

WHEELING

**Wheeling of energy- enabling
mechanism's in the current
environment**

Presentation at the AMEU conference

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Wheeling of energy occurs when a non-utility owned generator sells the energy it produces directly to a third party consumer and not to the utility.

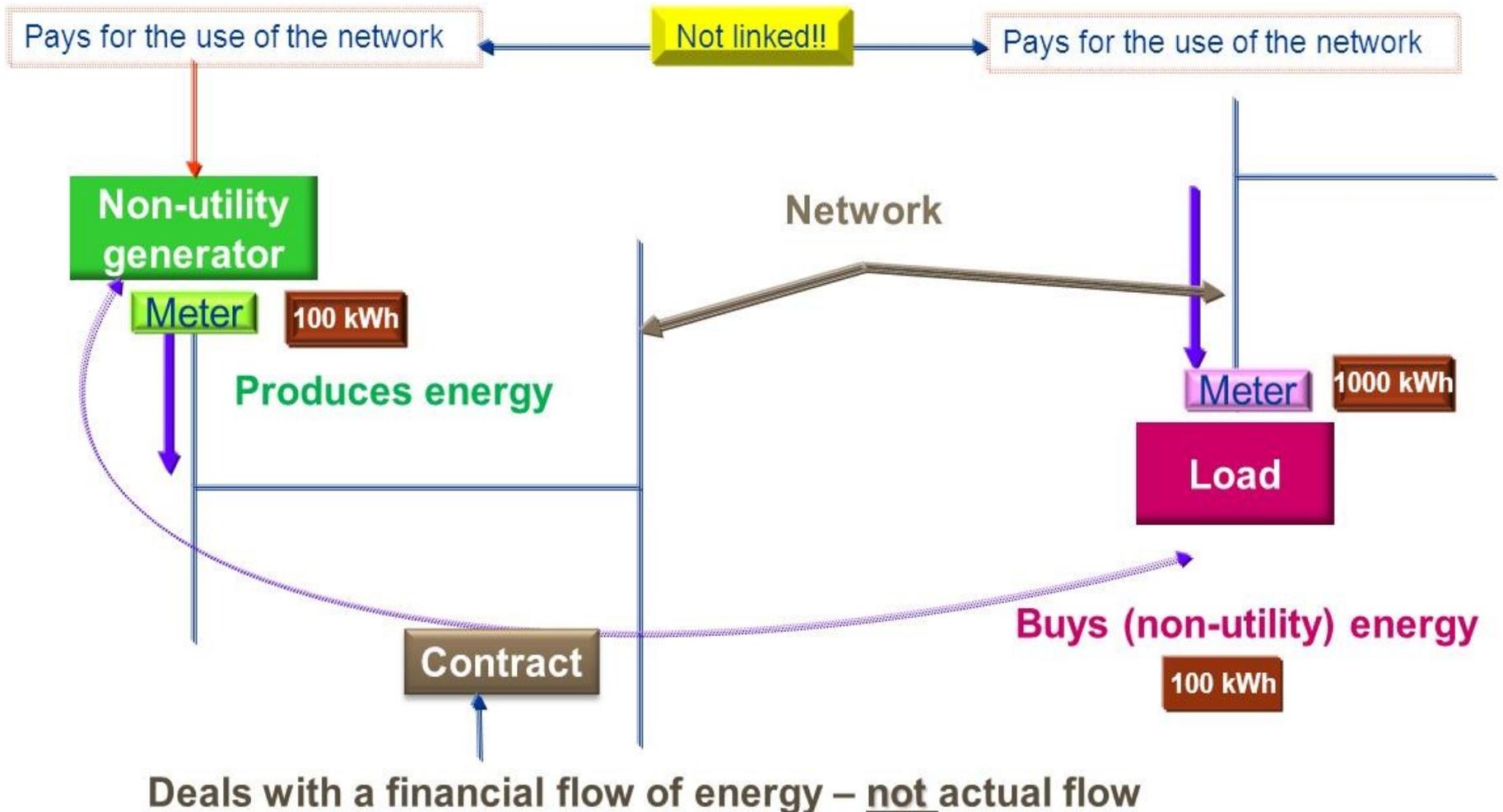
For various reasons, it has become attractive for consumers to want to procure energy from private generators.

In cases where the generator is not located on the same site as the consumer, this would require the wheeling of energy between the generator and the buyer/consumer of the energy.

This paper sets out the Eskom approach

What is wheeling of energy?

Wheeling providing access between a non-Eskom Generator and a third party to facilitate the trading of energy



Eskom allows wheeling based on the principle of non-discriminatory access to the grid, subject to:

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

The generator must comply with Eskom's requirements for the grid connection and have signed a connection and use-of-system agreement..

Either the buyer or the seller must be an Eskom customer.

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

Charges payable for use of the network

Loads

+ Connection charges

Transmission
Distribution

+ Network charges

Transmission
Distribution

+ Losses

Transmission
Distribution

+ Reliability services

System ops

+ Electrification and rural subsidy

Distribution

+ Service and admin charges

Transmission
Distribution

Generators

Transmission
Distribution

+ Connection charges

Transmission
Distribution

+ Network charges

Transmission
Distribution

+ /- Losses

System ops

+ Reliability services

Transmission
Distribution

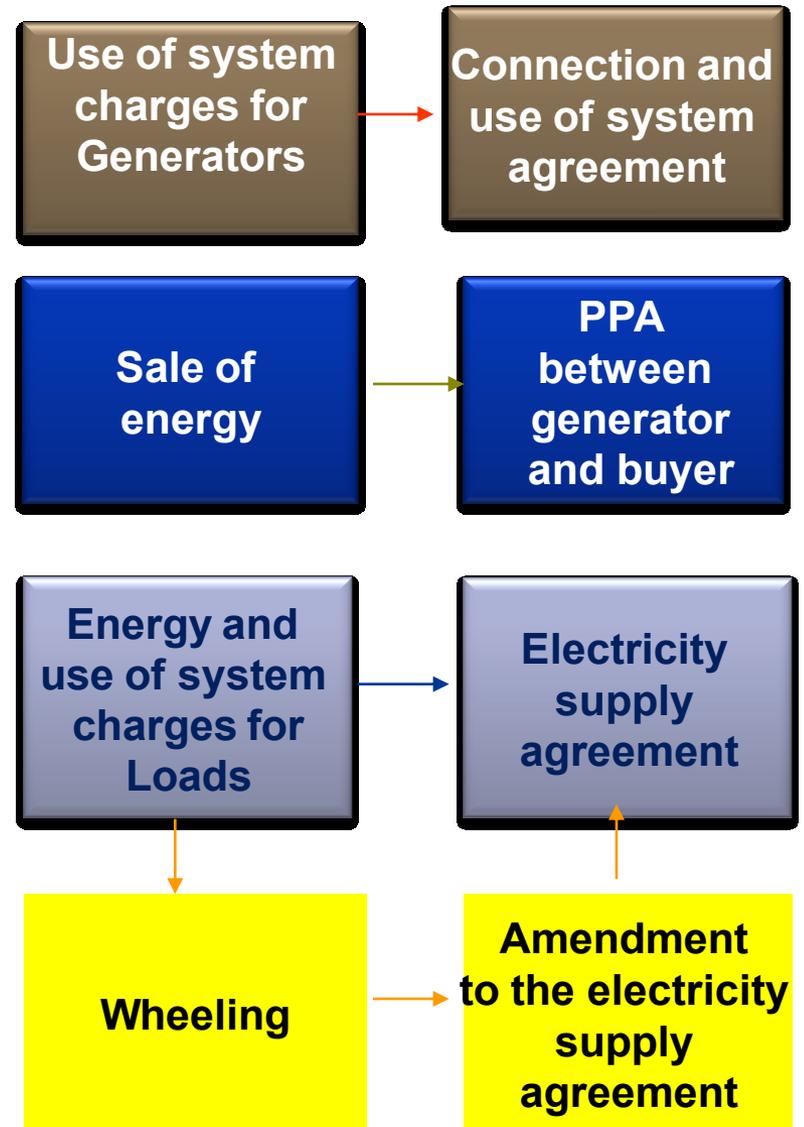
+ Service and admin charges

“Wheeling” charges

- “Wheeling charges” not special – should be standard network related tariff charges for the use of the network
- No link in charges between what the generator produces and what the load buys – charges are NOT dependant on ownership of energy
 - The generator is charged for what is exported - at standard GUOS tariffs
 - The load is charged for what is delivered over the network - at standard tariffs – same as any other customer
 - Any use-of-system benefit /cost associated with a generator’s location accrues to that generator and not to the buyer
- These charges are: network charges, the cost of losses, reliability services and for loads the associated subsidy contribution
 - Contribution to socio-economic subsidies not avoided by a wheeling arrangement
- No “credit’ given for network related charges – only energy!
- A wheeling arrangement does not reduce the capacity required on the network!

Transactions with generators

- The generator will contract with the network provider to provide network services. The network provider will raise charges for these services.
- The generator will contract with the entity purchasing the energy through a PPA and this may be with Eskom, a third party or for own generation.
- If the energy is sold to a third party, the electricity bill must be adjusted for the wheeled energy through a supplementary contract. The customer will pay the standard tariffs associated with the cost of delivering the energy.
- All of the above transactions are separate contracts and deal with different issues.



How the reconciliation of energy is done for a wheeling transaction

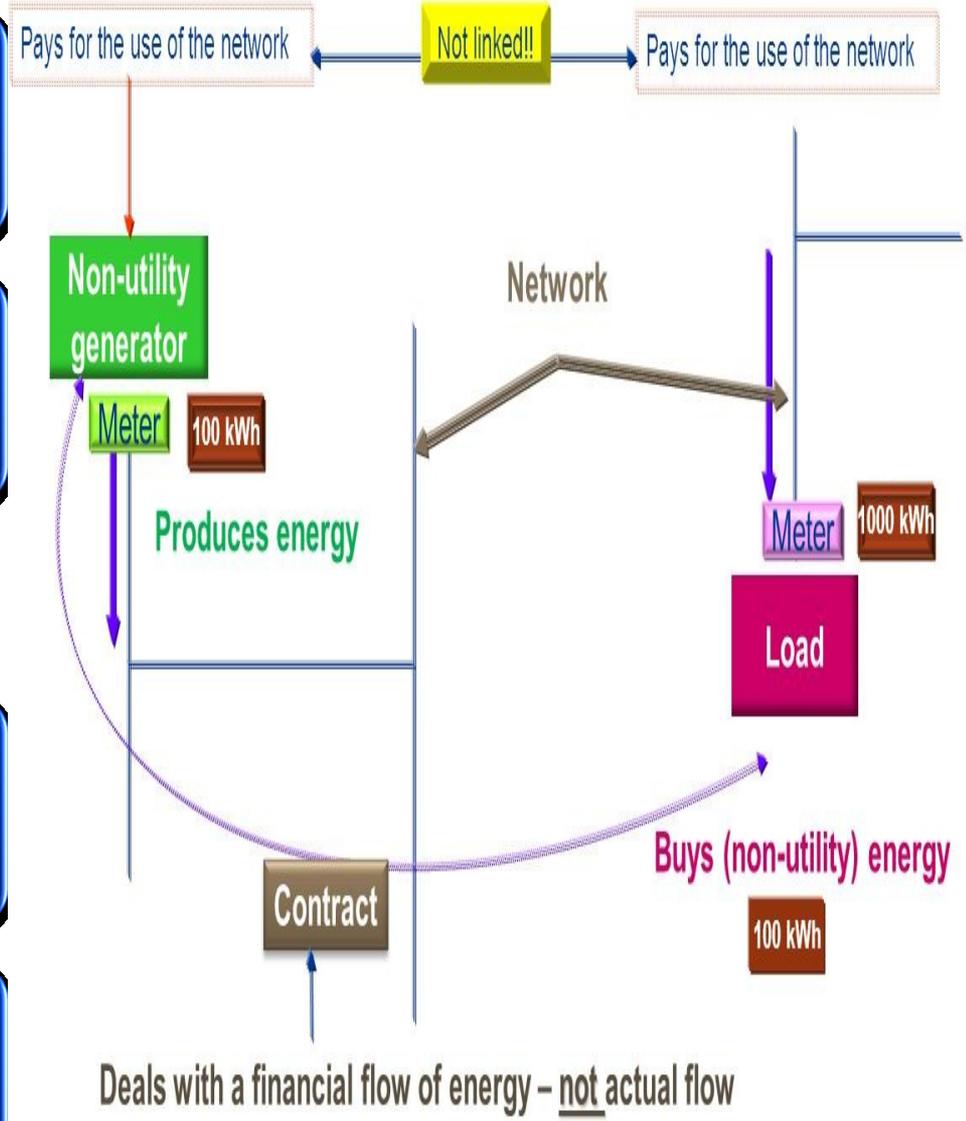
1) The energy produced by the generator is measured on a time-of-use basis and allocated to the buyer(s) as agreed.

2) The amount of energy allocated is adjusted on the customer's bill at the Megaflex time-of-use energy rates, less losses and reliability service charges.

- Losses and reliability service charges are excluded as these are use-of-system charges

3) Eskom will supply any energy not provided by the Generator, in terms of the supply agreement signed with Eskom.

4) In future there may be balancing mechanism to ensure effective and fair day-ahead scheduling by all generators by the System Operator.



Where a customer on Megaflex purchases a portion of its energy from a NEG wheeled through Eskom's network

Example 1 (a) - Customer account reconciliation (High demand season)

Assumptions				
- Notified maximum demand (kVA)		56,400		
- Maximum demand (kVA)		52,000		
- No. of days in billing month		30		
- Supply voltage		≥ 500 V & < 66 kV		
- Transmission zone		≤ 300 km		
- Munic		No		
- Size of supply		Key customers		
Calculations			High Demand Season	Charge
Network charges		kVA	R/kVA	
Transmission network charge		56,400	4.30	R 242,520
Distribution network access charge		56,400	8.63	R 486,732
Distribution network demand charge		52,000	16.35	R 850,200
A) Total network charges				R 1,579,452
Total energy through customer meter (High-demand season)		kWh	c/kWh	Charge
Peak consumption		4,824,703	182.83	R 881,004
Standard consumption		10,386,340	47.52	R 4,935,589
Off-Peak consumption		11,538,215	25.39	R 2,929,553
b₁) Sub-total		26,749,258	62.38	R 16,686,146
Adjustment for energy purchased from other sources (High-demand season)		kWh	c/kWh	Charge
Peak consumption		482,470	168.01	R 81,059
Standard consumption		1,038,634	43.43	R 451,079
Off-Peak consumption		1,153,822	23.05	R 265,956
b₂) Sub-total		2,674,926	57.11	R 1,527,633
B) (b₁-b₂) Net energy charge (may never be < 0)		24,074,332	62.97	R 15,158,513
Reactive energy charge		kvarh	c/kvarh	
		10,076	7.86	R 792
		kWh	c/kWh	
Electrification and rural subsidy (on all energy delivered)		26,749,258	3.97	R 1,061,946
Environmental Levy charge (on Eskom owned energy)		24,074,332	2.00	R 481,487
Service charge			R/day	R 63,129
Administration charge			R 67.20	R 2,016
C) Total other charges				R 1,609,369
Total excl VAT				R 18,347,334
VAT				R 2,568,627
D) Total account				R 20,915,961

The difference: (Winter)

182.83(tariff)

-168.01

= 14.82 c/kWh



Where a customer on Megaflex purchases a portion of its energy from a NEG wheeled through Eskom's network

Example 1 (a) - Customer account reconciliation (low demand season)

Assumptions				
- Notified maximum demand (kVA)		56,400		
- Maximum demand (kVA)		52,000		
- No. of days in billing month		30		
- Supply voltage		≥ 500 V & < 66 kV		
- Transmission zone		≤ 300 km		
- Size of supply		No Key customers		
Calculations			Low demand season	Charge
Network charges		kVA	R/kVA	
Transmission network charge		56,400	4.30	R 242,520
Distribution network access charge		56,400	8.63	R 486,732
Distribution network demand charge		52,000	16.35	R 850,200
A) Total network charges				R 1,579,452
Total energy through customer meter (Low-demand season)		kWh	c/kWh	Charge
Peak consumption		4,824,703	51.04	R 246,258
Standard consumption		10,386,340	31.27	R 3,247,809
Off-Peak consumption		11,538,215	21.87	R 2,523,408
b₁) Sub-total		26,749,258	30.78	R 8,233,745
Adjustment for energy purchased		(-)		
(@ Megaflex rates excluding losses and n)		kWh	c/kWh	
Peak consumption		482,470	46.65	R 225,072
Standard consumption		1,038,634	28.47	R 295,699
Off-Peak consumption		1,153,822	19.82	R 228,687
b₂) Sub-total		2,674,926	28.02	R 749,459
B) (b₁-b₂) Net energy charge (may never be < 0)		24,074,332	31.09	R 7,484,286
Reactive energy charge		kvarh	c/kvarh	
		kWh	c/kWh	
Electrification and rural subsidy (on all energy delivered)		26,749,258	3.97	R 1,061,946
Environmental Levy charge (on Eskom owned energy)		24,074,332	2.00	R 481,487
Service charge			R/day	R 63,129
Administration charge			R 67.20	R 2,016
C) Total other charges				R 1,608,577
Total excl VAT				R 10,672,315
VAT				R 1,494,124
D) Total account				R 12,166,439

The difference: (Summer)

51.04 (tariff)

- 46.65

= 4.39c/kWh

Offset of own energy/net metering – grid becomes the “bank” for energy that is not consumed

- Co-generators
- Renewable sources

Requires rules round “banking” of energy

Being applied for larger customers

Challenges around:

- Licenses/registration
- Standards
- Metering (AMI/smart meters/smart grid)
- Administration/billing systems
- National approach
- Credit given shown be based on energy related costs not network costs ¹⁴
required unbundled rates

Wheeling encourages private generation in situations where the energy is not able to be bought by Eskom acting as the Single Buyer.

Encouraging wheeling has an overall benefit to South Africa, but this needs to be done within accepted rules and in a framework that protects the whole integrated power system.

The method presented is simple to apply, uses the standard tariff loss factors and there are no “special” rates applicable – all users will pay the standard tariffs the same as any other customer.