MERIDIAN ECONOMICS
NAVIGATING COMPLEXITY

OILING THE WHEELS: PROPOSAL FOR TRADABLE ELECTRICITY CREDIT TOKENS

MERIDIAN ECONOMICS: 30TH JANUARY 2024

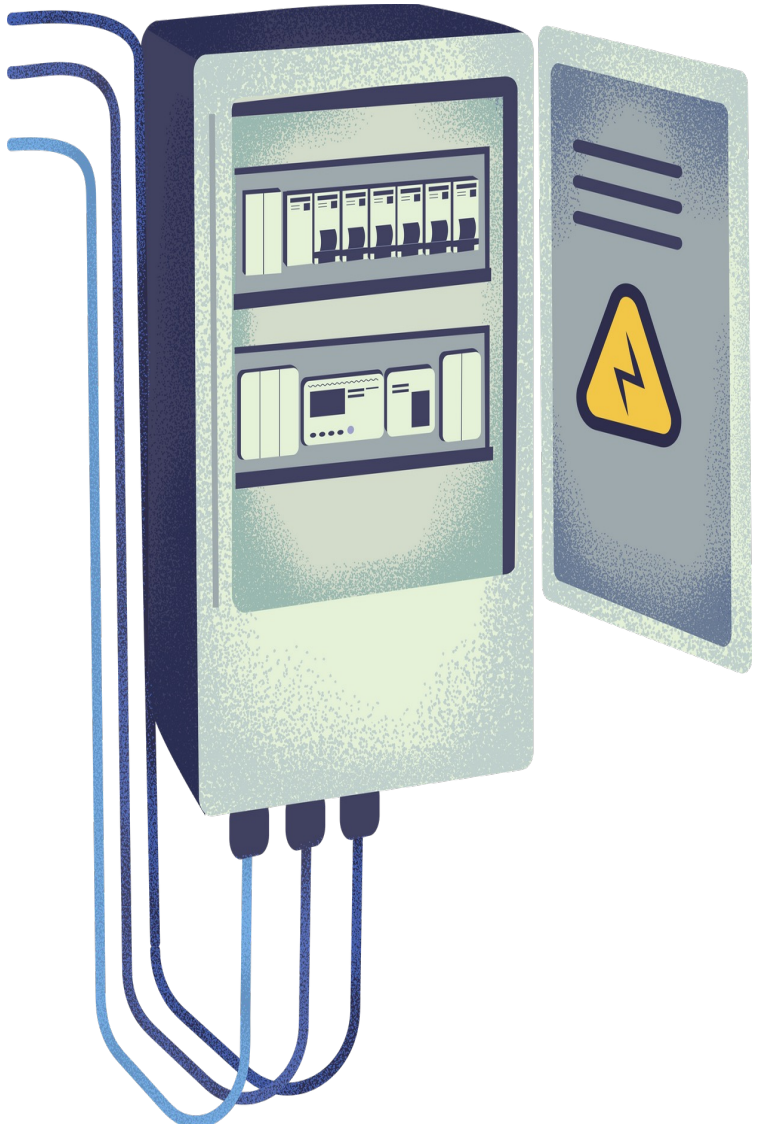
Introduction

1. This concept proposal presents a further evolution of existing wheeling models. It is built on top of the work of others (both on conventional wheeling and “virtual” wheeling).

2. The proposal is not a silver bullet and has its own challenges but hopefully presents further progress and improvement on existing wheeling models.

3. If token wheeling is going to be a viable solution it will need to be supported by many stakeholders & its development driven by industry- **It is up to us!**

4. We have been looking forward to this event and to the critical and constructive feedback from the panelists and stakeholders.



Presentation Structure

1

- The importance of unlocking the current barriers to wheeling and extending its reach

2

- An overview of Electricity Credit Token Wheeling

3

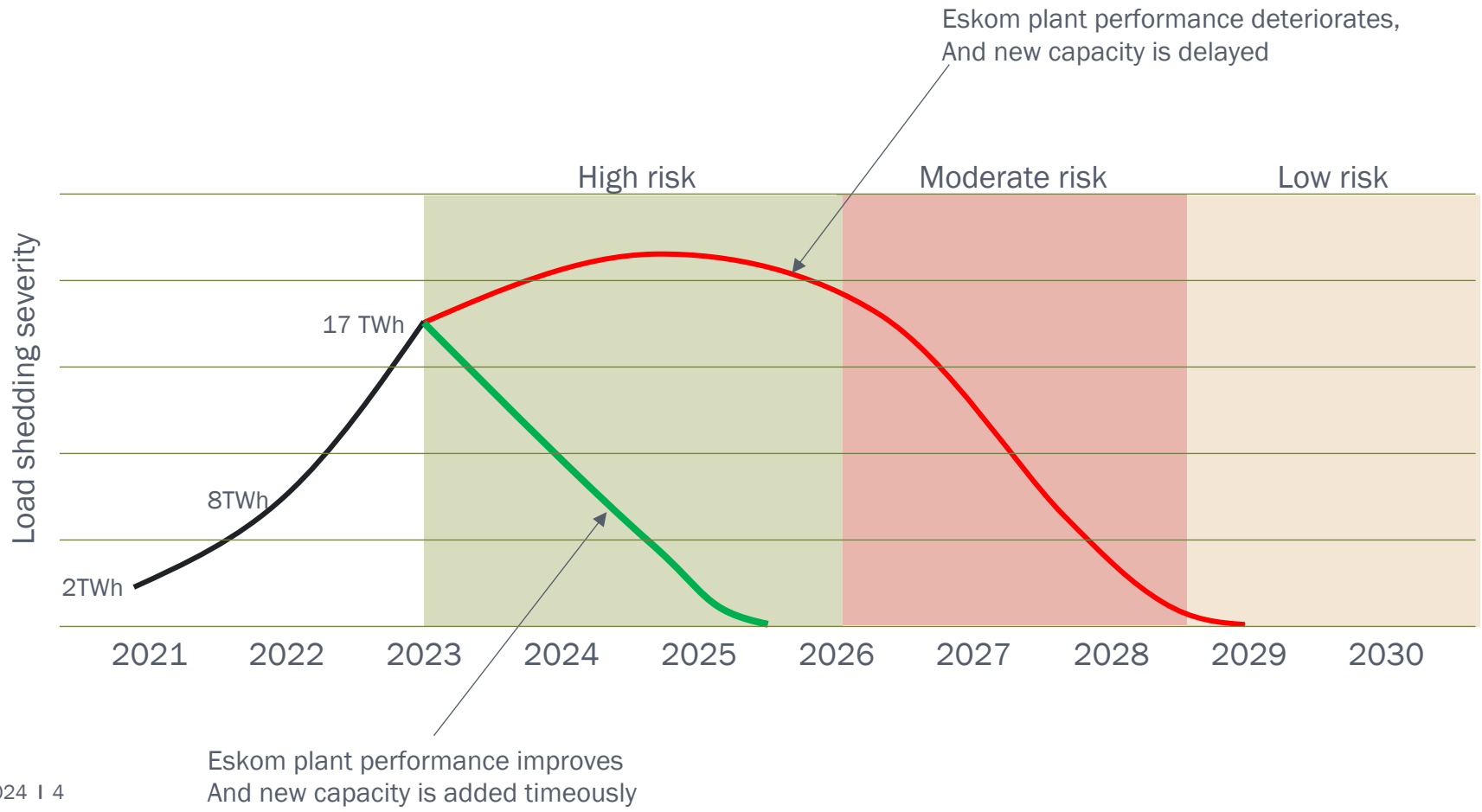
- Key benefits of Electricity Credit Token Wheeling

4

- Important next steps and the role of business and other stakeholders

The importance of unlocking wheeling

At the national level, the race is on to resolve load shedding, and we are not yet winning.



The importance of unlocking wheeling

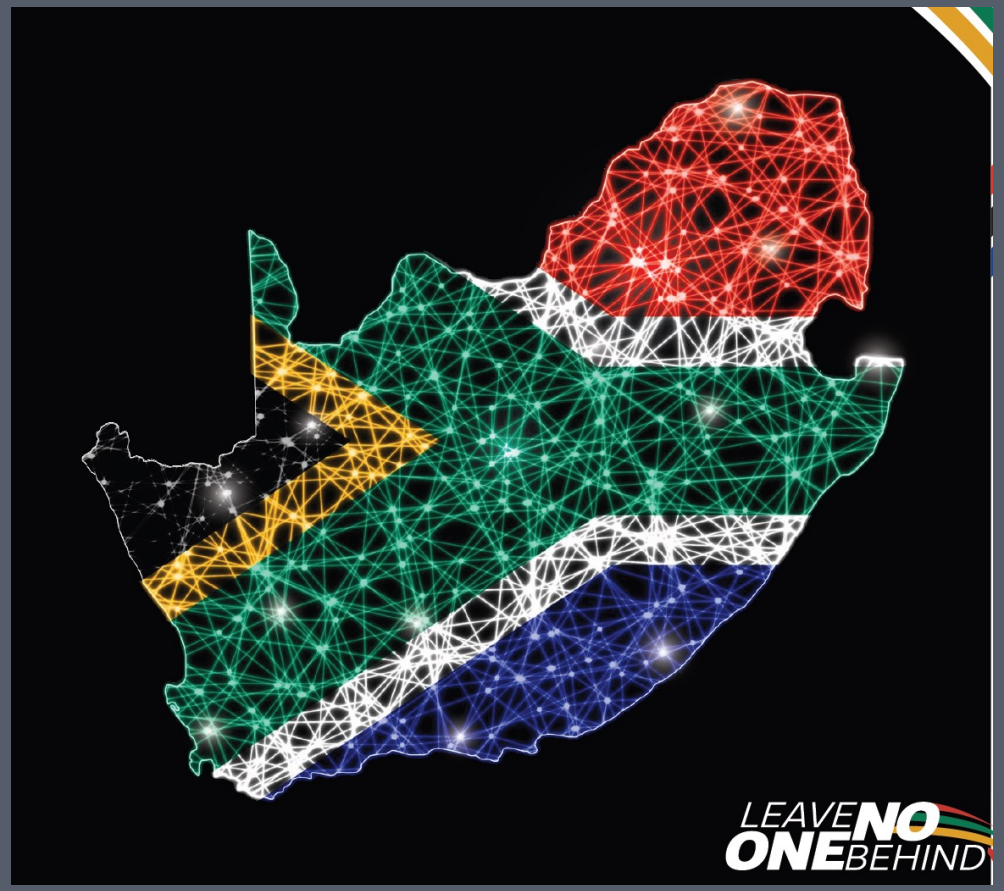
At a firm level, customers need to:

- ✓ Hedge against tariff increases; and
- ✓ Decarbonise their operations to:
  - Address climate related trade (CBAM, etc.), and domestic carbon tax objectives; and
  - Meet increasing demands to do so by their providers of capital

The importance of unlocking wheeling

Private power will be critical to meet these national and firm-level objectives

- Although early signs are encouraging, private power needs to be scaled up and sustained at significantly higher levels than current rates.
  - This is an important part of the NECOM Energy Action Plan.
- Accelerating private power will critically depend on establishing wheeling models that make it easy for aggregators:
  - to construct a portfolio of generators and other system resources; and
  - to serve customers:
    - that are either large or small;
    - with single or multiple off-take sites; and are
    - located in municipal areas, or on the Eskom grid.



The importance of unlocking wheeling

Current wheeling models are not well suited for the task and will only have limited reach.

- ✓ Conventional wheeling must be implemented in distributor billing systems and is difficult to scale to large numbers of generators and customers. Experience shows that it is unlikely to be implemented in most municipalities any time soon given the many policy and practical challenges.
- ✓ Virtual wheeling, as currently proposed by Eskom, entails the initial double payment for power (to both the IPP and the distributor), which then requires cash refunds by Eskom to customers on the basis of municipal payments of the Eskom bulk accounts.
  - ✓ This exposes projects and customers to both municipal and Eskom credit risk

(A more systematic review of existing wheeling models is provided in our report)

Given the scale of what must be achieved, current wheeling models are still in the very early stages of implementation

The design aims for token wheeling

De-risking the purchase decision for customers by creating a liquid "secondary" market, thereby enabling more customers to sign up for more power

Make it easier for customers to buy power from their supplier of choice

Enabling shorter term purchase agreements to meet customer needs

De-risking project financing for banks and investors by:

-enabling easier off-take diversification (reducing reliance on specific counterparty balance sheets); and

-creating a liquid secondary market for short- or longer-term supply

Reduce possible single points of institutional failure in the wheeling system

Build on the concepts and insights from conventional and "virtual" wheeling; and comply with Eskom wheeling requirements

An Overview of Token Wheeling

Tokens function as electricity vouchers and proof of power generated

Tokens function as "vouchers" with a monetary value, for the settlement of an electricity account

Tokens are generated by injecting power into the grid

All relevant information about the power is recorded on the token (meter ID; location; generation technology; time stamp; carbon emissions, face value)

A token's face value is based on an Electricity Credit Token Agreement with a Guarantor (e.g., Eskom) to honour it on presentation, for settlement of an electricity account

The token face value is determined by a valuation method agreed with the Guarantor (e.g., Eskom - WEPS before losses)

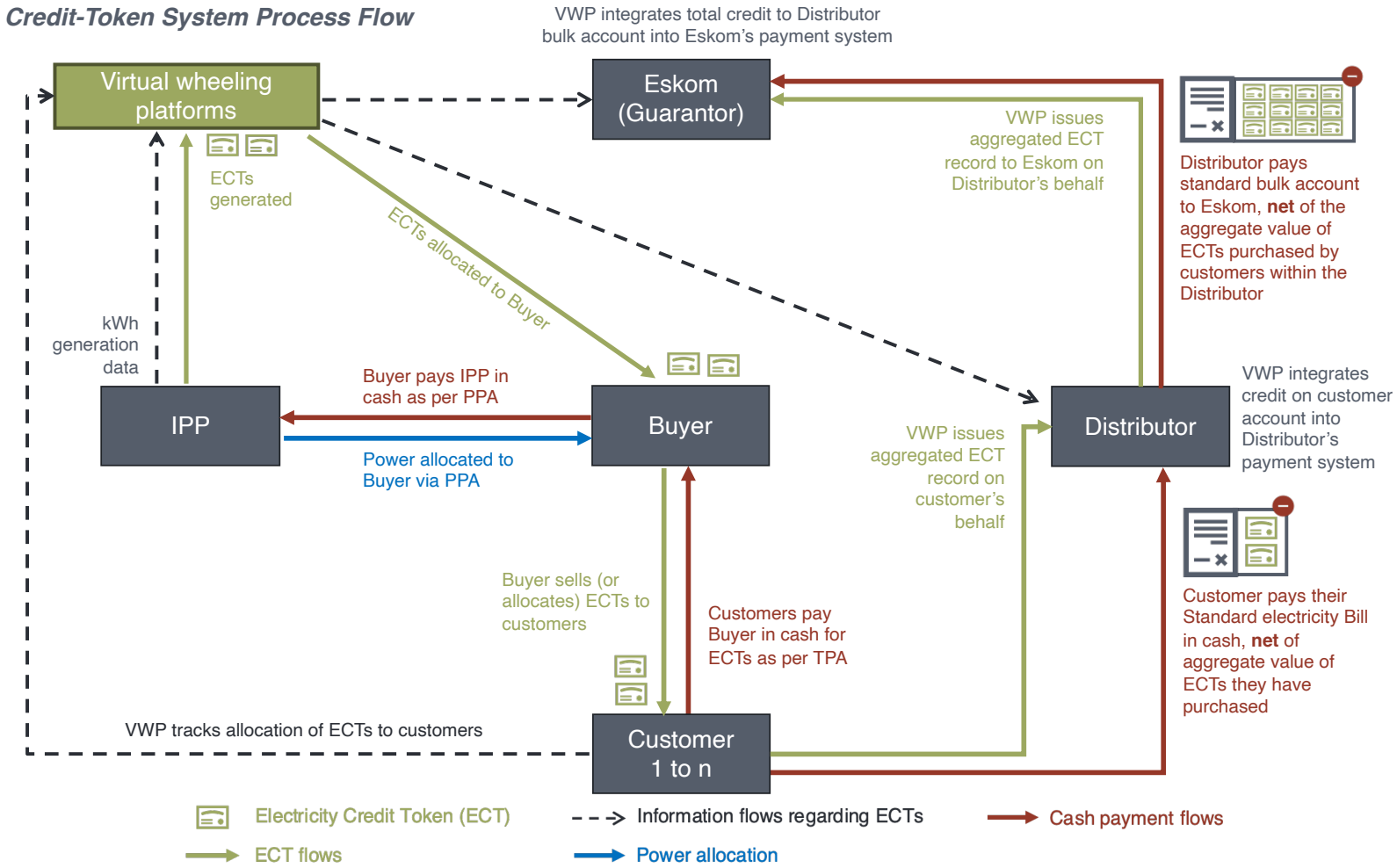
Tokens are financial assets and do not represent the ownership of power. End customers can sign up for short- or long-term token purchase agreements (TPA's) based on their demand for power and the amounts that they would want to redeem against their electricity accounts

Tokens are tradeable & can be used to settle obligations in a chain of transactions, before in the final transaction they are presented to the Guarantor (e.g., Eskom) to be redeemed:

- The bearer's electricity account is credited for the token face value; and
- The token is cancelled

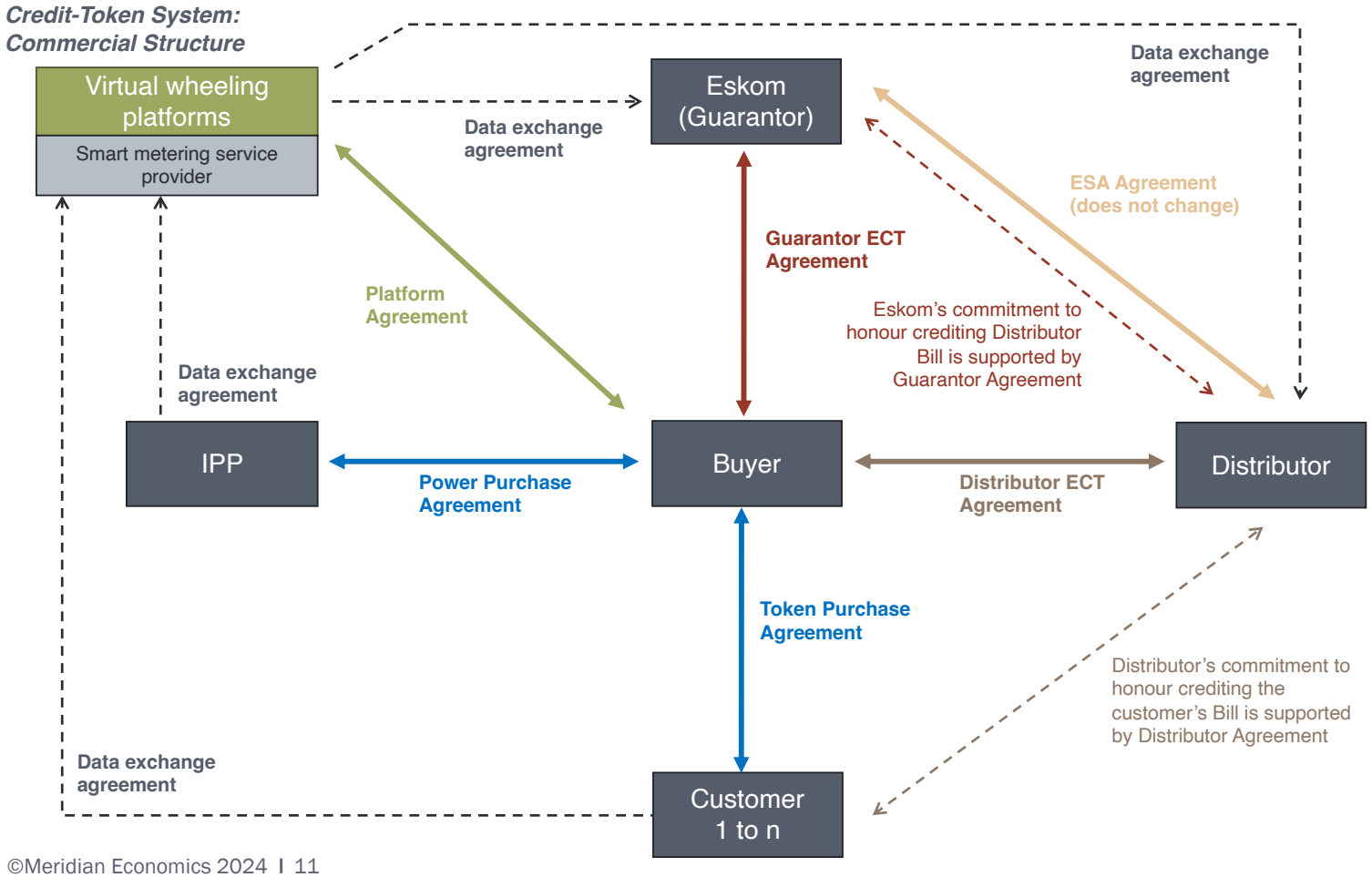
An Overview of Token Wheeling

Tokens are generated by injecting power into the grid (IPP) and ultimately redeemed by the Guarantor (E.g. Eskom)



An Overview of Token Wheeling

The primary commercial structure is established by a few key agreements



Standardised Guarantor and Distributor **ECT Agreements** will be the foundation for the commercial structure.

The ECT Agreements must:

(a) specify the conditions for the issuing of the tokens (on behalf of the Guarantor);
(b) bind the parties to the redeemable value of the tokens for settlement of electricity accounts;
(c) allow implementation via payment service providers; and
(d) specify data exchange and reporting requirements.

Key benefits of Token Wheeling

Enhances bankability of projects

Enhances project viability and bankability

Eliminates the risk of Eskom or municipal default by **avoiding double payment** for power

Liquid credit token trading reduces supply and off-take risks

Liquid trading of ECTs and TPAs mitigates risks for buyers, customers, and generators.

Offers flexibility in adjusting supply and off-take positions, reduces counterparty risk, and supports larger generation projects.

Lowers barriers to entry for Buyers

ECTs, are financial assets, that simplify the trading process by **eliminating the need for NERSA trading licenses** and modifications to Electricity Supply Agreements.

This reduces legal barriers compared to traditional trading models.

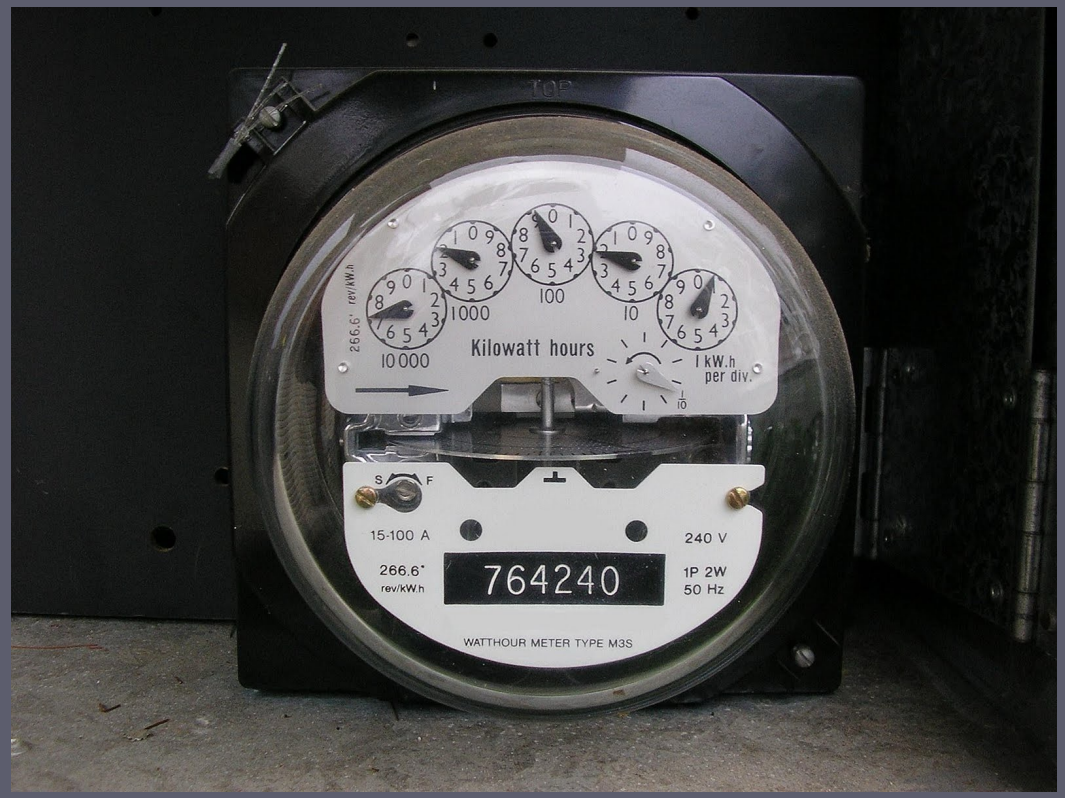
Sets up trading practices and supporting infrastructure for SA's future power market

Establishes power generation tracking and (potential) customer load reconciliation systems critical for the future SA power market. Prepares stakeholders for commercial power trading practices and can link to future multi-market mechanisms

Key benefits of Token Wheeling:

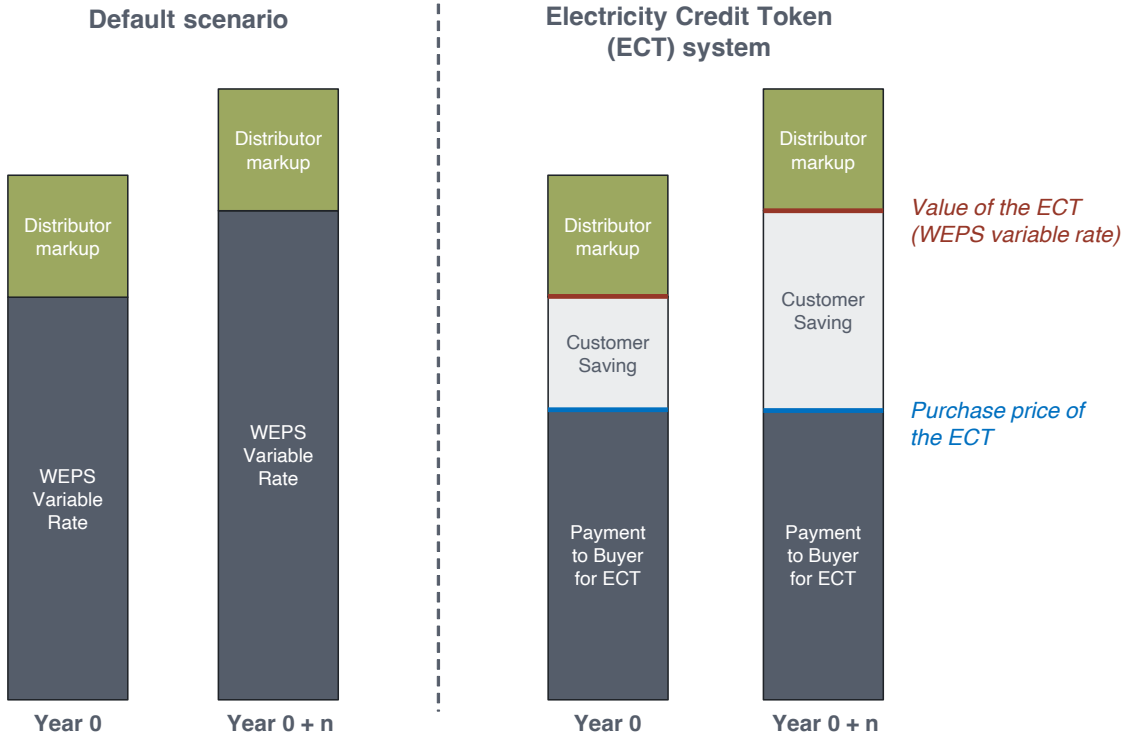
Simpler implementation model

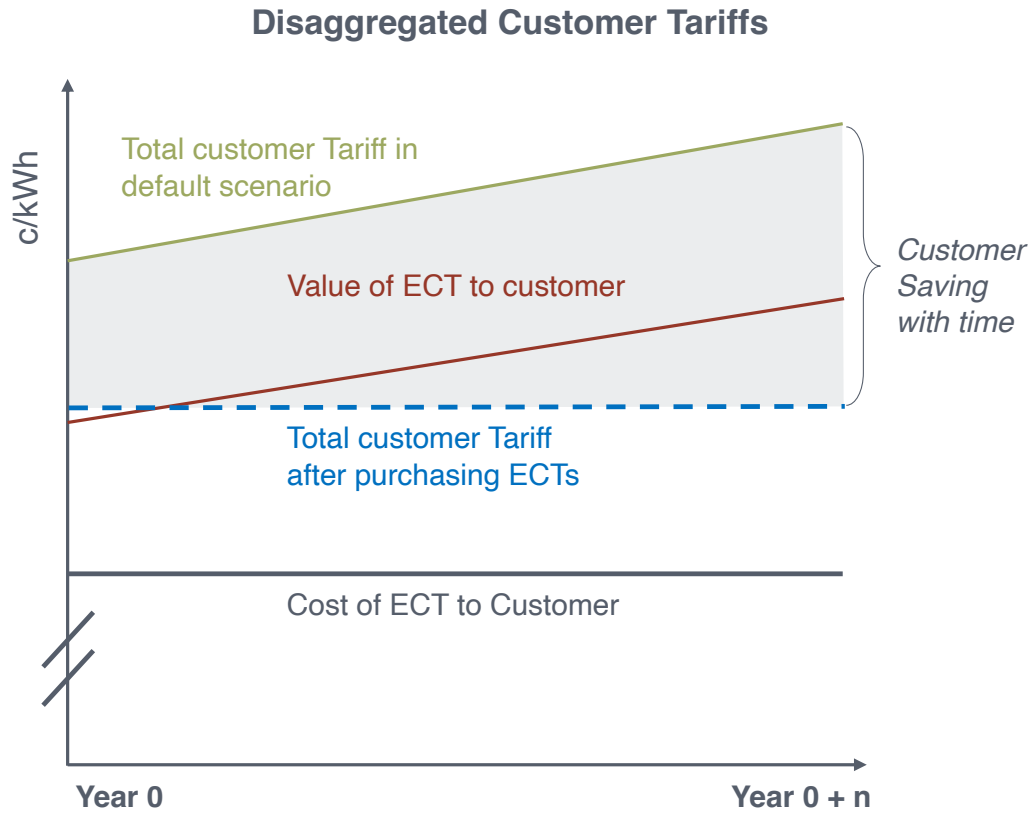
- ✓ **Can piggy-back on existing payment systems and avoids: implementation in the billing systems**; cost of supply studies; and wheeling fee negotiations with municipalities.
- ✓ Does **NOT** require monthly time–of-use reconciliation between generation and loads. While the system can deliver this, it can be eliminated entirely – further simplifying the systems that have to be developed and the value of tokens to customers.



Key benefits of Token Wheeling

Token Purchase Agreements extends the reach of hedging and decarbonisation opportunities to many more customers





Key benefits of Token Wheeling

Reduced pressure on Eskom

Facilitates additional generation capacity

Increases generation capacity with no additional impact on Eskom's balance sheet or requirements for government guarantees.

Reduces load shedding and diesel-fired generation costs

The increased levels of generation will decrease the levels of load shedding, reduce pumped-storage cycling, free up more pumped storage capacity, and reduce expensive diesel-fired generation required

Eskom does not need to run most of this system

Virtual Wheeling Platforms will do most of the heavy lifting and make the data available to Eskom in the formats it requires. All information will be auditable.

Reduces Eskom's exposure to Municipal non-payment

As Token wheeling uptake increases it reduces Eskom's exposure to non-payment by municipal distributors on their bulk electricity bills. Participating municipalities will ultimately owe Eskom less cash.

Key benefits of Token Wheeling

Municipalities remain revenue neutral and protect sales

Token wheeling, with its larger reach, will protect municipal **sales volumes and the margins thereon**:

1. Customers with hedged electricity input costs and the ability to decarbonise their power will be incentivised to maintain (or grow) grid-based power consumption:
   - → This has the effect of protecting municipal sales volumes, and therefore the margins made thereon.
2. If customers are price hedged on their energy costs, municipalities have more room to maintain margins on their power sales (customers are less squeezed).

Municipalities will at a **minimum remain revenue-neutral** under the ECT system, but will most likely benefit.

Key benefits of Token Wheeling

Additional market applications of ECTs

Embedded Rooftop PV Market:

- ✓ Replacement for municipal Feed-in Tariffs (Less administrative burden for residential market to participate)
- ✓ Opportunity for the financiers of roof top PV (C&I, and Residential) to:
  - ❑ purchase tokens generated from excess power from their customers (acting as "Buyers") to improve the affordability and bankability of projects; and grow their loan book.
  - ❑ Trade these tokens in the corporate market.

Hybrid wheeling:

- ✓ When wheeling into municipalities, conventional wheeling can be combined with hybrid wheeling
- ✓ If Eskom is slow to act as Guarantor A municipality can allow a hybrid model (e.g. to get pilots going)
  - ❑ This will entail the Buyer wheeling power from the IPP on the Eskom grid into the municipality by using conventional wheeling.
  - ❑ Tokens are still generated at the point of injection on the Eskom grid, with the *municipality* as the guarantor.
  - ❑ The tokens are sold in the municipal area and used to settle municipal electricity accounts.
  - ❑ The municipality could itself off-course also act as the Buyer (sign PPA, sign TPAs with customers)

Consolidation of Flexible Generation opportunities:

- ✓ Track and aggregate offsite dispatchable generation for load curtailment obligations (might require changes to the NRS048-9 rules)

Plugging into pre-payment system

Key Points

1

Creating a **liquid market for electricity related rights and obligations** will be the key to de-risk and unlock:

(a) much wider customer uptake of; and

(b) accelerated investment in…

grid-based private power in South Africa

2

Token wheeling enhances the bankability of projects:

- Reduces serial payment risk
- Reduces implementation risk
- Removes NERSA licensing requirements & alterations to ESAs

3

Simpler Implementation Model

- Do not need intervention in the billing systems
- Does not rely on large new utility systems to be developed

4

Unlocks generation capacity **without adding new financial pressure onto the public sector**

5

Municipalities protect sales volumes and margins and have new opportunities to benefit from embedded generation opportunities and hybrid wheeling

6

Extends the financial hedging and **decarbonization** benefits to a broader customer range

Proposed next steps: A stakeholder driven task team reporting into NECOM 9 should drive the adoption of the ECT System

Proposal:

Establish a stakeholder-driven task team under NECOM Workstream 9

- Given the limited resources at Eskom and Municipalities and their high workload, we propose that a single point of engagement with government and utilities be established under NECOM Workstream 9
- Business and other stakeholders with an interest in implementing the ECT system could drive the work in collaboration with Eskom and willing municipalities, under NECOM leadership
- The aims would be to develop: (a) a detailed set of principles describing the national functionality of the ECT system; (b) the standardised ECT agreements; and (c) the common technical standards for its implementation
- The necessary (competing) platforms (token management, reporting, and trading, etc.) will be developed by business

Link to report

https://meridianeconomics.co.za/our-publications/oiling-the-wheels/