

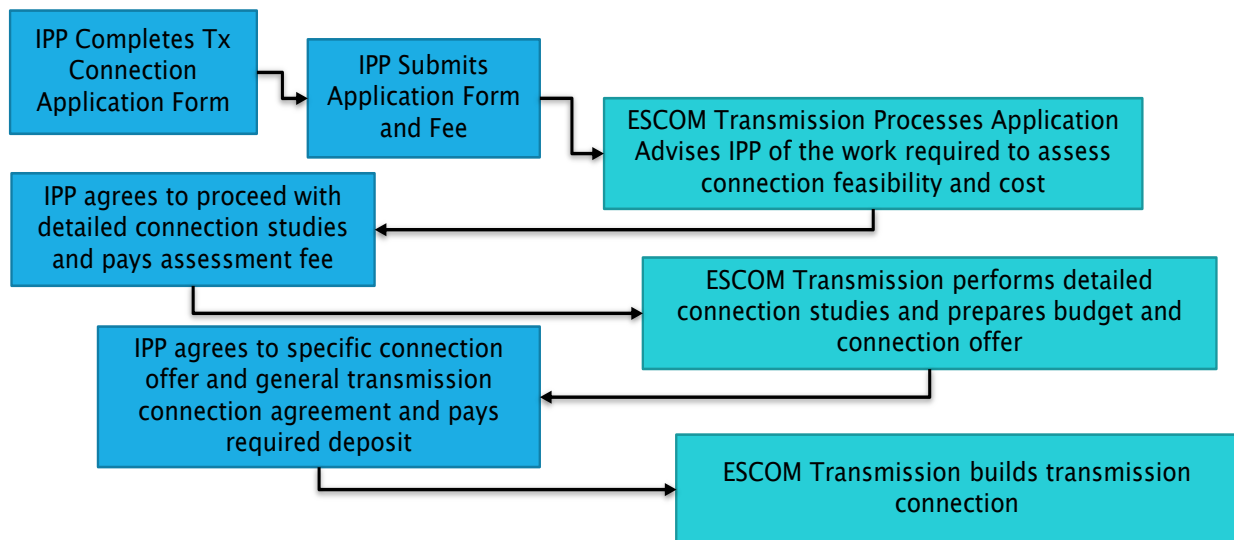
## Annexure G: Transmission Application to Connect (Generation)

This annexure describes a typical transmission connection application process and includes a typical transmission connection application form.

### A.3 Transmission Connection Process

The diagram below illustrates how the transmission connection process is typically dealt with and how it is expected to work.

- The IPP completes and lodges a connection application and fee for a generation transmission connection.
- ESCOM Transmission assesses what studies and costs the connection application process
- The IPP agrees to continue the process and pays the fee for transmission connection studies
- ESCOM Transmission performs the studies required and provides the IPP with a connection offer.
- The IPP agrees to both the general connection agreement and the specific terms of the connection offer and pays a deposit.
- SCOM Transmission proceeds with construction of the connection.



### A.4 APPLICATION TO CONNECT (GENERATION CUSTOMER)

Please return completed form to:

Tel:

Fax:

Email:

## **PREAMBLE**

This Application Form has been prepared by ESCOM to enable customers to make an application for connection to the Malawian Transmission System. An application for connection is required by:

- a new customer;
- an existing customer without an agreement with ESCOM to connect to the Transmission System and who does not have an alternative arrangement with ESCOM that is inclusive of connection services (for example, export of electricity and purchased through a Power Purchase Agreement by ESCOM); or
- an existing customer who requires to change the agreement to connect to the Transmission System (for example, if it requires an increase in export facilities at its point of connection).

After receiving the application ESCOM will respond to the applicant with an offer setting out the Specific Terms and Conditions for connection. These together with ESCOM's General Terms and Conditions for Connection will form the Connection Agreement.

The offer will be based on the information provided by the applicant in the completed Application Form. However, ESCOM may request further information from the applicant to enable ESCOM to fully assess the application before preparing an offer.

The offer once accepted by the customer will be incorporated into Specific Terms and Conditions for Connection (Connection Agreement) which, together with the General Terms and Conditions for Connection, will govern the terms and conditions for the customer's connection to ESCOM's Transmission System.

**SECTION A: PARTICULARS OF APPLICANT**

A.1 Full name of applicant:

---

---

A.2 Identity number of applicant, or in the case of a body corporate, registration number:

---

---

A.3 Nationality of applicant, or in the case of a body corporate, country of registration:

---

---

A.4 Physical of applicant, or in the case of a body corporate, the registered head office:

---

---

---

---

A.5 Postal address (if different from the above):

---

---

---

---

---

---

---

---

A.6 Telephone number of applicant:

( \_\_\_\_\_ ) \_\_\_\_\_  
\_\_\_\_\_

A.7 Fax number of applicant:

( \_\_\_\_\_ ) \_\_\_\_\_

A.8 E-mail of applicant (if any):

\_\_\_\_\_

A.9 Duly authorised representative of the applicant (for contact in relation to this application):

Name:

\_\_\_\_\_  
\_\_\_\_\_

Title:

\_\_\_\_\_  
\_\_\_\_\_

(e.g. owner, director)

Telephone Number: \_\_\_\_\_

Fax Number: \_\_\_\_\_

E-mail: \_\_\_\_\_

A.10 Date of application: \_\_\_\_\_

A.11 Applicant's signature: \_\_\_\_\_

## **SECTION B: PARTICULARS OF GENERATING STATION**

### **B.1 Name of generating station**

---

---

### **B.2 Address of generating station**

---

---

---

---

### **B.3 Contact person at generating station**

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

Fax Number: \_\_\_\_\_

E-mail: \_\_\_\_\_

### **B.4 Location of generating station**

Provide a map showing the location where the applicant intends to construct (or alter, where this application relates to a change to an existing connection) plant. The map should be 1:50,000 scale minimum with the location of the plant clearly marked with an "X". The map coordinates of the location should be provided and clearly defined (coordinate system, map projection, spheroid, latitude/longitude reference coordinates). For ease of identification the coordinates should also be converted to WGS 84 in the format deg min sec.sss.

### **B.5 Electrical configuration of generating station, auxiliary plant and electrical equipment**

Provide a single line diagram of the proposed plant and surrounding electrical system which the applicant intends to construct or alter, detailing all significant items of plant. Mark on the single line diagram the proposed operational control boundary between the applicant's plant and ESCOM.

### **B.6 Site Plan**

Provide a plan of the site showing the area within which the applicant intends to carry out the activities. The site layout plan should be on a 1:200 scale indicating the proposed location of the point of connection, generators, transformers, auxiliary plant, site buildings etc.

## SECTION C: FINANCIAL DETAILS AND REQUIREMENTS

The applicant must satisfy ESCOM that the applicant will be capable of paying the charges that may become payable by the applicant to ESCOM.

The applicant is required to pay to ESCOM an amount equal to the estimated cost to conduct integration studies and initial designs before ESCOM undertakes such studies and designs. The Application Fee is only valid for 12 months from date of first Offer made by ESCOM and will not be refundable. The Application Charge, which the applicant must pay on returning this application is shown in table C1 below:

C.1 The following Application Fees are applicable:

<b>REQUIRED LOAD/GENERATION (MW)</b>	<b>APPLICATION FEE (Kwacha) VAT INCLUDED</b>
0 – 10MW	100 000-00
11 – 50MW	3,000 000-00
51 – 100MW	4,500 000-00
101 – 200MW	6,000 000-00
201 – 500MW	7,500 000-00

Additional payments may be required as further studies, design work, equipment ordering and construction is undertaken. Should the applicant fail to pay the Application Charge within 60 days from date of invoice, the application shall be cancelled automatically and the applicant has to submit a new application.

As evidence of the applicant's ability to make such payments, the application must provide:

C.2 Applicant's credit rating or three years annual audited financial statements and of all major shareholders

---

C.3 Details of bonds and/or guarantees issued by a Malawian financial institution that the applicant is able to provide to ESCOM. (Note: ESCOM will only accept bonds and/or guarantees from financial institutions acceptable to ESCOM)

---

---

---

---

## SECTION D: TECHNICAL DETAILS

ESCOM will be required to do integrations studies which will be based on the information provided by the customers as part of this application, additional information could be required from the customer from time to time ESCOM.

Large Power Stations need to commission integration studies to determine whether Power System Stability (PSS) is required and to assist with the final engineering of control circuits.

- D.1 Type of generating station (e.g. thermal, nuclear, hydro, pumped storage, gas turbine, diesel generator, alternative/other)

---



---



---



---

- D.2 Number, capacity and technical details of each unit<sup>3</sup>.  
The applicant is required to provide ESCOM with all technical data as requested below and Annexure A of the Application.

	Unit 1	Unit 2
Normal maximum continuous generation capacity (MW)		
Normal maximum continuous export capacity (MW)		
Maximum (peaking) generating capacity (MW)		
Maximum (peaking) export capacity (MW)		
Minimum continuous generating capacity (MW)		
Minimum continuous export capacity (MW)		
Generator rated MVA		
Normal minimum lagging power factor		
Normal minimum leading power factor		
Generator voltage (kV)		

- D.3 Reliability of Connection  
Provide details of reliability of connection requested (number of connecting circuits e.g. one, two, ... ((n, n – 1).... ) (subject to technical and system security and reliability standards)

---



---



---

<sup>3</sup>If the applicant has more than two units please provide this information in a separate table

---



---

D.4 Black Start  
Provide the black start ability and/or black start requirements

---



---

D.5 Supply to Site  
Provide the following details if a separate transmission connection is required to supply the generating station site and specify:

Maximum Import Capacity required		MW
Maximum Import Capacity required		MVar
Load under normal operating conditions		MW
Load under normal operating conditions		MVar

**SECTION E: CONNECTION AND OPERATIONS**

E.1 Target connection date (month/year)

---

E.2 Projected period from connection date to operational date (months)

---

E.3 Maximum Export Capacity (MW) expected to be required over the period specified in E.2 of this application.

<b>Material changes</b>	<b>Date</b>	<b>Maximum Export Capacity required (MW)</b>
Connection date		
Operational date		

*Insert dates as required to show material changes in maximum export capacity required*



E.4 Period for which the applicant desires the connection (from the connection date to date on which the power station will be disconnected from ESCOM's Transmission System):

---

E.5 Maintenance Programme  
Provide details of any proposed major maintenance programmes, including the time and duration.

Maintenance	Date/Time	Duration (hours)

**SECTION F: PERMISSION FROM GOVERNMENT DEPARTMENTS OR REGULATORY AUTHORITIES**

Provide a list of permits and approvals required for the generation project, progress as at the date of this application and expected dates by which the applicant expects to obtain each permit or approval.

Permits / Approvals	Progress	Expected date

**SECTION G: ADDITIONAL INFORMATION**

Provide any other relevant information which the applicant wishes to include with this application.

---



---



---



---



---



---

## CHECKLIST COMPLETION FORM

Section A		X
Section B	B.1 to B.3	
	B.4 Map (1:50,000) with location marked and map coordinates stated and correct	
	B.5 Electrical single line diagram with operational control boundary marked	
	B.6 Site plan (1:200) showing locations of point of connection, generators, transformers and buildings	
Section C	C.1 Payment enclosed	
Section D		
Section E		
Section F		
TECHNICAL INFORMATION (GENERATION)		

### A.5 TECHNICAL INFORMATION (GENERATION)

#### Synchronous Generating Unit Parameters

Rated terminal volts (kV)	
Rated MVA	
Rated MW	
Minimum Generation MW	
Short circuit ratio	
Direct axis synchronous reactance	
Direct axis transient reactance	
Direct axis sub-transient reactance	
Direct axis short-circuit transient time constant	
Direct axis short-circuit sub-transient time constant	
Quadrature axis synchronous reactance	
Quadrature axis sub-transient reactance	
Quadrature axis short-circuit sub-transient time constant	
Stator time constant	
Stator leakage reactance	
Armature winding direct-current resistance	
Turbo generator inertia constant (MWsec/MVA)	
Rated field current (amps) at Rated MW and Mvar output and at rated terminal voltage	
Field current (amps) open circuit saturation curve for Generating Unit terminal voltages ranging from 50% to 120% of rated value in 10% steps as derived from appropriate manufacturers test certificates	

### Parameters for Generating Unit Step-up Transformers

Rated MVA	
Voltage ratio	
Positive sequence reactance (at max, min, & nominal tap)	
Positive sequence resistance (at max, min, & nominal tap)	
Zero phase sequence reactance	
Tap changer range	
Tap changer step size	
Tap changer type: on load or off circuit	

### Excitation Control System parameters

Excitation System Nominal Response	
Rated Field Voltage	
No-Load Field Voltage	
Excitation System On-Load Positive Ceiling Voltage	
Excitation System No-Load Positive Ceiling Voltage	
Excitation System No-Load Negative Ceiling Voltage	
Details of Excitation System (including PSS if fitted) described in block diagram form showing transfer functions of individual elements.	
Details of Over-excitation Limiter described in block diagram form showing transfer functions of individual elements	
Details of Under-excitation Limiter described in block diagram form showing transfer functions of individual elements	

**Governor Parameters:** Incremental Droop values (in %) are required for each Generating Unit at six MW loading points (MLP1 to MLP6):

- Designed Minimum Operating Level	
- Minimum Generation	
MLP3 - 70% of Registered Capacity	
-MLP4 - 80% of Registered Capacity	
-MLP5 - 95% of Registered Capacity	
-MLP6 - Registered Capacity	

(this data item need only be provided for Large Power Stations)

(i) Governor and associated prime mover Parameters - All Generating Units

Governor Block Diagram showing transfer function of individual elements including acceleration sensitive elements	
• Governor Time Constant (in seconds)	
• Speeder Motor Setting Range (%)	

• Average Gain (MW/Hz)	
• Governor Dead band (this data item need only be provided for Large Power Stations)	
○ Maximum Setting (Hz)	
○ Normal Setting (Hz)	
○ Minimum Setting (Hz)	
Where the Generating Unit governor does not have a selectable dead band facility, then only the actual value of the dead band needs to be provided	

(ii) Governor and associated prime mover Parameters - Steam Units

HP Valve Time Constant (in seconds)	
HP Valve Opening Limits (%)	
HP Valve Opening Rate Limits (%/second)	
HP Valve Closing Rate Limits (%/second)	
HP Turbine Time Constant (in seconds)	
IP Valve Time Constant (in seconds)	
IP Valve Opening Limits (%)	
IP Valve Opening Rate Limits (%/second)	
IP Valve Closing Rate Limits (%/second)	
IP Turbine Time Constant (in seconds)	
LP Valve Time Constant (in seconds)	
LP Valve Opening Limits (%)	
LP Valve Opening Rate Limits (%/second)	
LP Valve Closing Rate Limits (%/second)	
LP Turbine Time Constant (in seconds)	
Reheater Time Constant (in seconds)	
Boiler Time Constant (in seconds)	
HP Power Fraction (%)	
IP Power Fraction (%)	

(iii) Governor and associated prime mover Parameters - Gas Turbine Units

Inlet Guide Vane Time Constant (in seconds)	
Inlet Guide Vane Opening Limits (%)	
Inlet Guide Vane Opening Rate Limits (%/second)	
Inlet Guide Vane Closing Rate Limits (%/second)	
Fuel Valve Constant (in seconds)	
Fuel Valve Opening Limits (%)	
Fuel Valve Opening Rate Limits (%/second)	
Fuel Valve Closing Rate Limits (%/second)	
Waste Heat Recovery Boiler Time Constant (in seconds)	

(iv) Governor and associated prime mover Parameters - Hydro Generating Units

Guide Vane Actuator Time Constant (in seconds)	
Guide Vane Opening Limits (%)	
Guide Vane Opening Rate Limits (%/second)	
Guide Vane Closing Rate Limits (%/second)	
Water Time Constant (in seconds)	

**Unit Control Options**

The following data items need only be supplied with respect to Large Power Stations:

Maximum Droop %	
Normal Droop %	
Minimum Droop %	
Maximum Frequency deadband (Hz)	
Normal Frequency deadband (Hz)	
Minimum Frequency deadband (Hz)	
Maximum output deadband (MW)	
Normal output deadband (MW)	
Minimum output deadband (MW)	
Frequency settings between which Unit Load Controller Droop applies:	
Maximum Hz	
Normal Hz	
Minimum Hz	
State if sustained response is normally selected.	

**Plant Flexibility Performance**

The following data items need only be supplied with respect to Large Power Stations, and should be provided with respect to each Genset:

Run-up rate to Registered Capacity	
Run-down rate from Registered Capacity	
Synchronising Generation, Regulating range	
Load rejection capability while still Synchronised and able to supply Load	