
Office of Utilities Regulation

Wigton WindFarm Limited II
Energy Payment Rate Determination

Determination Notice



OFFICE OF UTILITIES REGULATION

March 18, 2011

DOCUMENT TITLE AND APPROVAL PAGE

DOCUMENT NUMBER: ELE2010011_DET005

1. DOCUMENT TITLE: Determination Notice - Wigton Windfarm Limited II Energy Payment Rate Determination

2. PURPOSE OF DOCUMENT

This document sets out the Office's decisions regarding the Energy Payment to be charged by Wigton WindFarm Limited Phase II for energy supplied to the National Grid in accordance with the Guidelines for the addition of Generating Capacity to the Public Electricity supply system.

3. RECORD OF DOCUMENTS ON ISSUE

Document Number	Description	Date
ELE2010011_DET005	Decisions -Wigton Windfarm Limited - Energy Payment Rate Determination	March 18, 2011

4. APPROVAL

This document is approved by the Office of Utilities Regulation and the Decisions therein become effective on **March 21, 2011**.

On behalf of the Office:



Maurice Charvis
Deputy Director General

Date : March 18, 2011

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1.0 DETERMINATION NOTICE

Issued pursuant to Sections 11 and 12 of the Office of Utilities Regulation Act (as amended) ("the OUR Act") as well as Condition 15 and Schedule 3 of the Jamaica Public Service Company Limited All-Island Electricity Licence, 2001.

Pursuant to Sections 11 and 12 of the OUR Act as well as Condition 15 of the Licence, the Office of Utilities Regulation ("the Office") is authorized to determine the rates and charges to be levied by regulated entities and pursuant to its statutory powers therein, the Office hereby **MAKES THE FOLLOWING DETERMINATION:**

DETERMINATION

WHEREAS in accordance with the provisions set out in the Jamaica National Energy Policy 2009 - 2030 and further in accordance with the Guidelines for the addition of Generating Capacity to the Public Electricity supply system, the Office hereby issues this Determination taking into account the avoided cost and level of incentive applicable and the proportion of the energy rate that shall constitute the Base Operations and Maintenance Charge (BOMC) as of December 2010.

AND

WHEREAS this Determination is made based upon and pursuant to the analysis of additional data as provided by Wigton WindFarm Limited, this analysis takes into consideration the level of the full premium that may be applicable in the circumstances.

AND

WHEREAS the Office has Determined that the electricity that Wigton WindFarm Limited presently sells to the JPS National Grid shall be sold subject to an Energy **Only Pricing Contract**.

AND

WHEREAS Under the present arrangement, the policy provides that the relevant supplier of renewable energy shall be referenced against the current variable avoided cost on a per kilowatt-hour basis.

AND

WHEREAS the current variable avoided cost for **Energy Only Pricing Contracts** published by the Office is **US 9.33 ¢/kWh**.

AND

WHEREAS pursuant to the above, the Office **HEREBY DETERMINES THAT** the full Energy Payment Rate to be charged for the supply of energy to the JPS grid shall be **US 10.7300 ¢/kWh inclusive of the full 15% premium applicable with the base prices and amounts as set out below:**

Component	Base Price (US ¢/kWh)	Basis for Adjustment	Frequency of Adjustment	Base Index Month
Base Price	10.7300			
Base O&M Charge (BOMC)	1.6095	US CPI _m	Monthly	Commercial Operations Date
Fixed Energy Charge (FEC)	9.1205			

USCPI_m = US GDP Chained Type Consumer Price Index (1999=100) for all Urban Consumers, City Average adjusted for month (m).

The Office further determined that in lieu of the standard rate outlined above, a frontloading of the rate to facilitate an accelerated repayment of its debt burden is hereby outlined below.

Component	Base Price (US¢/kWh)			Basis of Adjustment	Frequency of Adjustment	Base Index Month
	Year 1 to Year 5	Year 6 to Year 10	Year 11 to Year 20			
Base Price	13.6000	10.2000	5.6390			
Base O&M Charge (BOMC)	1.6095	1.6095	1.6095	US CPI _m	Monthly	Commercial Operation Date
Fixed Energy Charge (FEC)	11.9905	8.5905	4.0295			

2.0 BACKGROUND TO THE OFFICE'S DETERMINATION

- 2.1 Wigton WindFarm Limited (WWFL) is a company duly incorporated under the laws of Jamaica and having its registered office at 36 Trafalgar Road, Kingston 10 and whose principal shareholder is the Petroleum Corporation of Jamaica.
- 2.2 Wigton has proposed to sell energy to the grid from the new project, Wigton WindFarm II with capacity totalling 14 MW. The facility has been designed to achieve an average annual capacity factor of approximately 35% (representing an average annual capacity of 5MW).
- 2.3 WWFL requested a review of the Energy Payment Rate which was contracted under the Power Interchange Agreement (PIA) between itself and JPS in 2010. In its application to the Office of Utilities Regulation (OUR), WWFL requested a review of the rate per kilowatt hour based on the avoided cost plus 15%, along with any other applicable incentive for renewable energy in accordance with the most recent National Energy Policy.
- 2.4 WWFL posited that the present energy rate in the existing PIA is inadequate for the continued operation of the wind farm.
- 2.5 Wigton is requesting that the OUR develops a feed-in tariff of at least US14 cents for wind energy to achieve a return on investment of approximately 4%. Wigton also proposed that 20 percent of the energy price charged to JPS for Wigton's supply of energy be allocated to O&M charges. In addition Wigton wants the O&M portion to be indexed to inflation at a rate of 3% annually. Wigton posited that this is justified on:
- the basis that the wind industry trend is for O&M costs to increase with the age of the plant;
 - the impact of the inflation costs on the operating environment in Jamaica.
- 2.6 This Determination provides an analysis and the rationale which form the basis for the Office determination. This includes an examination of operation and maintenance costs and makes a Determination on the level of incentive that is appropriate for WWFL. Finally, the Document analysed how WWFL costs are comparable to the industry and outlined the OUR positions with respect to cost containment.

3.0 OFFICE OF UTILITIES REGULATION ANALYSIS OF THE WWFL PROPOSAL

3.1 This section provides an analysis on data as provided by Wigton WindFarm Limited, and this analysis takes into consideration the level of the full premium that may be applicable in the circumstances and the proportion of the energy rate that shall constitute the Base Operations and Maintenance Charge (BOMC).

The approach outlined herein includes:

- An analysis of WWFL's impact on system heat rate and the value to the system.
- An analysis of the Cost and Investment structure of Wigton and provide a benchmarking comparison to illustrate Wigton's cost effectiveness.
- An analysis of economic costs and some international comparison to illustrate the price range of wind energy to the consumer.

3.2 The underlying logic of this approach is to establish the basis of determining the level of incentive up to the maximum 15% allowed.

WWFL's Impact on System Heat Rate and Value to the System

- 3.3 In order to assess the likely impact of WWFL II on the system heat rate, the OUR analysed data that is produced from the operation of the existing wind plants. This approach represents the best benchmark of estimating the potential benefit of the new proposed plant to the country and in particular the consumers of electricity.
- 3.4 The overall system heat rate on a monthly basis is derived by dividing the total heat content (kJ) of oil used (energy input) by the total net generation of the generating plants (conventional and renewable) operating in the system.
- 3.5 For renewable base generating technologies such as wind, hydro and solar there is no oil input. The energy output from the WWFL is a component in the derivation of the system heat rate equation even though the heat content is zero. The inclusion of wind energy in the derivation of the composite heat rate effectively reduces the actual system heat rate and as such is providing a benefit to the electricity system.

Figure 1 shows the contribution of WWFL to the overall system heat rate for the year 2009 and **Table 1** outlines the contribution and benefit of the heat rate to the system.

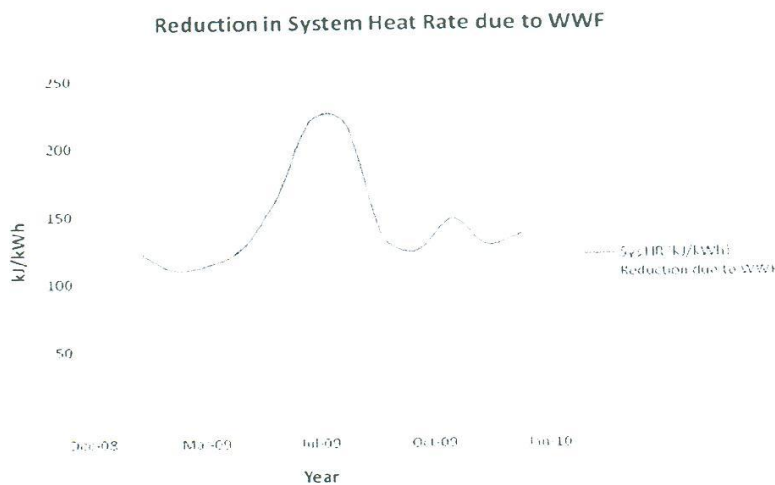


Figure 1

DATE	Permitted Billing HR (kJ/kWh)	System HR with WWF (kJ/kWh)	System HR without WWF (kJ/kWh)	Sys HR (kJ/kWh) Reduction due to WWF	Total Fuel Cost before Efficiency Adj. with WWF (\$'000)	Total Fuel Cost before Efficiency Adj. without WWF (\$'000)	Benefit to the system (\$'000)	Exchange Rate (J\$:1US\$)	System Benefit in US\$
Jan-09	11,200	10,002	10,124	122	2,229,420	2,258,242	28,822	86.07	334,866.97
Feb-09	11,200	9,847	9,957	110	2,088,759	2,112,863	24,104	88.30	272,978.48
Mar-09	11,200	9,895	10,009	114	2,291,974	2,319,846	27,872	88.81	313,838.53
Apr-09	11,200	10,152	10,278	126	2,578,384	2,612,302	33,918	89.01	381,058.31
May-09	11,200	10,130	10,294	164	3,099,898	3,151,904	52,006	89.08	583,812.30
Jun-09	11,200	10,255	10,475	220	3,668,434	3,749,354	80,920	89.07	908,498.93
Jul-09	11,200	10,509	10,726	217	4,220,668	4,307,587	86,919	89.01	976,508.26
Aug-09	11,200	10,588	10,723	135	4,416,334	4,473,257	56,923	89.00	639,584.27
Sep-09	11,200	10,408	10,532	124	4,371,963	4,424,499	52,536	89.08	589,762.01
Oct-09	10,400	10,197	10,344	147	4,196,349	4,258,703	62,354	89.24	698,722.55
Nov-09	10,400	10,005	10,134	129	4,281,378	4,315,187	33,809	89.59	377,374.71
Dec-09	10,400	9,970	10,106	136	4,234,613	4,293,814	59,201	89.60	660,725.45
TOTAL					41,678,174	42,277,558	599,384	88.82	6,737,730.77

Table 1: WWFL Contribution to System Heat Rate and benefit to the System

3.6 In addition to reducing the system heat rate which is based on a mathematical construct, WWFL being a renewable energy plant offers other important benefits such as:

- The displacement of fuel oil which would otherwise be required for producing the equivalent energy output delivered to the grid by WWFL.
- Protection of the environment by not emitting GHGs into the atmosphere.

Table 1 above shows the derived benefit to the system by analyzing the total fuel cost for the system in 2009 with and without WWFL

3.7 It is important to note that the avoided fuel cost for 2009, by having WWFL on the system, is estimated at US\$6.7 Million. With regards to the renewable premium of up to 15% of avoided generation cost (9.33 US ¢/kWh), the additional payments to WWFL as a result of allowing 15% equates to approximately US\$ 0.7 Million. A Comparison of the benefit that the plant is offering the system with the premium applied for by WWFL indicates that the contribution being made by the plant far exceeds the maximum premium available and as a result the award of the 15% premium is considered reasonable and justified.

Analysis of the Cost & Investment structure of Wigton & benchmarking comparison

3.8 The total cost per produced kWh (unit cost) is traditionally calculated by discounting and levelising investment and O&M costs over the lifetime of the Wind Turbine (WT), divided by the annual electricity production. The unit cost of generation is thus calculated as an average cost over the lifetime. In reality, actual costs will be lower than the calculated average at the beginning of the life of the WT, due to low O&M costs, and will increase over the period of the WT's use. The production of power is the single most important factor for calculating the cost per generated unit of power.

3.9 Turbines sited at good wind locations are likely to be profitable, while those at poor locations may run at a loss.

3.10 Based on technical and financial data provided by Wigton, the OUR estimated the levelised production cost of the proposed wind plant at 7.96 US ¢/kWh to 10.47 US ¢/kWh using a discount rate ranging from 8% to 12%. **Table 2** below outlines the levelised cost of production of energy estimated by the OUR. Additionally the

10

annual estimated Operating and Maintenance cost is shown separately in **Table 3**, and is derived from general administrative expenses data provided by Wigton.

Economic analyses are carried out as simple national economic ones. No taxes, depreciation, risk premia, etc. are taken into account with respect to the capacity cost estimation. Everything is calculated at constant prices.

Table 2. Wigton II Levelised Cost of Energy

Size of Windfarm	14	14	MW
Overnight Cost	2,272.14	2,272.14	US\$/kW
IDC	58.17	58.17	US\$/kW
Plant total Cost	2,330.31	2,330.31	US\$/kW
Economic Life of the Project	20	20	yrs
Discount Rate	0.08	0.12	
Fixed Charge Rate (Capital Recovery Factor)	0.10	0.13	
Annual Fixed Payments	3,322,860.68	4,367,706.30	US\$
Average Expected Capacity Factor	0.34	0.34	
Annual Electricity Generation	41,697,600.00	41,697,600.00	kWh
Levelised Capacity Cost	7.9689	10.4747	US¢/kWh

Table 3. WWFL II Annual O&M cost

Annual O&M Cost	306,000,000.00	J\$	Unit Cost	
Exchange Rate	88	J\$:1US\$		
Annual O&M Cost	3,477,272.73	US\$	20.70	US\$/kW-month
			0.08	US\$/kWh

3.11 Based on Benchmark analysis, O&M costs constitute a sizeable share of the total annual costs of a WT. For a new machine, O&M costs might easily have an average share over the lifetime of the turbine of approximately 20%-25% of total levelised cost per kWh produced – as long as the Wind Turbine is fairly new, the share might constitute 10-15% increasing to at least 20-35% by the end of its life.

3.12 O&M costs are related to a limited number of cost components:

- Insurance
- Regular maintenance
- Repair
- Spare parts
- Administration

Table 4: Benchmarked Levelised cost of conventional and RET including Wind

	COAL	COMBINE CYCLE, NG	BIOMASS/W 20% COAL	WIND	HYDRO	COMBINED CYCLE	SOLAR PV
Capacity Factor(%)	86.3	78.8	80.0	30.0	45.0	78.8	38.0
Capital Cost (US c/kWh)	3.19	1.94	3.80	7.13	9.86	2.10	20.30
O&M Cost(US c/kWh)	1.09	0.47	1.70	1.14	0.76	0.48	0.45
Fuel Cost(US c/kWh)	1.97	4.80	1.90	0	0	9.78	0
Total Cost(US c/kWh)	6.25	7.21	7.40	8.27	10.62	12.36	20.75

3.13 **Table 4** above shows the benchmarked levelised cost of conventional and Renewable Energy Technology (RET) including Wind. It is clear that the Operating and Maintenance cost proposed by Wigton is 3 to 4 times higher than industry norm. It is on the basis of this extraordinary high O&M cost that Wigton is requesting a tariff rate of 14 US c/kWh. The OUR believes that to allow this higher O&M cost is to encourage inefficiency at the expense of the electricity consumers. The OUR is of the view that the current avoided cost of energy rate declared by the Office plus the full 15% incentive is adequate for Wigton's profitability and is certainly reflective of the industry cost profile.

Determination of Energy Payment

3.14 Base on the foregoing the OUR is recommending an energy payment of 10.73US c/kWh comprising 9.33.US c/kWh as the avoided cost component plus 15% premium.

3.15 WWFL further submitted recommendations for the structure of the Base Operations and Maintenance Charge (BOMC) components of the determined rates to be adjusted to reflect 20% of the Fixed Energy Charge (FEC).

¹Source: Planning towards a more sustainable future, Electricity Generation System in Jamaica
A thesis submitted for the degree MPhil, Duane Rowe, 2007

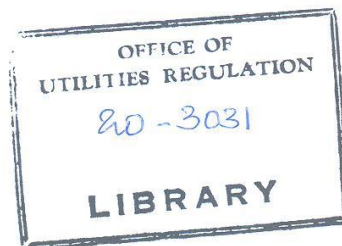
- 3.16 WWFL posited that the BOMC as a percentage of the original cost of the investment over the past five years has ranged from 12% to 17%. An analysis of the available data however shows average O&M costs as a percentage of total cost at 13.4%.
- 3.17 The OUR is recommending that WWFL be allowed to allocate the determined energy rate based on a split of 15% as follows.

Component	Base Price (US ¢/kWh)	Basis for Adjustment	Frequency of Adjustment	Base Index Month
Base Price	10.7300			
Base O&M Charge (BOMC)	1.6095	US CPI _m	Monthly	Commercial Operations Date
Fixed Energy Charge (FEC)	9.1205			

USCPI_m = US GDP Chained Type Consumer Price Index (1999=100) for all Urban Consumers, City Average adjusted for month (m).

The OUR further recommends that in lieu of the standard rate outlined above, a frontloading of the rate to facilitate an accelerated repayment of its debt burden is hereby outlined as follows:

Component	Base Price (US¢/kWh)			Basis of Adjustment	Frequency of Adjustment	Base Index Month
	Year 1 to Year 5	Year 6 to Year 10	Year 11 to Year 20			
Base Price	13.6000	10.2000	5.6390			
Base O&M Charge (BOMC)	1.6095	1.6095	1.6095	US CPI _m	Monthly	Commercial Operation Date
Fixed Energy Charge (FEC)	11.9905	8.5905	4.0295			



APPENDIX: Derivation of Front Loaded Tariff

Wind Farm	14000	kW
Sales [Exp.]**	41,697,600	kWh Annual
Discount Rate	12%	
Capacity Factor	34%	
	Base Price US\$	Revenue
A**	0.10730	4,474,152.48
Year 1 to Year 5	0.13600	5,670,873.60
Year 6 to year 10	0.10200	4,253,155.20
Year 11 to Year 20	0.05639	2,351,334.81

** From Avoided cost plus 15% incentive

Year	A (Wigton Levelised rate Determination)	B (Wigton Front Loaded rate Determination)
1	4,474,152.48	5,670,873.60
2	4,474,152.48	5,670,873.60
3	4,474,152.48	5,670,873.60
4	4,474,152.48	5,670,873.60
5	4,474,152.48	5,670,873.60
6	4,474,152.48	4,253,155.20
7	4,474,152.48	4,253,155.20
8	4,474,152.48	4,253,155.20
9	4,474,152.48	4,253,155.20
10	4,474,152.48	4,253,155.20
11	4,474,152.48	2,351,334.81
12	4,474,152.48	2,351,334.81
13	4,474,152.48	2,351,334.81
14	4,474,152.48	2,351,334.81
15	4,474,152.48	2,351,334.81
16	4,474,152.48	2,351,334.81
17	4,474,152.48	2,351,334.81
18	4,474,152.48	2,351,334.81
19	4,474,152.48	2,351,334.81
20	4,474,152.48	2,351,334.81
	89,483,049.60	73,133,492.10
	NPV A	NPV B
	\$33,419,429.72	\$33,419,429.72