140,921
PREMISE ID NUMBER: NAME: Gen-DUOS-Rural		
Generator Ancillary service 140,921 @ R0.0060/kWh	R	845.53
Administration charge @ R121.17 per day for 30 days	R	3 635.10
Service charge @ R282.31 per day for 30 days	R	8 469.30
TOTAL CHARGES	R	12 949.93

Energy produced by a private generator is credited under a separate Gen-wheeling tariff

Normal load tariff charges for the load account

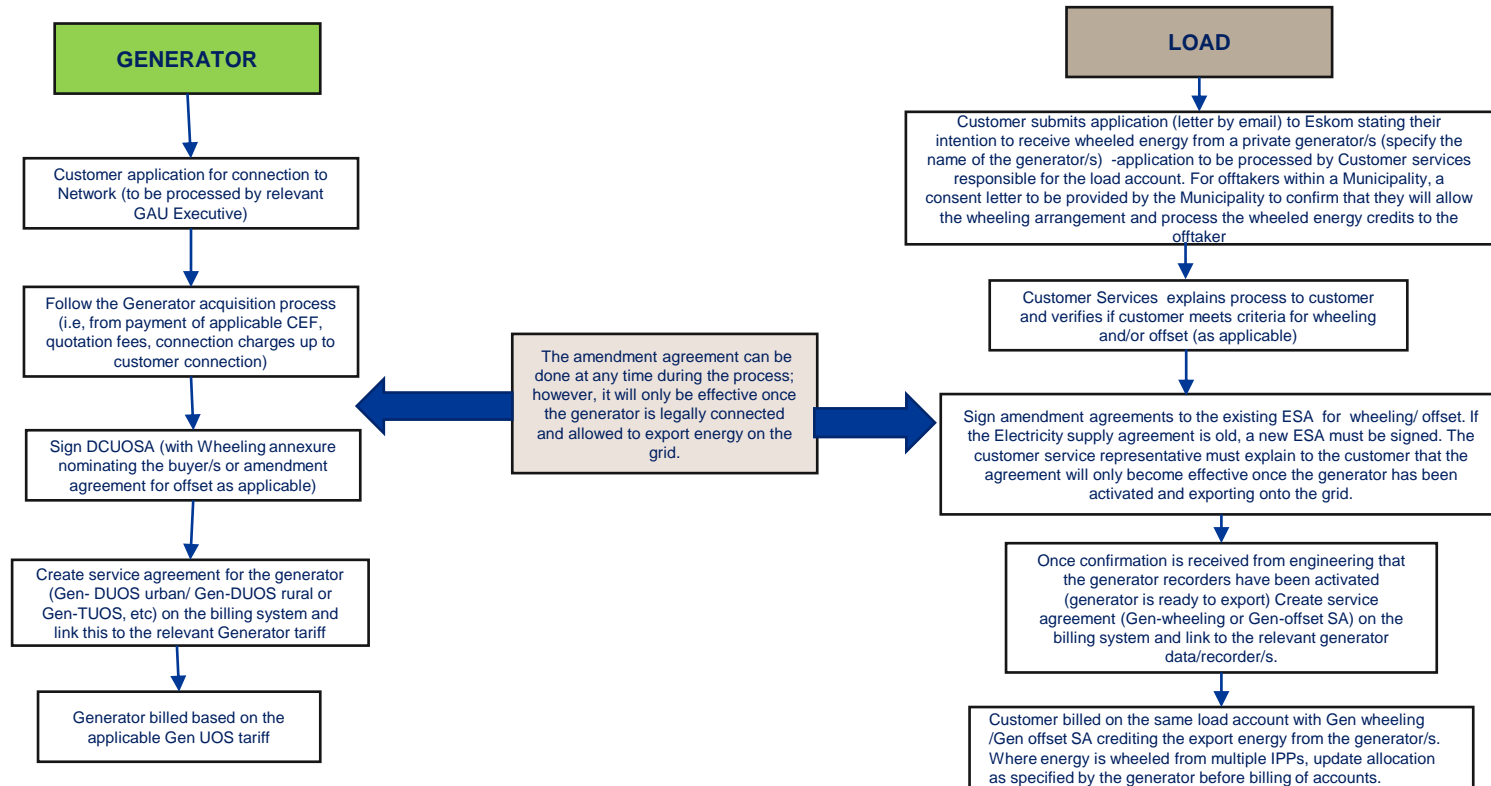
PREMISE ID NUMBER		TARIFF NAME: Megaflex
Administration Charge @ R188.51 per day for 30 days	R	5,655.30
TX Network Capacity Charge 60,000 kVa @ R11.74 : = R11.74/kVA	R	704,400.00
Network Capacity Charge 60,000 kVa @ R8.65 : = R8.65/kVA	R	519,000.00
Network Demand Charge 31,727.33 kVA @ R16.00 : = R16.00 /kVA	R	507,637.28
Urban Low Voltage Subsidy 60,000 kVa @ R21.18 : = R21.18/kVA	R	1,270,800.00
Ancillary Service Charge 14,336,197 kWh @ R0.0055 /kWh	R	78,849.08
Low Season Standard Energy Charge 4,932,017 kWh @ R1,0162 /kWh	R	5,011,915.68
Low Season Peak Energy Charge 1,998,645 kWh @ R1.4762 /kWh	R	2,950,399.75
Low Season Off Peak Energy Charge 7,405,535 kWh @ R0.6445 /kWh	R	4,772,867.31
Electrification and Rural Subsidy 14,336,197 kWh @ R0.1173 /kWh	R	1,681,635.91
SERVICE CHARGE	R	177,086.40
TOTAL CHARGES	R	17,680,246.71

Credit for wheeled energy provided under a separate Gen wheeling tariff

PREMISE ID NUMBER		TARIFF NAME: Gen-wheeling
Administration Charge @ R188.51 per day for 30 days	R	5,655.30
Low Season Standard Energy Charge -49,450 kWh @ R0.9473 /kWh	R	-46,843.99
Low Season Peak Energy Charge -19,620 kWh @ R1.3764 /kWh	R	-27,004.97
Low Season Off Peak Energy Charge -71,851 kWh @ R0.6009 /kWh	R	-43,175.27
TOTAL CHARGES	R	-111,368.93

Only additional charge raised is the Admin charges

Process for adjustment of accounts due to wheeling





Net-billing (Offset) framework

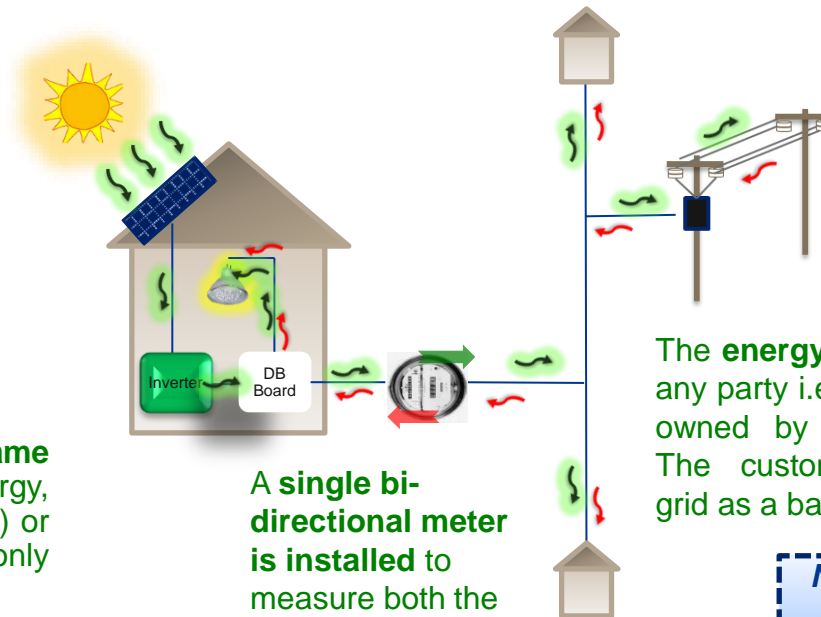
What is net billing (offset)

The customer owns and operates an electrical generating device and this is operated in parallel with the utility's system (grid-tied).

Net billing is where the customer gets a **credit on the electricity bill for surplus energy** produced that is not consumed immediately.

The **credit is either at the same rate** the utility pays for energy, cost of fuel (the avoided cost) or a rate lower than the energy only charge.

For Eskom, currently the credit is at the same energy rate but this might change in the future.



A **single bi-directional meter is installed** to measure both the usage and any exported energy.

For Eskom, the customer must be on a TOU tariff

The **energy is not sold** to any party i.e. this energy is owned by the customer. The customer uses the grid as a battery.

Net billing (not net-metering) is the term used in Eskom – the netting is done on the customer's bill through separate import and export measurements – there is no netting of energy!

This credit is **not purchase of energy (not a feed-in tariff)** – Eskom uses it and gives it back to customers at the end of the month.

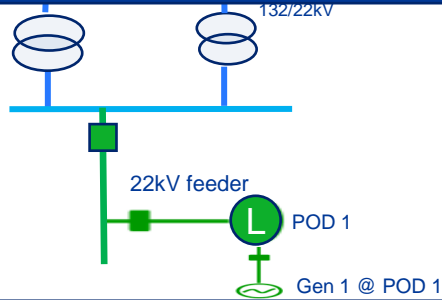
- The generator and Load must be at the same location – same MV feeder or from the same busbar if supplied directly at the substation (cannot go through a substation transformer)
- If the generator and the load are located on different feeders of the same substation or at different substations, then offset cannot be allowed and therefore wheeling will be the applicable option.

PODs (Point of delivery) can be consolidated into one account for offset, subject to the following conditions:

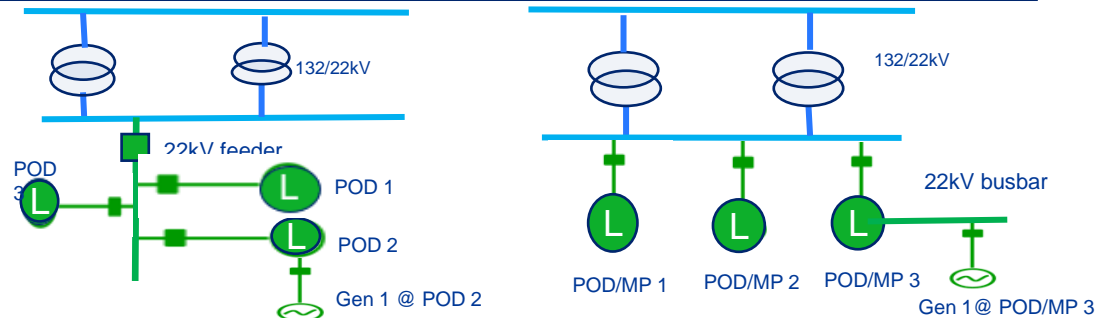
- Be on the same MV feeder or busbar if supplied directly at the substation*
- Belong to one legal entity
- Be in the same OU
- All PODs must be on a TOU tariff
- Not be a mixture of Top or Operating unit customers.

*If PODS are supplied from different feeders of the same substation or from different substations, then offset cannot be allowed (irrespective of the distance between the generator and the load) and therefore wheeling will be the applicable option.

A. One generator one POD scenario (same fdr or same sub if directly supplied from substation busbar)



B. one generator to multiple load PODs on the same MV feeder or same substation



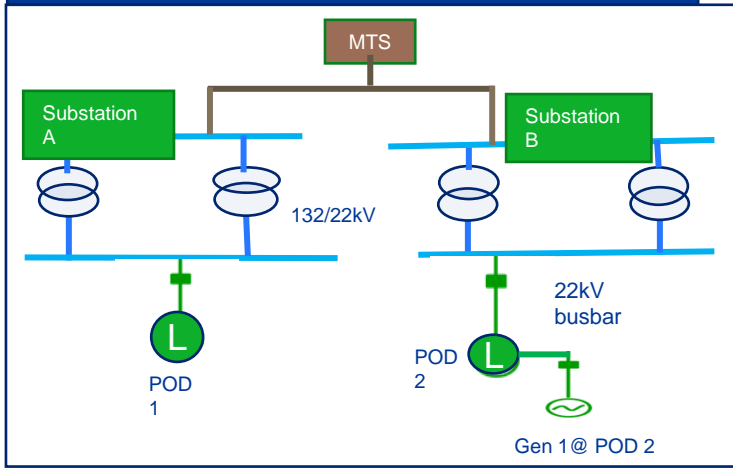
A. one generator connected at the load POD on the same physical site

- Export energy from Gen 1 can offset the consumption for POD
- Gen DUOS SA for the generator
- Gen-offset SA for net-billing/offset

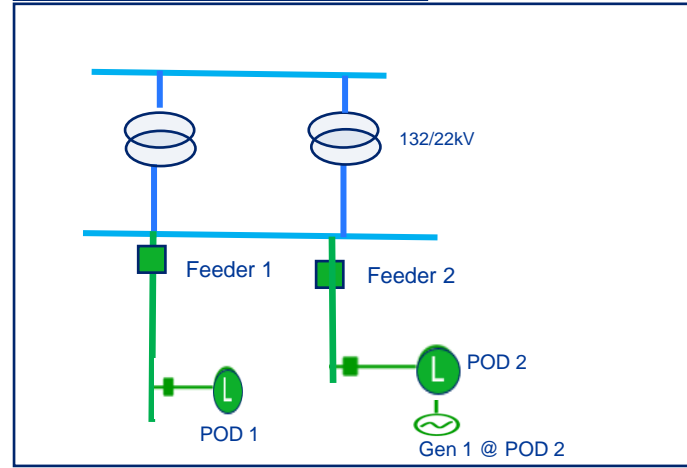
B. one generator to multiple load PODs on the same MV feeder or same substation

- POD 1, 2 and 3 on the feeder can be consolidated into one account, and export energy from generator 1 can offset the total consolidated consumption for the 3 PODS.
- For the PODs supplied directly at the substation, the POD or meter panels 1, 2 and 3 can be consolidated into one account, and export energy from generator 1 can offset the total consolidated consumption for the 3 meter panels.
- All the PODS must be supplied from the same MV feeder (could be a combination of PODs supplied at MV and LV on the same feeder) or substation if direct substation connected.
- All the load PODs must belong to one legal entity.
- The load PODs must all be under one account, i.e., satisfy conditions for consolidation of PODs under one account.

D. One generator to multiple load PODs on the same network (same MTS)

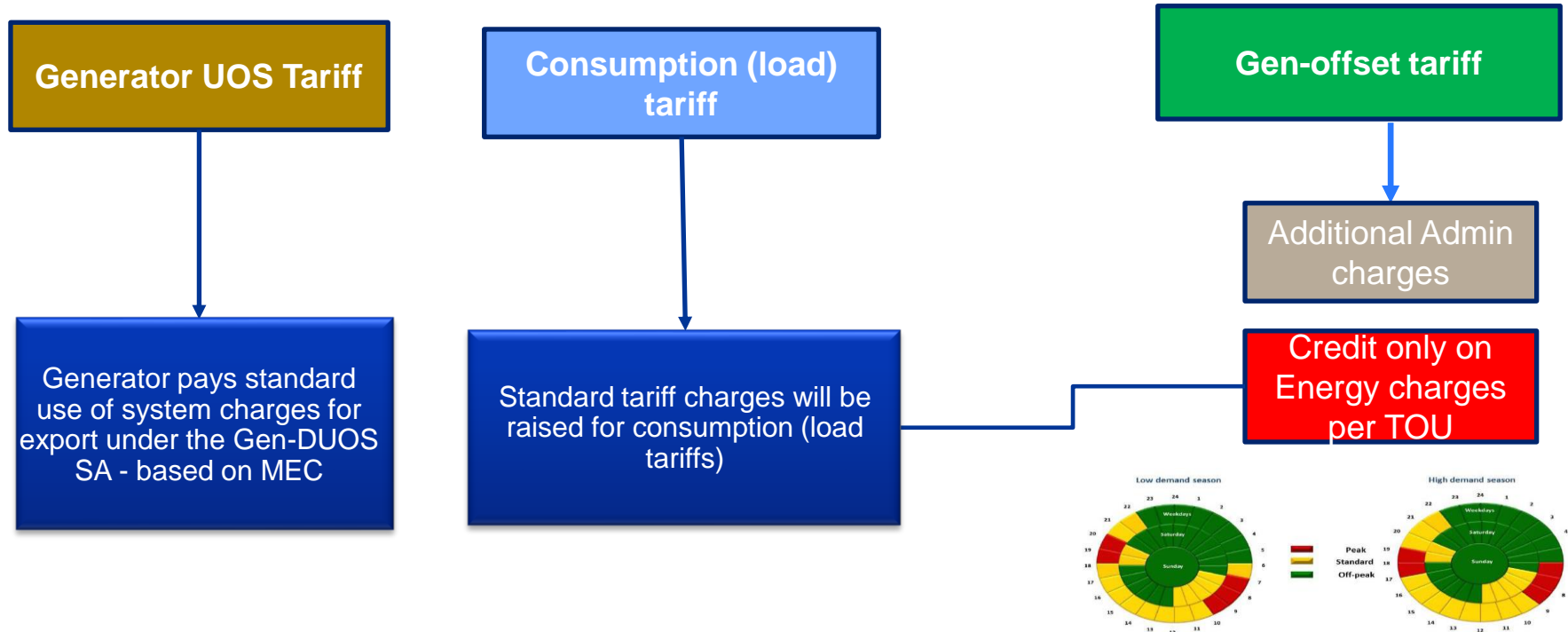


PODS on different feeders scenario



- Offset (net-billing) cannot be allowed if the generator and POD/s are located at different substations or different feeders.
- This scenario must be treated as wheeling where the generator at POD 2 wheels the energy to POD 1

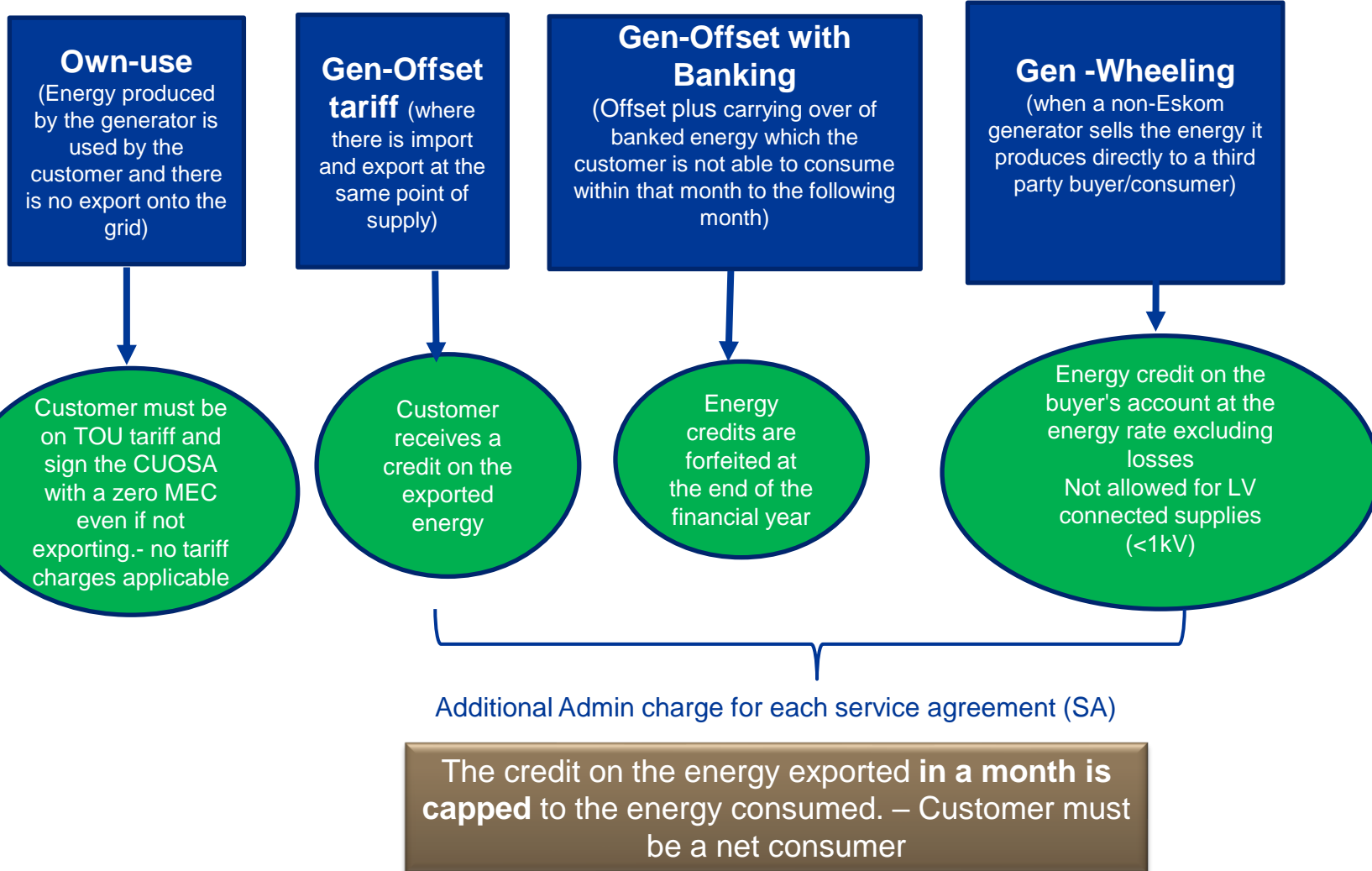
3 Service agreements for a customer on the Offset tariff



- Offset is done for energy exported (kWh) per TOU period only @ the Gen-offset tariff – all other charges are payable
- There is no netting of exported energy against consumed energy - A separate service agreement/tariff called Gen-offset is loaded on the bill
 - In a month, any offset energy that is greater than that consumed shall be ignored - unless banking approved
 - Banking (carry over to the next month) is currently only allowed for customers < 1MW (additional admin charge for this)
 - Offset (Net-billing) is allowed for all customers including those connected at low voltage
 - Energy exported under Gen-offset tariff is **credited in the same TOU periods** as what is generated e.g. there is no swapping of energy produced say in standard periods for energy consumed in off-peak

Summary of the options for grid-tied generators

(Reconciliation of Exported Energy For Rural & Urban Customers)



The connection for own use:

- Budget Quote
- Electricity Supply Agreement (ESA)
- Connection and use of system agreement (CUOSA) with an MEC of zero

The connection with offset (net billing):

- Budget Quote
- Electricity Supply Agreement (ESA)
- Connection and use of system agreement (CUOSA)
- Gen Recon Amendment Agreement

The connection with Offset plus Banking:

- Budget Quote
- Electricity Supply Agreement (ESA)
- Connection and use of system agreement (CUOSA)
- Gen Recon Amendment Agreement (this has a Banking annexure):

The connection with wheeling:

For the Generator:

- Budget Quote
- Connection and use of system agreement (CUOSA) with wheeling annexure to nominate the buyer/s (receiver of the energy)

For the receiver of the energy (load)

- Electricity Supply Agreement (ESA)
- Gen wheeling Amendment Agreement

For small scale embedded generators (SSEG) a simplified version of the CUOSA called the supplementary agreement is required.

Wheeling and offset

- Eskom energy tariffs currently are volumetric only, that is, recover the cost of energy and generation capacity through c/kWh charges only and therefore do not reflect the cost of providing generation standby costs in an unbundled way.
- In order to reflect the cost of providing capacity, the energy charges will be unbundled into a TOU volumetric charges and into a demand related capacity charge.
 - This will result in lower energy related charges due to the addition of a capacity charge
 - The intent is to introduce this in 2023
- This means the credit for energy wheeled and offset will be reduced
- At the same time Eskom is attempting to restructure its tariffs to reflect energy, network and retail costs more accurately and this will have the effect of increasing the energy charges and reducing the other charges

Generators – balancing mechanism

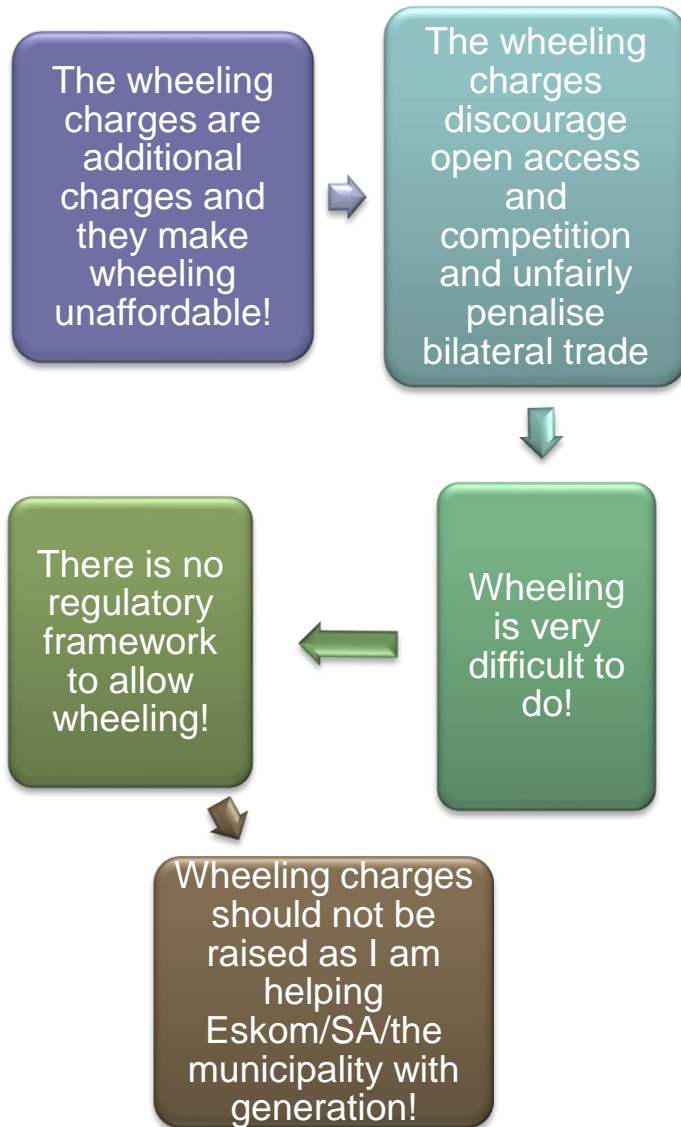
- Most new generating plant will not be dispatchable by the system operator, and therefore there needs to be a mechanism introduced to ensure that there is optimal dispatch.
- This will require all generators (above a certain size), whether private or Eskom-owned to provide a day-ahead forecast, and that consequences are introduced for not meeting the forecast.
- Initially, the thoughts are that a standard balancing charge is to be applied only to generators (independent as well as Eskom) to incentivise the generation part of the industry to support system integrity.
- These rules around balancing need to be watertight and fully understood by the industry to enable optimal dispatch (not a free for all).

Thank You

[Wheeling - Distribution \(eskom.co.za\)](http://eskom.co.za)



Misconceptions



Facts

