




Western Cape
Government
FOR YOU

WHEELING

Wheeling Toolkit for Municipalities

July 2023

A wide-angle photograph of a wind farm. In the foreground, a large white wind turbine stands prominently, its three blades extending across the frame. The landscape is a series of rolling hills with terraced agricultural fields, some appearing to be planted with crops. In the distance, more wind turbines are visible, receding into the haze. The sky is a pale blue with a few wispy clouds. The overall scene is bright and clear, suggesting a sunny day.

The aim of this toolkit is to enable access to all materials available to municipalities, an overview of the potential way forward, and a step-by-step guide for implementation.

Supported by:

Western Cape Government

Department of Economic Development and Tourism

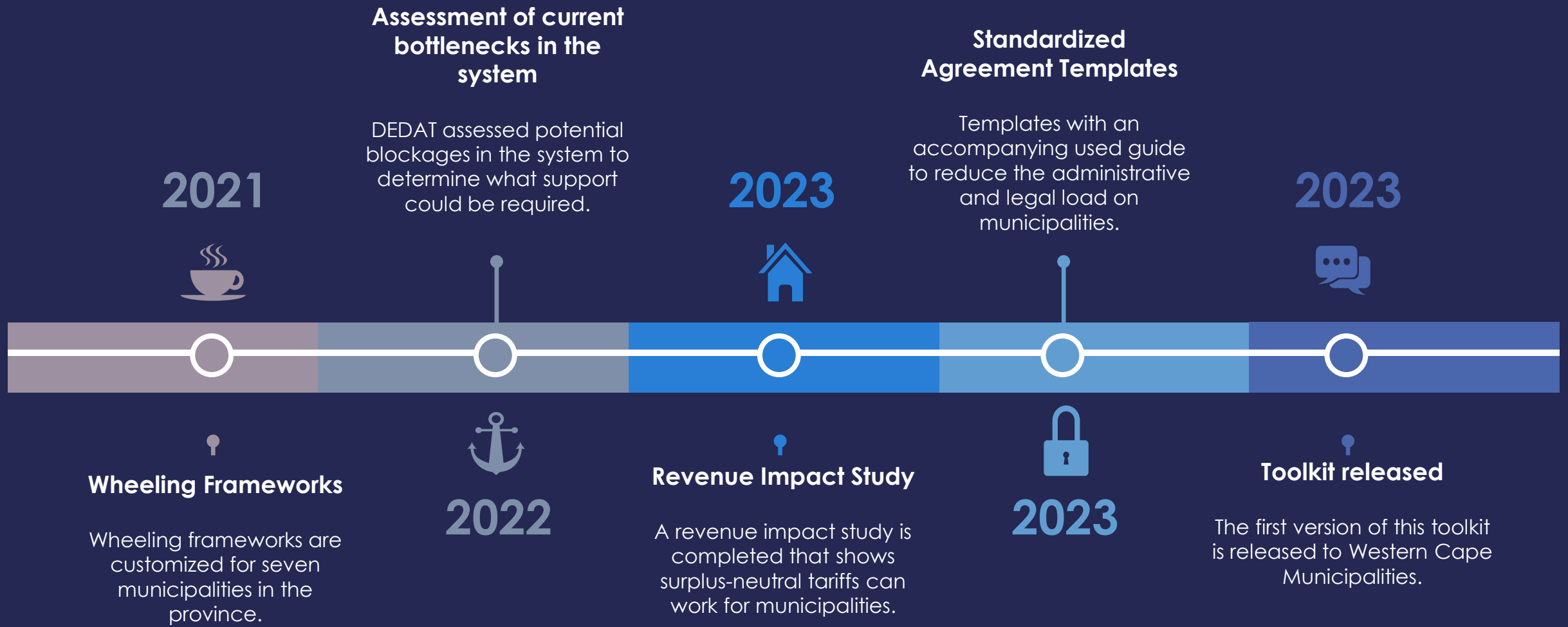
Department of Infrastructure

There are many direct and indirect benefits to implementing wheeling

- Wheeling is an important steppingstone to a more open electricity market.
- Extensive modelling has shown that it can be implemented in a surplus-neutral way, to ensure municipal revenue streams are protected.
- The best way to understand this is that instead of “wheeling” Eskom electricity like the municipality currently does, you would also allow private users to wheel over your network and charge the same surplus as you do with Eskom energy.
- There is a legislative responsibility to allow access to the network to third parties.
- There are some steps involved with the implementation, but many resources have been developed to assist, and there is support available.



A lot of things have happened and several municipalities have already been involved



In this presentation we will cover the following areas

General
Wheeling
Information

Steps toward
Implementation

Summary of
resources and
support

Request for
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Several pieces of information have been made available that speak to general wheeling information, including the benefits thereof and the reason for the urgency.

Wheeling in Municipalities

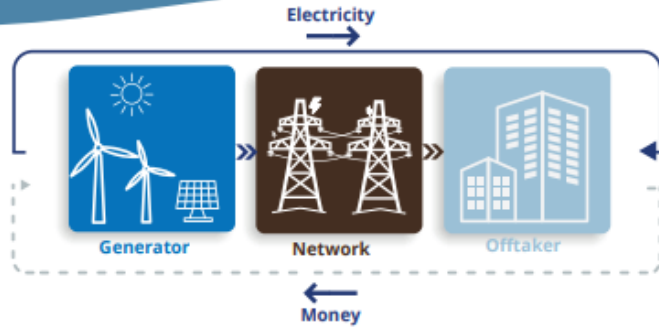


SUSTAINABLE
ENERGY
AFRICA



Western Cape
Government
Economic Development
and Tourism

Wheeling refers to the use of Eskom/Municipal grids to transport electricity from a private generator to a private offtaker



01 Municipal Revenue

ZERO IMPACT

A comprehensive model shows that wheeling has zero impact on municipal revenue using surplus-neutral tariffs.

02 Cost Savings

CHEAPER THAN ESKOM ENERGY

Offtakers consuming wheeled energy can save on their electricity bill as wheeled energy can be cheaper than Eskom energy.

03 Generation Investment

TO END LOADSHEDDING

Wheeling is a good business model for generators which will bring much needed generation capacity onto the grid.

04 Jobs

22 JOB YEARS PER MW WHEELED

Wheeling from local generators creates jobs and drives investment in the local economy.

05 Service Delivery

CUSTOMER GROWTH

Municipalities that offer services like wheeling will build customer trust leading to customer retention and growth.

06 Clean energy

TO REMAIN GLOBALLY RELEVANT

Wheeling allows companies to reduce emissions without investing in rooftop solar.

Recommendations to Municipalities

01 Engage and learn

This is a complex new field which will require committed individuals to drive the process in municipalities.

02 Develop billing system

Most billing systems are not capable of processing the transactions required for wheeling. Billing system upgrades are inevitably required.

03 Develop contracting capacity

Third-party grid access requires contracting that is fair for all parties. Legal departments will need to upskill to ensure fair contracting terms.

Infographic developed with Sustainable Energy Africa



Video developed with Sustainable Energy Africa and George Municipality

Speaking to the private sector users yielded some interesting results



Aim

a

Engage the highest electricity users in each municipality to understand their needs and plans

We spoke with the owners / managers of 150 sites located in the Western Cape, with every municipality represented. The types and sizes of users varied significantly between municipalities.

The typical size of municipal electricity users is small relative to Eskom large users

We have very few “Very Large (>10 MVA)” customers. This means that solutions that fit our customers may not be the same as at national level.

b



Size



Demand

c

Current demand for wheeling is mostly from large multinationals with carbon targets

These users often have multiple sites across different supply areas. They may prefer Eskom-to-municipal wheeling to simplify their arrangements.

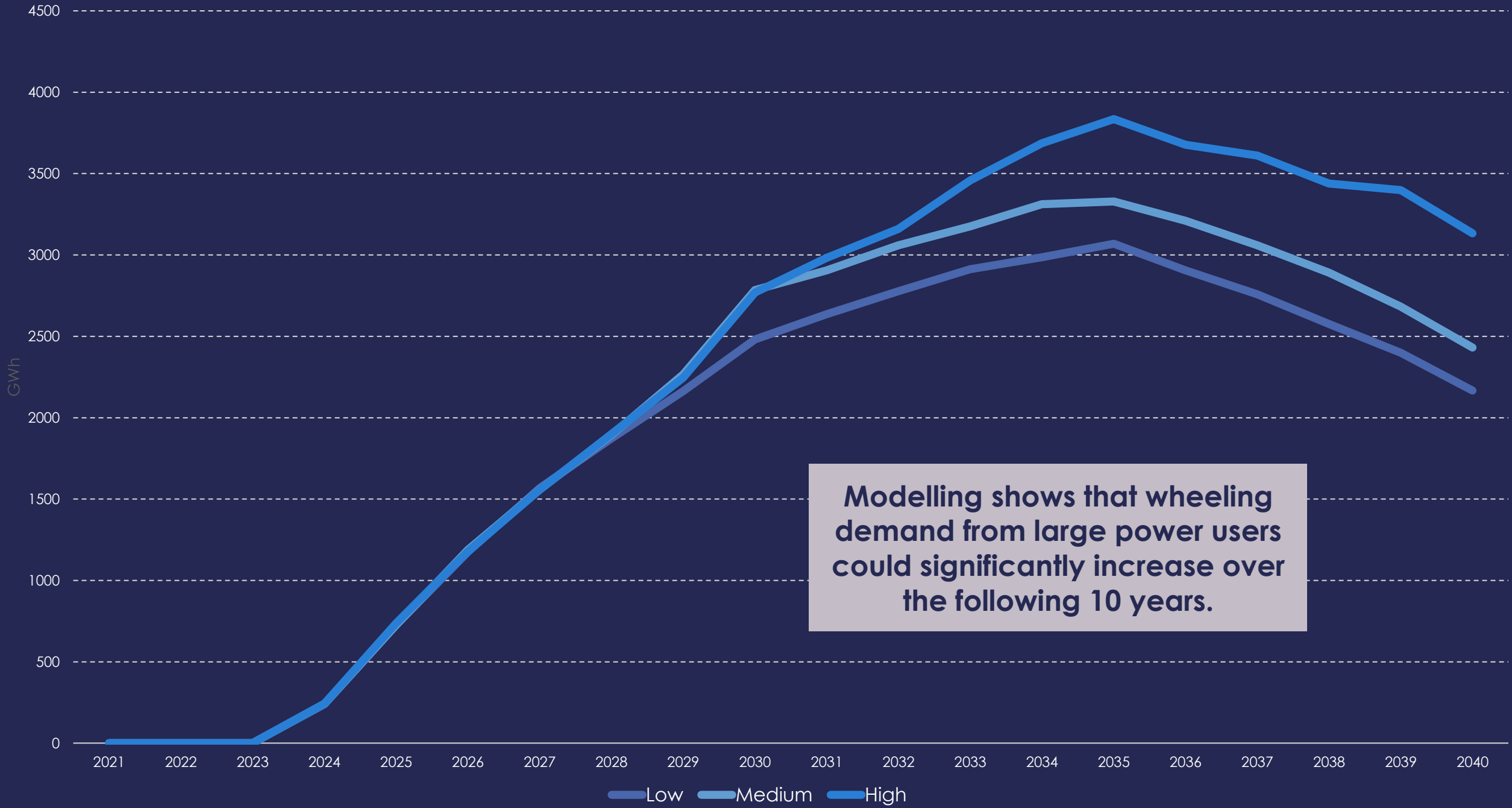
Municipalities that have indicated a clear path for wheeling see much greater interest

Where tariffs or frameworks have been published, there is significantly greater interest in wheeling. This is often driven by generators / traders doing marketing in the area.

d



Progress



Modelling shows that wheeling demand from large power users could significantly increase over the following 10 years.

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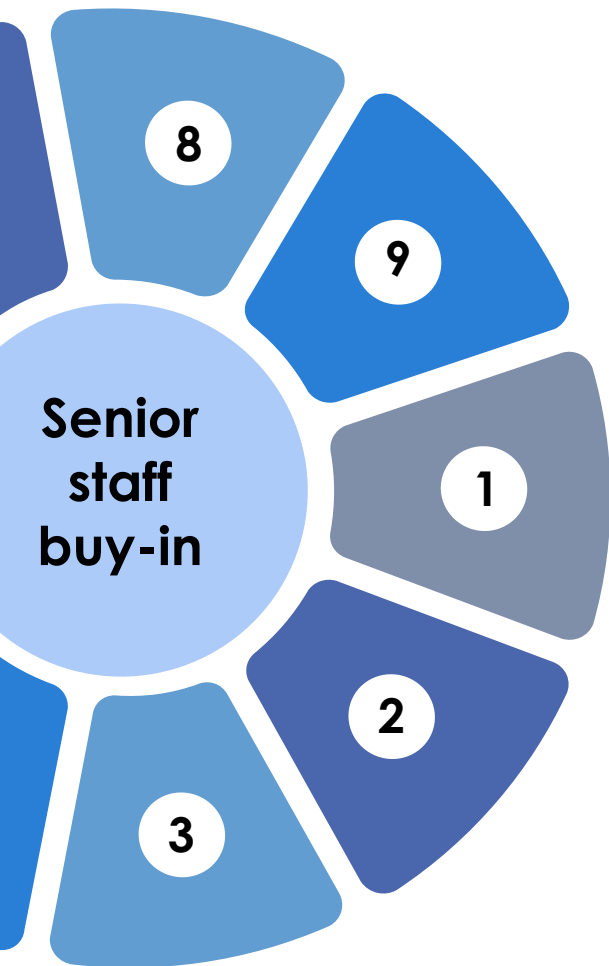
Request for
information

In order to implement wheeling there are certain steps that need to be completed. The steps given in this toolkit are not the only way to move towards implementation, but serve as a guideline of a potential way to do this procedurally and efficiently.

MAJOR STEPS FOR WHEELING

- 01
- 02
- 03
- 04
- 05
- 06
- 07
- 08
- 09

Get senior staff buy-in – Wheeling requires inputs from many different departments in the municipality and will require a combined effort to develop to fruition.
Develop wheeling tariffs – Use the existing templates to prepare rules and tariffs.
Prepare a wheeling guideline – The wheeling guideline signals to the private market your intentions and a framework for wheeling.
Get council approval – Prepare a submission and present to council.
Apply to NERSA for approval of tariffs – Currently NERSA is not approving tariffs due to a lack of methodology, but this should not stop wheeling projects going ahead.
Customize wheeling agreements – Use existing templates and user guides.
Prepare / Upgrade billing system – Initial projects can be run on simple basis like Excel, but future billing systems should be prepared to incorporate wheeling transactions.
Pilot project – The municipality may decide to run a pilot project to test mechanisms and procedures.
Open wheeling market – Open the wheeling market to the public.



- Use the infographic and video provided to frame the opportunity.
- Use the information in the toolkit to estimate effort / costs required to implement.
- Use the municipal revenue study Excel tool to prove no negative revenue impact.
- Get buy-in of the following key departments: Legal, Finance, Billing, Electro-technical.

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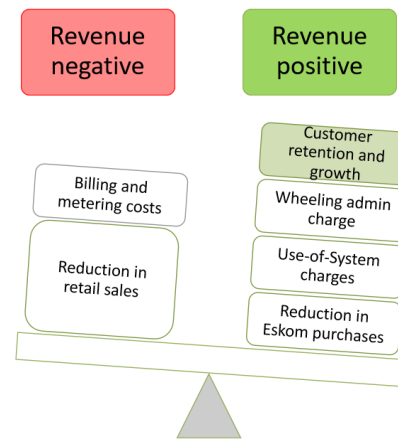
Recommendations to Municipalities

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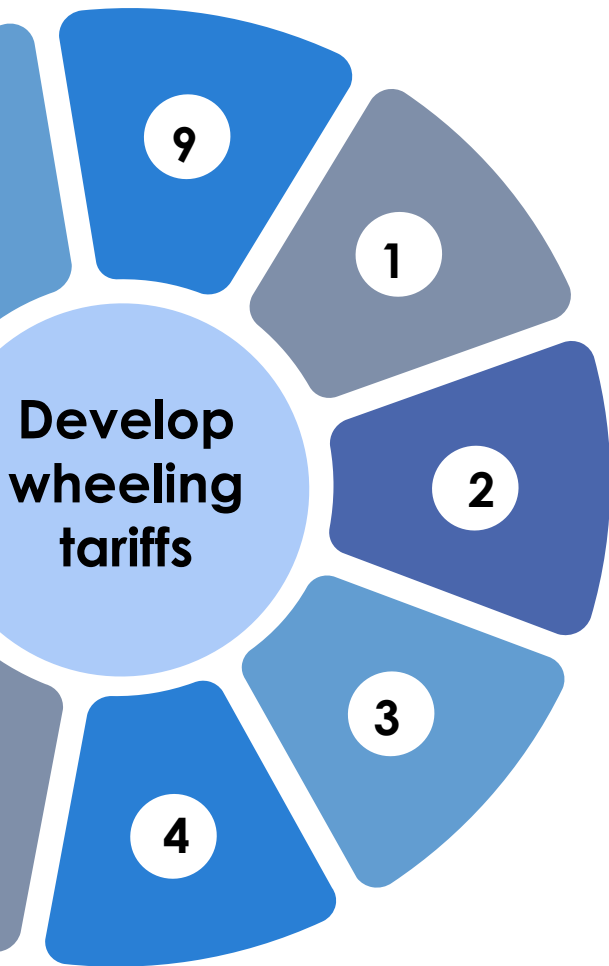
02 Develop billing system
Most billing systems are not capable of processing the transactions required for wheeling. Billing system upgrades are inevitably required.

03 Develop contracting capacity
Third party grid access requires contracts that is fair for all parties. Legal departments will need to upscale to ensure fair contracting terms.

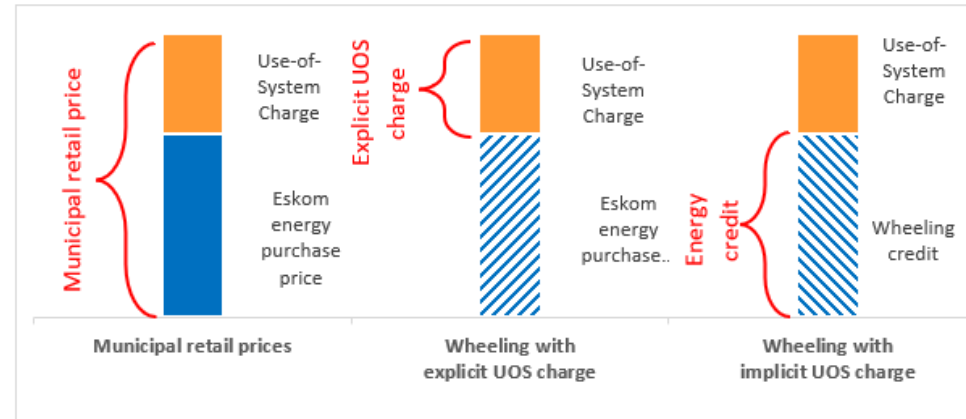
Wheeling Revenue Impact? Let's dig deeper.



Municipal revenue impact	Configuration 1: Embedded Solar with Half Hourly Billing	Configuration 2: Embedded Solar with Monthly TOU Billing	Configuration 3: Eskom Solar with WEPS Credit	Configuration 4: Eskom Wind with WEPS Credit
Annual revenue impact of wheeling	R6 000,00	R6 000,00	R6 000,00	R6 000,00
Annual cost savings from buying excess wheeled energy	R17 691,52	R-	R-	R57 825,94
Total Annual Revenue Impact	R23 691,52	R6 000,00	R6 000,00	R63 825,94
Power producer business case				
Generation capacity allocated to offtaker	200 kWp	200 kWp	200 kWp	200 kWp
Annual wheeled energy	311 056 kWh	325 524 kWh	366 219 kWh	567 659 kWh
Annual excess exported energy	15 100 kWh	0 kWh	0 kWh	12 085 kWh
Power producer cost per kWp	R13 000	R13 000	R12 000	R18 000
Total cost of installation	R2 600 000	R2 600 000	R2 400 000	R2 997 052
Discounted Operation and Maintenance Costs	R400 467	R400 467	R400 467	-R622 948
Total Costs	R3 700 467	R3 700 467	R2 800 467	R1 877 052
Total Income	R2 634 468	R2 878 651	R3 238 523	R5 019 891
Net Present Value	-R 366 048	-R 169 871	R 390 000	R 796 943
Payback Period	13	12	9	8
Internal Rate of Return	3%	5%	8%	9%
LCOE	1,23 R/kWh	1,23 R/kWh	1,03 R/kWh	0,96 R/kWh



- **Decide which of the following tariff methodologies will be used***



- **Develop tariffs specifically for your municipality using the revenue impact tool.**

NOTE: The tool may show that negative wheeling charges are revenue neutral for certain time-of-use periods. This happens when current municipal tariffs for that time-of-use period are lower than the Eskom tariffs (i.e. currently the municipality might be “losing” money in those periods to be made up from others). This poses a problem which is typically resolved with more cost-reflective tariffs following a cost-of-supply study

- **Check if projects remain viable for all three parties involved (generator, offtaker and municipality).**
- **This may prompt you that an update of your cost of supply study is required (resources available: [COS template & COS ToR](#)).**
- **Submit tariffs to council for approval (typically as part of the budget process driven by the CFO).**

*Developed by:

Prepare a wheeling guideline by adapting the template provided [online](#)



KEY DECISIONS*

- 01 Generator Connection**
You may decide to only or intra-municipal wheeling or Eskom wheeling at first.
- 02 Voltage Level Connection Constraints**
Allow connection at HV / MV or LV or both.
- 03 Customer size restriction**
While access should be non-discriminatory, you may allow access to wheeling for specific users initially to test the billing system until it can take on multiple users. You may also limit access where technically unfeasible.
- 04 Metering Ownership**
Municipality has a meter at the generator and consumer meters.
- 05 Generator and Consumer arrangement**
Allow one-to-one, one-to-many, many-to-one and/or many-to-many wheeling.
- 06 Where are Wheeling calculations done**
On metering system, billing system or manually.
- 07 What type of wheeling tariff will you use**
Eskom energy plus use-of-systems charge, or WEPS rebate system.
- 08 How to calculate excess**
Could be consolidated on a per-month, per-hour or per half-hour basis. Will mostly happen on a Time-of-use basis as well.
- 09 How do we rebate excess?**
Allow banking over TOU periods, purchase through municipal feed-in tariff, or do not rebate at all (affects generator business case).
- 10 SSEG installers**
Do you allow SSEG users to wheel excess or only dedicated generators?

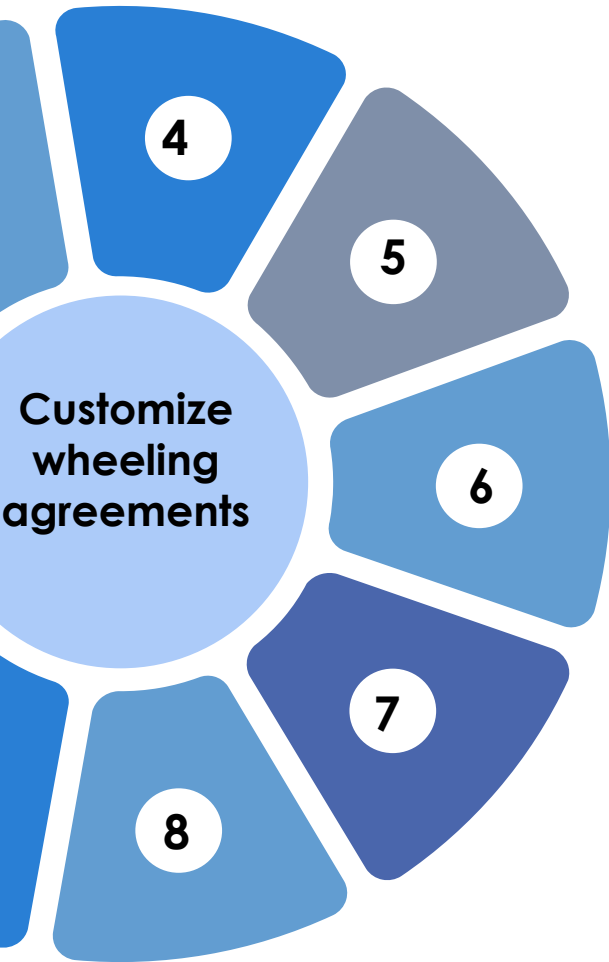


- **Prepare submission document, discuss with Management Team and then submit to Executive Mayoral Committee with a recommendation to submit to Council for adoption**
- The Draft By-law will typically go to Council for Concept approval and permission to consult the public.
- Once you have done consultation with the public you will take the By-law back to council for final approval and the Public announcement of final approval will follow.
- **The submission to Council could include the following:**
 - Updating of Electricity Supply by-law.
 - Wheeling Policy (Only EMC approval required).
 - Wheeling Tariff (typically with the submission of annual tariff increase as part of the Budget approval process).

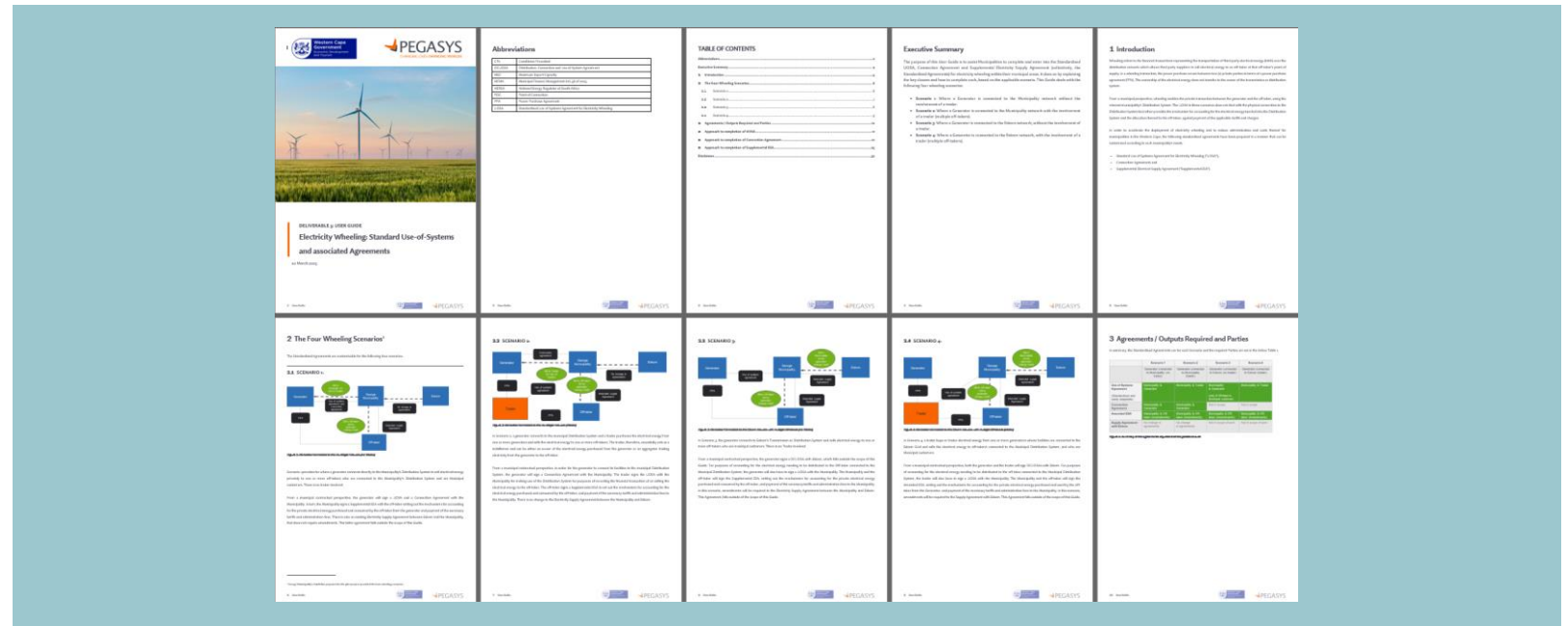
Note: DO NOT include technical specifications/requirements in the submission to EMC or Council. You can refer to the documents in the policy/by-law but don't make it part of the policy/by-law.

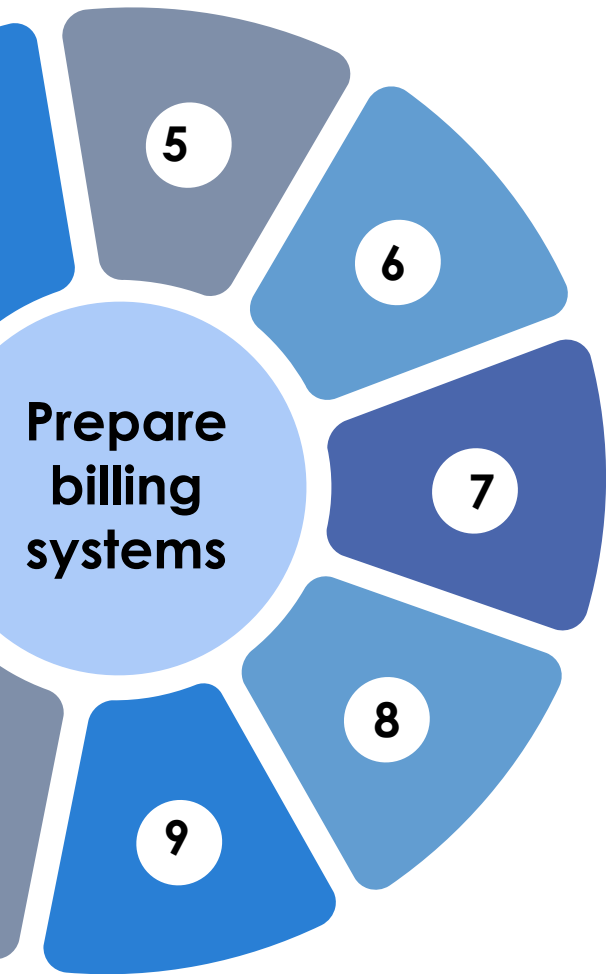


- **NERSA are not currently approving tariffs due to a perceived lack of methodology. They are also not refusing applications.**
- **Typically your tariffs would be implicit – i.e. the difference between two explicit approved tariffs.**
- **This means that currently you could go ahead with wheeling tariffs.**
- **This is likely to change with the National Wheeling Framework being published.**
 - **This framework is partly based off of similar work as previously done in the WC, so should align with current tariff methodologies.**
- **When this is published, NERSA approval of tariffs will likely be required again.**



- Standard wheeling agreements have been developed and can be found [here](#).
- There are three agreements, and the use of each depends on the specific wheeling arrangement happening.
- This is all explained in the User Guide which can be found [here](#).
- The aim of the standardized agreements is that they will handle the complicated techno-legal part, and leave the municipal specific information up to the legal department of the municipality.





- If the current billing system cannot handle wheeling transactions, changes might be required.
- For a small amount of projects it could be possible to run this process manually, but once larger amounts of transactions are happening, automated systems will be required.

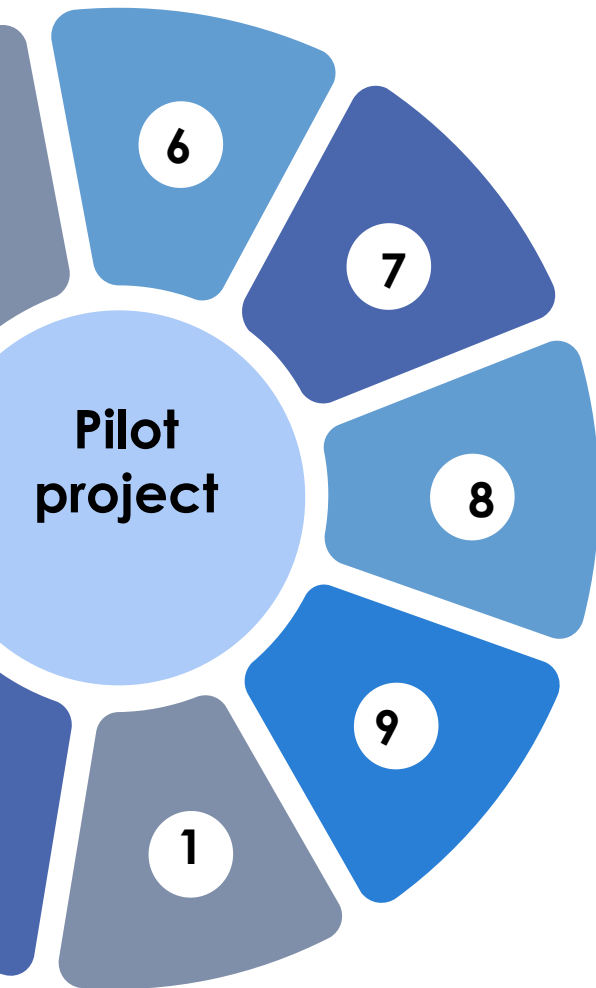
Billing

Municipal bill to Generator	
Total (with wheeling)	
Basic @ R 2187.32 per month	R 2 187.32
Demand 580 kVA @ R 70.26 per kVA	R 40 750.80
Access 600 kVA @ R 61.61 per kVA	R 36 966.00
Wheeling energy credit	
Peak Energy 25000 kWh @ R1.2846	-R 32 115.00
Standard Energy 70000 kWh @ R0.9139	-R 63 973.00
Off-peak Energy 100000 kWh @ R0.6149	-R 61 490.00

Municipal bill to client	
Total (with wheeling)	
Basic @ R 2187.32 per month	R 2 187.32
Wheeling admin @ R 250 per month	R 250.00
Demand 95 kVA @ R 70.26 per kVA	R 6 674.70
Access 100 kVA @ R 61.61 per kVA	R 6 161.00
Energy charge	R -
Peak Energy 80000 kWh @ R1.2231	R 97 848.00
Standard Energy 170000 kWh @ R0.936	R 159 120.00
Off-peak Energy 100000 kWh @ R0.81	R 81 000.00

27

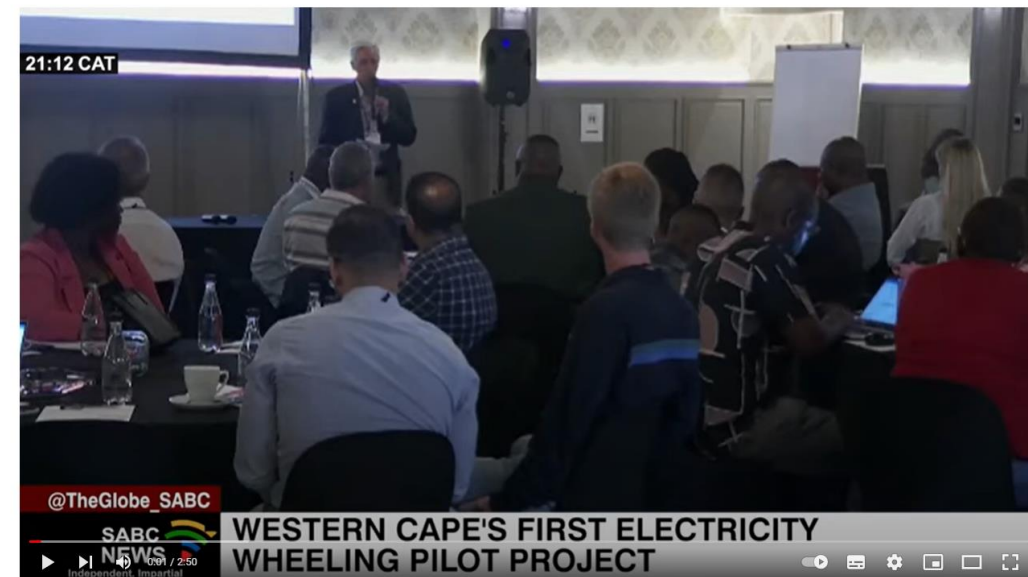
*from George Municipality [“Reinventing the wheel: Wheeling Case Study”](#)



- If needed, the municipality might want to run a pilot project.
- During this project specific limits could be applied – such as a limited amount of users, or only specific types of arrangements.



Fifteen commercial electricity suppliers will start wheeling electricity through Cape Town's grid following the greenlight from the City of Cape Town's Council for third parties to start selling electricity using Cape Town's grid infrastructure.

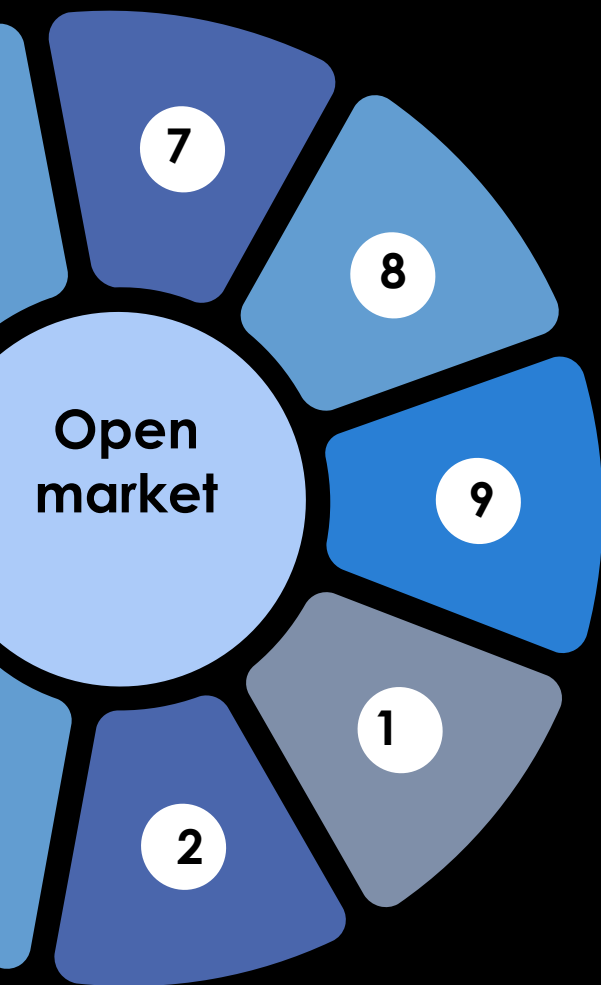


Electricity project - Energy Wheeling gains momentum in Western Cape

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It is clear that South Africa will likely follow global trends to end up with a more open market.

There is however currently a lack of clarity as to what route we will take to get there.

Wheeling is an important steppingstone in that route which ensures municipal financial stability.



General
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information

In this section we summarize the resources available and provide relevant links to online locations for download and viewing.

- Framework templates ([online](#)).
- Infographic ([Link to WCG website](#)).
- Wheeling explainer video ([Link to youtube](#)).
- Excel revenue model ([Link to WCG website](#)).
 - [Demo video](#)
- Calculating [fair use of systems charges](#).
- Wheeling [discussion paper](#) .
- Report on revenue study ([Link to WCG website](#)).
- Use of systems and associated agreements with user guide ([Link to WCG website](#)).
- SEA/SALGA [support website](#) and training.
- Cost of supply [resources](#) .

List of Resources

The list to the left contains all the resources used in this toolkit, along with some other potentially relevant or useful information. The resources have been developed and funded by a variety of entities and where possible they are linked to the earliest source.

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In order to further improve the support we are given and the reporting on wheeling enablement, we request anyone that uses this toolkit to send us some key information.



How far are you with implementation?

This information allows us to see where support might be required, and for municipalities in an advanced stage, to point private sector developers to ideal locations.



What is stopping implementation?

While a lot of work has gone into removing roadblocks, there may be others that come up and we would like to stay ahead of them.



Reporting at provincial level

This reporting is crucial as it shows private sector that we are ready to do business and will provide the support they need for growth. We would like to know number of projects and MW of capacity.

Municipalities can contact: mer-initiative@westerncape.gov.za

This work has been funded by the Western Cape Government:

Department of Economic Development and Tourism & Department of Infrastructure

Entities involved in various parts of the toolkit



Thank you

Municipalities can contact: mer-initiative@westerncape.gov.za

Businesses, developers and other private parties can contact us at:

<https://www.westerncape.gov.za/110green/contact-us-2>