

**CONFIDENTIAL**

**REGULATORY REVIEW OF THE  
PUERTO RICO ELECTRIC POWER  
AUTHORITY FUEL AND PURCHASED  
POWER COSTS FOR FISCAL YEARS  
2019/2020, 2018/2019, AND 2017/2018**

Case No. NEPR-MI-2020-0003

September 5, 2023

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# TABLE OF CONTENTS

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**1 EXECUTIVE SUMMARY .....1**  
    Audit Approach..... 1  
    Major Findings..... 2  
    Recommendations ..... 2

**2 PREPA BACKGROUND.....3**

**3 AUDIT FINDINGS.....9**  
    A Review of the Transactions Entered into by the Company during the Audit Period,  
    with an Assessment as to the Reasonableness of the Transactions.....9

**4 AES PUERTO RICO - REVIEW OF COAL CONTRACTS AND DELIVERED COAL  
COSTS ..... 14**  
    Recommendations ..... 19

**5 PURCHASING PERFORMANCE FOR LNG, DIESEL AND BUNKER .....22**

Attachments: Methodology Cost Per Barrel Consumed for FY 2020-2021

## LIST OF EXHIBITS

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Exhibit 1-1. Interviews Conducted.....	1
Exhibit 2-1. PREPA Generating Assets Ranked by Capacity .....	4
Exhibit 2-2. Percentage of Fuel and Purchased Power Costs .....	4
Exhibit 2-3. Cost of Coal per Tonne .....	6
Exhibit 2-4. Summary of Columbian Coal Exports.....	7
Exhibit 2-5. Summary of LNG Export Pricing.....	7
Exhibit 2-6. Exporting Capacity .....	8
Exhibit 3-1. Corrected Methodology for Calculating Consumption Prices .....	10
Exhibit 3-2. Comparative Inventory Adjustment.....	12
Exhibit 4-1. Summary of Generation by Plant.....	16
Exhibit 4-2. Generation by Plant – 2022.....	17

# 1 EXECUTIVE SUMMARY

## Audit Approach

The Puerto Rico Energy Bureau (“PREB”) employed Larkin & Associates PLLC (“Larkin”) and Energy Ventures Analysis, Inc. (“EVA”) (collectively “Larkin team”) to conduct a regulatory review of PREPA’s fuel and purchased power procurement and management process for the fiscal years 2019/2020, 2018/2019, and 2017/2018.

Our review used a combination of document review, interrogatories, virtual site visits, and interviews. Larkin and EVA conducted interviews with individuals with various position titles and with specific subject matter expertise via Microsoft Teams on the dates shown in the exhibit below. PREPA and LUMA regulatory staff also participated in the interviews. Representatives of the PREB were also invited to participate in the interviews.

### Exhibit 1-1. Interviews Conducted

Position Title	Date	Subject Matter	Department
Engineer	2/11/2021	Dispatch Process Demonstration	Director of PREPA’s Electric Control Center
Acting Manager in Renewable Energy Projects Department of the Planning and Environmental Protection Directorate (Rivera) and Director of Planning & Environmental Protection (Barety-Huertas)	2/18/2021	AES Coal Contracts	Renewable Energy Projects Department, Planning and Research Division of the Planning and Environmental Protection Directorate
Assistant Chief of Finance Directorate (Adrover); Comptroller (Matias)	2/25/2021	PREPA’s filings pertaining to Fuel and Purchased Power costs and Fuel Transportation costs and related revenues during review period	Finance Directorate
Manager of PREPA’s Fuel Office (Barbosa), Comptroller (Matias), Generation Directorate (Rios)	3/4/2021	PREPA’s filings pertaining to Fuel and Purchased Power costs and Fuel Transportation costs and related revenues during review period	Fuel Office and Finance Directorate
Program Manager supervised by Lizzandra Matias-Controller, Accounting and Budget Division, Finance Directorate	3/11/2021	PREPA’s filings pertaining to Fuel and Purchased Power costs and Fuel Transportation costs and related	Accounting and Budget Division of the Finance Directorate
Manager of PREPA’s Fuel Office (Barbosa), Superintendent of Renewable Energy Projects Department, Planning and Research Division of the Planning and Environmental Protection Directorate (Irizarry) Acting Manager of Renewable Energy Projects Division (Rivera) and Acting Manager of Renewable Energy Projects Department, Planning and Research Division (Acosta).	3/18/2021	Organizational Charts	PREPA’s Fuel Office and the Renewable Energy Projects Department, Planning and Research Division of the Planning and Environmental Protection Directorate
Program Manager supervised by Lizzandra Matias-Controller (Tasha), Accounting and Budget Division, (Ortiz) Finance Directorate, DFMO Project Specialist (Diaz)	3/31/2021	Consumption pricing error issue in J-28 Report	Accounting and Budget Division of the Finance Directorate
Accountant, Finance Directorate	4/19/2021	A walkthrough of the audit trail associated with PREPA’s Fuel and Purchased Power Rider filings LA-EVA-1-48	Financial and Economic Analysis Department of the Finance Directorate
Program Manager supervised by Lizzandra Matias-Controller, Accounting and Budget Division, Finance Directorate	5/17/2021	Follow-up interview which addressed the consumption pricing error and the resulting corrections/reconciliation	Accounting and Budget Division of the Finance Directorate

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## **Major Findings**

- 1) PREPA corrected an accounting methodology error that was causing PREPA's fuel cost to be mis-stated.
- 2) The energy and fuel commodity markets have experienced significant changes subsequent to the audit period.

## **Recommendations**

1. PREPA's fuel and purchased power costs should continue to be reviewed whenever PREPA's fuel and purchased power rates are reset, which typically occurs on a quarterly basis, as PREPA's FCA and PPCA rates are updated.
2. PREPA's reimbursements from FEMA and insurance for extreme weather events should continue to be investigated in the context of the reviews of PREPA's quarterly FCA and PPCA rate reviews.

## **Audit Review**

The auditors appreciated PREPA's and LUMA's efforts in providing information and explanations.

## **Audit Outline**

The outline of the remainder of this audit report is as follows:

- Section 2      PREPA Background
- Section 3      Audit Findings
- Section 4      AES Puerto Rico – Review of Coal Contracts and Delivered Coal Costs
- Section 5      Purchasing Performance for LNG, Diesel and Bunker

## 2 PREPA BACKGROUND

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### Overview

PREPA, formally known as The Authority of the Fluvial Sources, was founded in 1941 and is one of the largest publicly operated utilities in the United States, ranking Number 1 in clients and revenue, Number 6 in sales kWh, and Number 7 in generation kWh. The Company has been producing, transmitting, distributing, and selling electricity for almost 70 years, and is the sole provider of electricity for its 1.5 million customers in Puerto Rico.

On May 30, 1979, through Law no. 57, the Fluvial Sources Authority changed its name to the Puerto Rico Electric Power Authority (PREPA<sup>1</sup>). The change was due to the new circumstances in how electricity for Puerto Rico was being generated and supplied. In 1981, PREPA acquired the electrical system owned by the Municipality of Cayey, completing the consolidation of all electrical systems in Puerto Rico under a single entity. Because Puerto Rico is an island, PREPA, like the electric utilities serving the Hawaiian islands, is an island system. PREPA is not interconnected with neighboring utilities, and is not a member of a regional transmission organization, as are many of the electric utilities located in the continental United States.

Puerto Rico has a single electric grid that had been managed by PREPA that provides virtually all of the electric power consumed in Puerto Rico. Historically, PREPA generates, transmits and distributes electricity to approximately 1.5 million customers.

The Puerto Rico Energy Bureau is the main regulatory body for PREPA. The Bureau approves wholesale and retail rates, sets efficiency and interconnection standards, and oversees PREPA's compliance with Puerto Rico's renewable portfolio standard. In 2019, PREPA's electricity came approximately 97% from thermal plants (38% from petroleum, 40% from natural gas, and 19% from coal). PREPA's system has been transitioning to using more liquified natural gas ("LNG") and renewables, and is gradually migrating away from the use of fossil fuels, which must be imported.

Puerto Rico does not produce oil, natural gas, or coal so all of the fossil fuel that is used to generate electricity on the island is imported. The following is believed to be a list of PREPA's generating assets ranked<sup>1</sup> by capacity indicating the primary energy source:

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<sup>1</sup> A number of these statements have not been confirmed with PREPA and, therefore, are reported as "believed to be."

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**Exhibit 2-1. PREPA Generating Assets Ranked by Capacity**

Power plant	Capacity (MW)	Energy source	Owner	Operator
Costa Sur	990	heavy fuel oil	PREPA	PREPA
Aguirre Thermoelectric	900	diesel oil	PREPA	PREPA
Palo Seco	602	heavy fuel oil	PREPA	PREPA
Aguirre Combined Cycle	592	heavy fuel oil	PREPA	PREPA
EcoEléctrica	510	natural gas	Gas Natural Fenosa, International Power	Gas Natural Fenosa
San Juan Combined Cycle	464	diesel oil	PREPA	PREPA
AES Puerto Rico	454	coal	AES Corporation	AES Corporation
San Juan Thermoelectric	400	heavy fuel oil	PREPA	PREPA
Cambalache	247	diesel oil	PREPA	PREPA
Santa Isabel Wind Farm	75	wind power	Pattern Energy <sup>[35]</sup>	Pattern Energy
Oriana Solar Farm	45	solar power	Sonnedix	Sonnedix
San Fermin Solar Farm	27	solar power	Uriel Renewables and Coqui Power	Uriel Renewables and Coqui Power
Punta Lima	26	wind power	Sovereign Bank <sup>[29]</sup>	Gestamp Wind
AES Ilumina	24	solar power	AES Corporation	AES Corporation
Salinas Solar Park	16	solar power	Sonnedix	Sonnedix
Windmar Ponce	4.5	solar power	Windmar Renewable Energy	Windmar Renewable Energy

According to the May 2020 Monthly Report to PREPA’s Governing Board, fuel and purchased power costs are typically over 70 percent of PREPA’s total operating expenses.

**Exhibit 2-2. Percentage of Fuel and Purchased Power Costs**

Current Expenses	Twelve Months Ended		
	Budget June 2019	Actual May 2020	Actual May 2019
Fuel Cost	1,262,397	1,505,326	1,263,834
Purchased Power	714,451	733,796	665,127
Other Production	51,683	49,693	47,801
Transmission & Distribution	119,825	122,808	91,445
Maintenance	187,801	165,533	102,963
Customer Accounting and Collection	104,062	77,784	34,557
Natural Disaster Expense		16,063	1,583,171
Admin and General	316,594	256,826	249,378
<b>Total</b>	<b>2,756,813</b>	<b>2,927,829</b>	<b>4,038,276</b>
<b>Fuel &amp; Purchased Power Share</b>	<b>72%</b>	<b>76%</b>	<b>48%</b>

## **PREPA Fuel Supply**

PREPA purchases diesel, Bunker C and LNG fuel for the plants. In addition, PREPA is believed to be responsible for the cost of the coal purchased by AES for the AES Puerto Rico 524 MW coal-fired plant.<sup>2</sup> It is believed that all of these fuels are purchased on a delivered price basis.<sup>3</sup>

Other relevant issues include the Jones Act and the Puerto Rico Energy Public Policy Act. The Jones Act requires trade between U.S. ports be conducted using U.S. flag vessels. The Jones Act is believed to limit the number of available fuel suppliers to PREPA, and to tilt fuel purchasing decisions toward foreign supply and transportation sources.

The Energy Public Policy Act established guidelines for grid efficiency and eliminating coal as a source for electricity generation by January 1, 2028. The Act supports the accelerated deployment of renewables through the Renewable Portfolio Standard and the conversion of coal generating facilities to other fuel sources.

AES Puerto Rico's long-term PPA with PREPA expires November 30, 2027. Unless the Act is amended or a waiver from its provisions is obtained, AES Puerto Rico will need to convert fuel sources to continue operating.

### ***Relevant Fuel Markets***

The PREPA plants are believed to consume coal, Bunker C, LNG, and Diesel. Procurement practices need to be consistent with each fuel source.

The AES Puerto Rico coal plant is believed to burn Colombian coal. Colombian coal is the most proximate source and has quality characteristics that should insure good operating costs. As shown below, the global market price for Columbia coal had ranged between \$40 and \$90 per tonne between 2014 and 2020 until moving to new heights in 2021 before peaking at close to \$350 per tonne in mid-2022. The Colombian price has fallen to about \$100 per tonne in mid-2023.

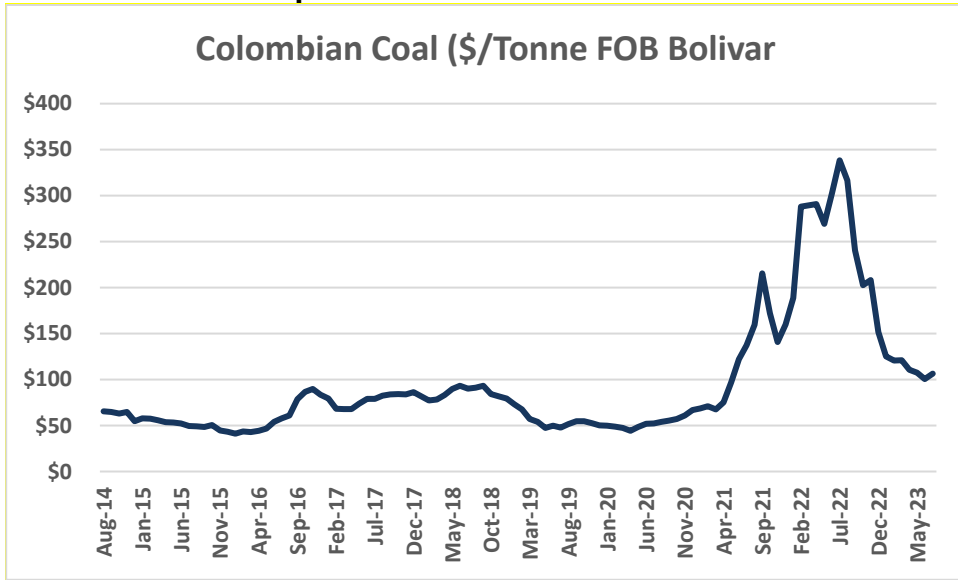
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<sup>2</sup> AES only notes in its 10-K that it receives a capacity payment from PREPA based upon the plant's 12-month rolling average availability. There is no mention of how fuel costs are recovered.

<sup>3</sup> If not, an audit would separate out the cost of the fuel and the transportation costs.



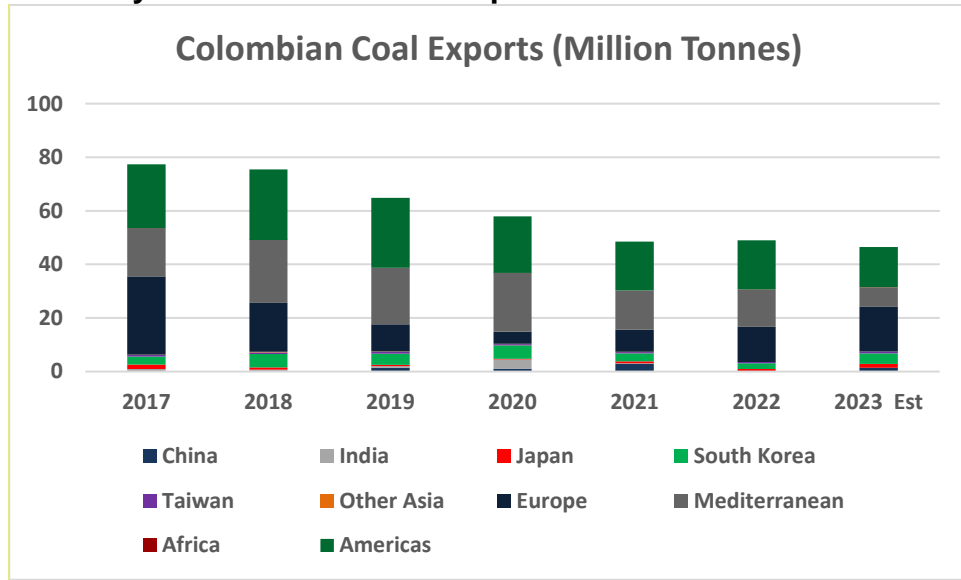
**Exhibit 2-3. Cost of Coal per Tonne**



Coal can be purchased on a fixed price basis or on an index basis. If the procurement is at a high point in the market, an index basis is clearly preferred for the Buyer. Alternatively, if the procurement is at a low point in the market, fixed price is better for the Buyer. Most coal burning utilities look to a portfolio of contracts to manage timing risk. Alternatively, they can have periodic price reopeners to ensure pricing does not diverge greatly from market, up or down.

As shown in the exhibit below, there has been significant contraction in the Colombian coal supply over the last few years. Some of the contraction was related to downturns in the market due to COVID-19. Much of the contraction is in response to declining demand in Europe due to low LNG prices and high carbon costs. In addition, the devaluation of the Ruble has made Russian coal more competitive than Colombian coal in certain markets.

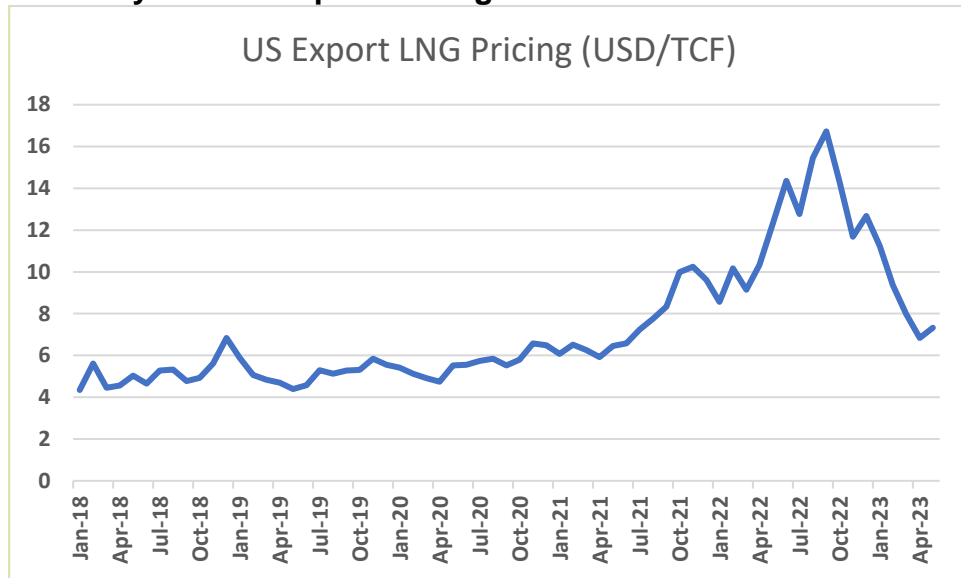
**Exhibit 2-4. Summary of Columbian Coal Exports**



Global energy markets changed substantially initially as a result of the economic recovery post-COVID and the war in Ukraine. With respect to the latter, the impact on coal can be seen in increased Colombian coal exports and the rise in the Colombian coal price due to the loss of Russian gas and coal imports into Europe.

LNG export pricing was similarly affected by these events. U.S. export LNG pricing rose to \$16 per thousand cubic foot (TCF) in late 2022.

**Exhibit 2-5. Summary of LNG Export Pricing**



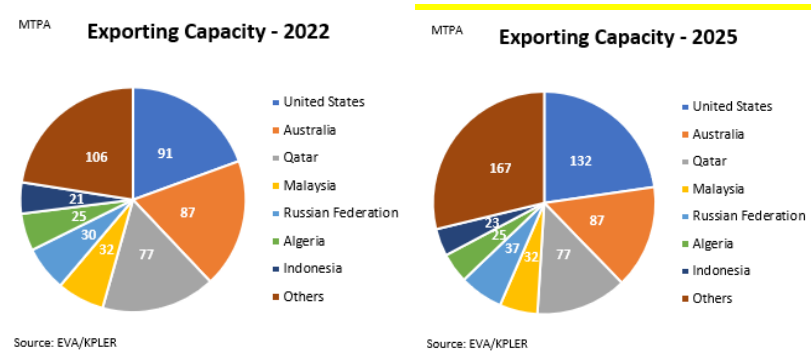
LNG supply has grown in recent years and is expected to continue to expand. In 2022, LNG exporting capacity was 469 million tonnes per annum (MTPA). By 2025, capacity is expected to increase to 582 MTPA, a very significant increase. Using LNG rather than diesel for Bunker C

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fuel also requires modification of the generating units. PREPA’s electric generation and purchased power have used more LNG in recent years, and PREPA has reached fuel cost savings accordingly. Supply is expected to continue to grow assuming global demand. LNG use requires regasification. Depending upon the price of LNG, it can be considered in certain applications as a substitute for diesel and Bunker C.

**Exhibit 2-6. Exporting Capacity**

**Exporting Capacity in 2022 and 2025 (Forecast)**



Bunker C and diesel prices are tied to world oil demand and pricing. The COVID-19 related drop in demand has contributed to a significant drop in WTI pricing in 2020. Absent an agreement by OPEC+ to curtail production, pricing would have been even lower. The markets for oil and natural gas are inter-related. Low oil prices reduced the associated (free) natural gas produced by oil wells. Low associated natural gas production increases natural gas prices which potentially increases LNG costs.

# 3 AUDIT FINDINGS

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## ***Scope and Objectives***

- Review PREPA's Fuel and Purchased Power accounting.
- Identify and discuss concerns identified.

## **A Review of the Transactions Entered into by the Company during the Audit Period, with an Assessment as to the Reasonableness of the Transactions**

### Consumption Pricing Error

PREPA had a persistent accounting problem related to its fuel costs, which was resulting in distorted fuel cost amounts being reported and being used for purposes of setting the FCA rate. PREPA was made aware of the problem. PREPA and LUMA addressed the fuel accounting problem and it was subsequently resolved after the period covered in this fuel audit.

As discussed during a Progress Meeting on March 24, 2021, during an interview with PREPA on March 11, 2021, the Company has been investigating and attempting to fix an error in the methodology used to calculate the prices related to fuel consumption which had occurred during the entire audit review period of Fiscal Years 2017/2018, 2018/ 2019 and 2019/2020 and had not been corrected by PREPA as of June 30, 2020. The discovery of the consumption pricing error necessitated that PREPA use a new methodology for calculating fuel consumption prices starting in July 2020.

Under PREPA's previous methodology, that was used during the entire audit period, the cost of consumption was determined using the Asset Suite system, which calculated a price per barrels consumed for each of PREPA's plants using previous invoices. PREPA determined that under this method, the consumption prices were determined to be inaccurate due to:

- The calculation for the quantities of fuel in inventory at the end of the month consisted of using the last price recorded for each plant without considering the date it was incurred.
- Most of PREPA's plants did not record fuel consumption in a daily/monthly manner.

Under the new methodology for calculating consumption prices, PREPA uses the following formula in its Reporte De Combustible (Fuel Report or J-28 Report):

Cost Beginning Balance, Receipts, Transfers In, Miscellaneous Service & Inspection Fees÷

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Fuel Quantity (Barrels) Beginning Balance, Receipts, Transfers In

Using the Reporte De Combustible for the period ended January 31, 2020, we performed sample calculations for the following plants and fuel types: (1) Aguirre Steam Plant – Fuel No. 6, (2) Aguirre Steam Plant – Light Destillate, (3) San Juan Steam Plant – Fuel No. 6, and (4) Palo Seco Steam Plant – Fuel No. 6. The results of those calculations are summarized below:

**Exhibit 3-1. Corrected Methodology for Calculating Consumption Prices**

Plant:	AGUIRRE STEAM PLANT						
Fuel:	FUEL NO 6						
		BBIs		Consumption			
	Cost in Dollars	Quantity	Unit Cost	BBIs	Cost	Check Amount	Difference
Begin bal	\$ 24,941,707	333,119					
Receipts	\$ 35,668,620	400,457					
Transfers In	\$ -						
Misc Serv & Inspection Fee	\$ 217,504	-					
Excise Taxes	\$ 143,247						
Totals	\$ 60,971,078	733,577	\$ 83.11	282,233.51	\$ 23,457,787		
Compare with PREPA Old Method			85.17	282,233.51	\$ 24,037,349	\$ 24,037,349	\$ -
Difference			\$ (2.05)	282,233.51	\$ (579,563)		
What about excise taxes?							
What about transfers out?							
Plant:	AGUIRRE STEAM PLANT						
Fuel:	LIGHT DESTILLATE						
		BBIs		Consumption			
	Cost in Dollars	Quantity	Unit Cost	BBIs	Cost	Check Amount	Difference
Begin bal	\$ 35,150,389	366,187					
Receipts	\$ 8,676,869	106,954					
Transfers In	\$ -						
Misc Serv & Inspection Fee	\$ -	-					
Excise Taxes	\$ 223,067						
Totals	\$ 44,050,325	473,141	\$ 93.10	221.70	\$ 20,641		
Compare with PREPA Old Method			95.55	221.70	\$ 21,184	\$ 21,184	\$ -
Difference			\$ (2.45)	221.70	\$ (543)		
What about excise taxes?							
What about transfers out?	\$ 26,690,871	279,332	\$ 95.55				
Plant:	SAN JUAN STEAM PLANT						
Fuel:	FUEL NO. 6						
		BBIs		Consumption			
	Cost in Dollars	Quantity	Unit Cost	BBIs	Cost	Check Amount	Difference
Begin bal	\$ 1,407,116	23,981					
Receipts	\$ 10,624,638	126,783					
Transfers In	\$ -						
Misc Serv & Inspection Fee	\$ 33,946	-					
Excise Taxes	\$ 22,470						
Totals	\$ 12,088,171	150,763	\$ 80.18	121,679.39	\$ 9,756,217		
Compare with PREPA Old Method			106.71	121,679.39	\$ 12,984,387	\$ 12,984,387	\$ -
Difference			\$ (26.53)	121,679.39	\$ (3,228,170)		
What about excise taxes?							
What about transfers out?							

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Plant:	<b>PALO SECO STEAM PLANT</b>						
Fuel:	<b>FUEL NO. 6</b>						
		BBIs		Consumption			
	Cost in Dollars	Quantity	Unit Cost	BBIs	Cost	Check Amount	Difference
Begin bal	\$ 9,613,249	111,824					
Receipts	\$ 26,219,805	304,071					
Transfers In	\$ -						
Misc Serv & Inspection Fee	\$ 4,057	-					
Excise Taxes	\$ 22,288						
Totals	\$ 35,859,400	415,895	\$ 86.22	300,809.97	\$ 25,936,515		
Compare with PREPA Old Method			83.85	300,809.97	\$ 25,223,696	\$ 25,223,696	\$ -
Difference			\$ 2.37	300,809.97	\$ 712,818		
What about excise taxes?							
What about transfers out?							

As shown in the above tables, by using PREPA’s revised formula for calculating consumption prices and comparing the calculations with PREPA’s old method, in each case the differences net to zero. The new formula appears to work to correctly calculate PREPA’s fuel consumption prices.

Pursuant to the new methodology for calculating fuel consumption prices, PREPA stated that correcting journal entries were posted to its books for the fiscal year ended June 30, 2020. However, as discussed below, these correcting journal entries were not posted until September 30, 2020.

In a follow-up Microsoft Teams Meeting (“Teams”) on May 17, 2021, PREPA provided three Excel files, including:

- Comparativa Ajuste Inventario (Comparative Inventory Adjustment) – corrected as of September 30, 2020.
- 2020-09 General Ledger Analysis (imported from PREPA’s G/L as of September 30, 2020).
- Reporte De Combustible (Fuel Report or J-28 Report) as of September 30, 2020.

The Comparative Inventory Adjustment is replicated below:

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**Exhibit 3-2. Comparative Inventory Adjustment**

<b>Residual</b>											
	Fuel Office	Asset Suite		Costo					\$/bbl Fuel	\$/bbl Asst	
	BBIs	BBIs	varianza	Ponderado	Fuel Office	Asset	varianza	Office	Suite	varianza	
	(A)	(B)	(C)	jun30	(E)	(F)	(G)	(H)	(I)	(J)	
PALO SECO	266,106.23	266,852.17	-745.94	47.61	\$12,669,331.37	\$10,183,899.36	\$ 2,485,432.01	47.61	38.16	9.45	
AGUIRRE	431,484.65	431,998.95	-514.30	49.91	\$21,536,550.25	\$11,475,104.29	\$ 10,061,445.96	49.91	26.56	23.35	
COSTA SUR	583,976.90	512,837.57	71,139.33	66.69	\$38,948,280.95	\$34,001,892.49	\$ 4,946,388.46	66.69	66.30	0.39	
SAN JUAN	89,677.94	62,619.47	27,058.47	47.61	\$ 4,269,571.36	\$ 2,652,058.82	\$ 1,617,512.54	47.61	42.35	5.26	
<b>TOTAL</b>	<b>1,371,245.72</b>	<b>1,274,308.16</b>	<b>96,937.56</b>		<b>\$77,423,733.93</b>	<b>\$58,312,954.96</b>	<b>\$ 19,110,778.97</b>	<b>56.46</b>	<b>45.76</b>	<b>10.70</b>	

<b>Destillado</b>											
	Fuel Office	Asset Suite		Costo					\$/bbl Fuel	\$/bbl Asst	
	BBIs	BBIs	varianza	Ponderado	Fuel Office	Asset	varianza	Office	Suite	varianza	
	(A)	(B)	(C)	jun30	(E)	(F)	(G)	(H)	(I)	(J)	
PALO SECO	31,783.50	22,256.12	9,527.38	57.03	\$ 1,812,655.42	\$ 1,746,986.85	\$ 65,668.57	57.03	78.49	-21.46	
<b>AGUIRRE</b>	<b>187,485.64</b>	<b>215,469.58</b>	<b>55.43</b>	<b>55.43</b>	<b>\$10,391,410.82</b>	<b>\$16,232,338.69</b>	<b>\$ 5,840,927.87</b>	<b>55.43</b>	<b>75.33</b>	<b>-19.91</b>	
COSTA SUR	3,694.13	3,716.24	-22.11	81.75	\$ 301,980.35	\$ 300,163.42	\$ 1,816.93	81.75	80.77	0.98	
SAN JUAN	44,795.73	37,814.21	6,981.52	56.87	\$ 2,547,648.32	\$ 9,710,091.15	\$ (7,162,442.83)	56.87	256.78	-199.91	
VEGA BAJA	5,383.18	5,789.84	-406.66	54.09	\$ 291,173.51	\$ 578,012.89	\$ (286,839.38)	54.09	99.83	-45.74	
CAMBALACHE	99,172.81	86,003.83	13,168.98	56.89	\$ 5,641,848.21	\$ 3,624,795.93	\$ 2,017,052.28	56.89	42.15	14.74	
JOBOS	7,102.07	10,993.42	-3,891.35	52.46	\$ 372,577.87	\$ 445,701.79	\$ (73,123.92)	52.46	40.54	11.92	
MAYAGUEZ	42,801.19	42,470.33	330.86	56.50	\$ 2,418,221.31	\$ 2,136,814.51	\$ 281,406.80	56.50	50.31	6.19	
DAGUAO	8,321.43	15,467.72	-7,146.29	53.27	\$ 443,301.45	\$ 142,324.72	\$ 300,976.73	53.27	9.20	44.07	
YABUCOA	12,833.33	16,057.76	-3,224.43	64.43	\$ 826,878.61	\$ 1,282,858.37	\$ (455,979.76)	64.43	79.89	-15.46	
VIEQUES	2,464.38	7,001.26	-4,536.88	86.90	\$ 214,158.52	\$ 608,420.57	\$ (394,262.05)	86.90	86.90	0.00	
CULEBRA	474.43	369.44	104.99	91.82	\$ 43,560.42	\$ 33,920.62	\$ 9,639.80	91.82	91.82	0.00	
<b>TOTAL</b>	<b>446,311.82</b>	<b>463,409.75</b>	<b>10,886.01</b>		<b>\$25,305,414.80</b>	<b>\$36,842,429.51</b>	<b>\$ (5,696,086.84)</b>	<b>56.70</b>	<b>79.50</b>	<b>-22.80</b>	

As shown above, the Comparative Inventory Adjustment spreadsheet breaks out PREPA’s inventory adjustments for fuel consumption (by generating unit) between Residual and Destillado (Distilled). The quantities shown under the Column A are from the Fuel Office whereas the quantities shown in Column B are from PREPA’s Asset Suite module. Column C reflects the quantity variances between the two sources of information (see additional discussion below). The amounts shown under Column E are the result of multiplying the Fuel Office barrel quantities in Column A by the weighted cost per barrel amounts as of June 30, 2020 in Column D. The variances shown in Column G reflect the differences between the Fuel Office inventory dollar amounts and the dollar amounts calculated using the Asset Suite information, shown in Column F.

The dollar amount variances shown in Column G represent PREPA’s inventory adjustments. With the exception of the \$10,061,445.96 that relates to Aguirre residual (see below), we traced the inventory adjustments shown in Column G in the table above, to PREPA’s general ledger, which are reflected in the 2020-09 General Ledger Analysis file. In addition, with the exception of Aguirre Destillado, in which PREPA’s inventory report shows no quantity or dollar amount in the Variance column, all of the quantity variances and dollar amount variances (i.e., inventory adjustments) for PREPA’s generating units are reflected in PREPA’s J-28 report for the period ending September 30, 2020. Specifically, the inventory adjustments are reflected on the tab titled “Busqueda” which in turn flow to the main “Reporte” tab, which is PREPA’s Fuel Oil Consumption Report for the month ended September 30, 2020 and which are included in the ending monthly balances. PREPA also provided the journal entries which reflect the inventory adjustments for FY2019/2020.

Barrel Quantity Variances

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As noted above, based on the interview with PREPA on March 11, 2021, it had been our understanding that the consumption error was related solely to the method in which the consumption prices were calculated using Asset Suite and that the barrel quantities in Asset Suite were accurate. However, the quantity variances shown above suggest that the quantities in PREPA's Asset Suite application were also inaccurate. Upon our inquiry as to whether the Asset Suite barrel quantities were also inaccurate, the PREPA employee we spoke to during the Teams meeting advised that she would have to consult with another PREPA employee and would follow-up with us. During the fuel audit we did not receive an explanation from PREPA for the barrel quantity variances between the Fuel Office and Asset Suite.

**Aguirre Generating Plant**

As noted above, the inventory adjustment in Column G in the table above that relates to Aguirre Residual in the amount of \$10,061,445.96 is not reflected on the General Ledger Analysis file for the period ending September 30, 2020. We inquired during the Teams meeting on May 17, 2021 as to why this amount was not reflected in the general ledger, but the PREPA employee we spoke to during the meeting indicated she would have to consult with another PREPA employee and would follow-up with us. During the fuel audit we did not receive an explanation from PREPA. During subsequent quarterly reviews of PREPA's FCA and PPCA rates and supporting documentation and discussions with Commissioner Rivera while he was serving on the Bureau, it is our understanding that PREPA and LUMA have corrected these accounting problems.

With regard to Aguirre Destillado, as shown in the table above in Columns C and G, PREPA did not reflect the barrel quantity variance nor the related dollar amount variance. During the Teams meeting on May 17, 2021, PREPA stated that the Aguirre inventory adjustment had not yet been finalized because including the adjustment would have resulted in a negative inventory amount. Consequently, the inventory adjustment for Aguirre Destillado was not reflected in the general ledger as of September 30, 2020 nor was it reflected in PREPA's Fuel Oil Consumption Report for the period ended September 30, 2020. Had this adjustment had been made, it would have decreased inventory and increased fuel costs by \$5,840,928 for Aguirre Destillado. At the time of the Teams meeting on May 17, 2021, PREPA had not yet determined when it would record the inventory adjustment for Aguirre Destillado. In addition, it was unclear whether PREPA included this amount in the FCA rate proposed for July 1, 2021. We followed up with PREPA with regard to these issues. It is our understanding that PREPA had corrected for the remaining Aguirre fuel cost issues after September 30, 2020, and that the mis-pricing of the Aguirre Destillado fuel that had been occurring has been corrected and is no longer a continuing problem with PREPA's fuel accounting for that plant.

**Conclusion**

The accounting issue for fuel costs noted above that had occurred during the audit period was subsequently resolved by PREPA and LUMA.

A review of current fuel costs in 2023 reveals that there are no longer large discrepancies between the per-unit cost for fuel consumed and fuel in month-end inventory. We conclude that the fuel accounting problems discussed above that occurred during the audit period has been resolved by PREPA and LUMA subsequent to the period covered by the fuel audit.



## **4 AES PUERTO RICO - REVIEW OF COAL CONTRACTS AND DELIVERED COAL COSTS**

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The Power Purchase Operating Agreement (“PPOA”) with AES Puerto Rico L.P. (“AES Puerto Rico” or “Operator”) was executed in October 1994. The PPOA was tied to a new cogeneration facility expected to consist of two or more circulating fluidized bed (CFB) boilers and one or more steam turbine generators or approximately 413 MW of capacity. All of the Dependable Capacity and Energy produced by the plant would be sold to PREPA.

The PPOA was amended twice. In November 1999, the PPOA was amended to reflect the decision to modify the pricing structure, the terms and procedures for financing the Facility, the terms for PREPA’s option to purchase the Facility, and various other provisions of the agreement. Other changes were made to reflect the decision to utilize two new steam turbines and the relocation of the switchyard. In June 2015, the PPOA was amended following approval of disposal of coal combustion waste in Puerto Rico which previously had been required to be done elsewhere.

Fuel procurement in the PPOA, which is effectively a cost pass-through from AES Puerto Rico to PREPA, is addressed in Section 13 of the PPOA. The PPOA affords PREPA considerable oversight through the following:

- Operator must maintain at all times a list of qualified suppliers which must be updated at least once per year. Operator agrees to include up to five additional suppliers designated by PREPA.
- Operator will provide PREPA a copy of the fuel RFP at least 90 days prior to issuing the RFP to allow PREPA an opportunity to comment upon.
- Operator agrees to provide PREPA copies of all responses to the Fuel RFP with 15 days of receipt.
- Operator agrees to provide a copy of any agreements to PREPA for review and comment.
- Operator has the right to purchase fuel on an emergency basis for an actual or anticipated interruption of supply but must submit any agreements to PREPA for an expedited review.

In addition, the PPOA provides certain guidelines related to fuel procurement including:

- The purchased Fuel and Transportation has to be the lowest cost bid.

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- The Fuel and Transportation Agreement has to have an initial term of not less than two years and not more than the remaining life of the PPOA.

The only requirement that has changed relates to disposal of coal combustion residuals. In the original PPOA, it was expected to be part of the scope of the Fuel and Transportation agreements. After the change in policy that allowed disposal of CCRs in Puerto Rico, that was no longer the case.

During the review period, the coal purchased by AES for AES Puerto Rico is summarized below.

	FY1	FY2	FY3		
	2017H2/2018H1	2018H2/2019H1	2019H2/2020H1	2020H2/2021H3	2021H2/2022H1
Coal Supplier					
H2	?	Drummond	Drummond	Drummond	Drummond
H1	Drummond	Drummond	Drummond	Drummond	AES PR
Delivered Coal Price					
H2	?	90.03	88.53	109.33	109.82
H1	90.03	88.53	109.33	109.82	?
RFP Conducted	?	?	?	2016 RFP	2016 RFP
	?	?	2016 RFP	2016 RFP	2020 RFP

Based on a review of the available documentation, we conclude that PREPA was nominally compliant with the terms of the PPOA.

As noted above, PREPA purchases power under a PPOA from the AES Puerto Rico generating plant, which burns coal to generate electricity. An investigation was undertaken of the coal supply and cost of power to PREPA from the AES Puerto Rico plant. During the audit period, the purchased power from the AES Puerto Rico plant was generally the lowest cost per-MWh, and was below the cost of LNG fueled generation and PREPA’s LNG-funded fuel and purchased power resources.

A post-audit comparison of PREPA’s fuel and purchased power costs from recent 2023 information reveals that the AES Puerto Rico plant purchased power cost is no longer the lowest cost generating resource on PREPA’s system. Some of the LNG-fueled generation now has a lower per-MWh cost than the purchased power from the AES Puerto Rico generating plant.

The market cost for coal that is used for fuel and the AES Puerto Rico generating station has experienced substantial changes subsequent to the audit period.

It appears that PREPA could have availed itself with opportunities during and subsequent to the audit period to investigate, and potentially challenge, the cost of coal being used at the AES Puerto Rico plant; however, PREPA did not do that.

PREPA did little to nothing to minimize the coal procurement costs. At this point, PREPA believes it followed the “terms” of its agreement with AES. Under the agreement, PREPA has the right to opine on the RFP, opine on the bids received, opine on the contracts, PREPA documents it looked at these items but never offered any comments. There is no indication that

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PREPA understood the coal markets or made any effort to determine whether the process was limiting the lowest cost option.

Further, in the most recent solicitation that we were able to review when AES received only one bid, PREPA agreed to effectively buy their coal from AES at a significant cost rather than selecting other options.

The PPOA requires that coal be purchased for at least two years. Rather than simply accepting the two-year contract through AES, PREPA should have considered other options such as: (1) determining if the bid prices reflected the market, (2) considering whether purchasing the coal on an index basis would have been likely to improve the pricing, (3) reducing the term to one year, (4) determining whether there was any flexibility in the coal specifications that would have produced alternative coal supplies, and (5) determining independently why the bid response was so low.

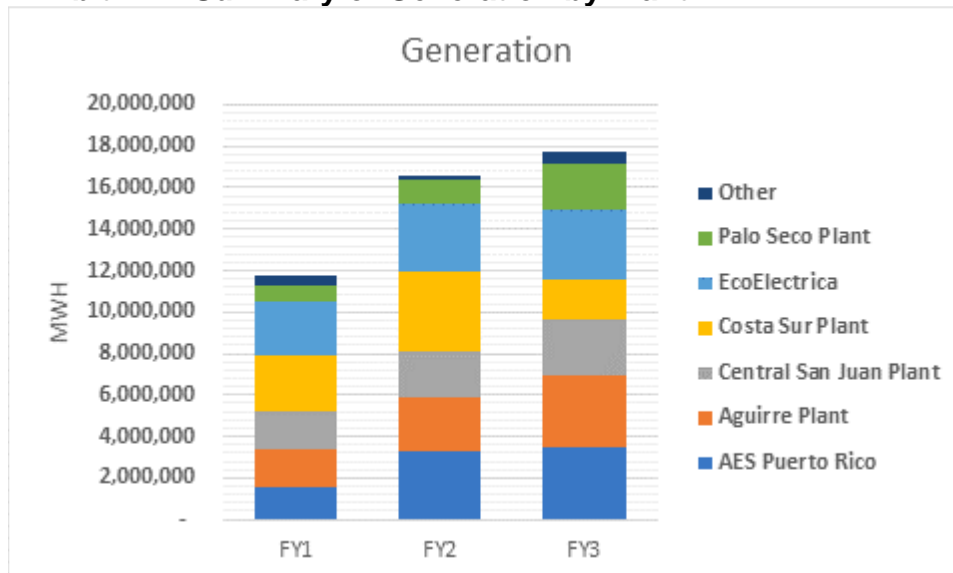
PREPA and LUMA should be diligently reviewing the cost of coal delivered to the AES Puerto Rico plant for as long as the AEP Puerto Rico power plant is in operation.

The review procedures available to PREPA that were established in the PPOA in 1994 were never changed. The PPOA was amended twice. There is nothing that would have prevented an amendment to “update” the process to align the process with industry standards.

**PREPA’s Generation as Reported in EIA Form 923**

EIA reports PREPA’s generation on Form 923, for which an illustration summary of generation by plant is shown below:

**Exhibit 4-1. Summary of Generation by Plant**



Generation by resource for 2022 is shown in the following exhibit:

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**Exhibit 4-2. Generation by Plant – 2022**

**GENERATION BY PLANT, 2022**

<b>AES ILUMINA, LLC</b>	<b>35,581</b>
AES ILUMINA	35,581
<b>AES Puerto Rico LP</b>	<b>2,962,885</b>
AES Puerto Rico	2,962,885
<b>EcoElectrica LP</b>	<b>3,350,885</b>
EcoElectrica	3,350,885
<b>Fonroche Energy America, Inc.</b>	<b>66,400</b>
Humacao Solar Project, LLC	66,400
<b>Oriana Energy LLC</b>	<b>84,723</b>
Oriana Energy Hybrid	84,723
<b>Pattern Operators LP</b>	<b>155,009</b>
Pattern Santa Isabel LLC	155,009
<b>Puerto Rico Electric Pwr Authority</b>	<b>10,821,892</b>
Aguirre Plant	2,611,990
Cambalache Plant	212,511
Caonillas	-
Central San Juan Plant	2,554,672
Costa Sur Plant	3,336,652
Mayaguez Plant	252,710
Palo Seco Plant	1,853,357
<b>San Fermin Solar Farm LLC</b>	<b>21,969</b>
San Fermin Solar Farm Hybrid	21,969
<b>TOTAL</b>	<b>17,499,344</b>

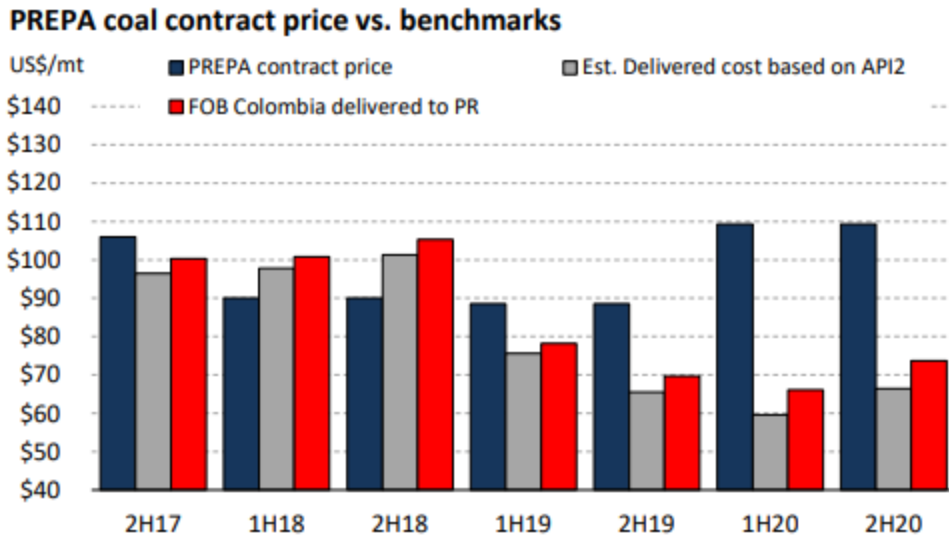
Source: EIA 923/860

**Overview of Performance**

Per the PPOA with AES PUERTO RICO, coal is purchased for at least two-year periods in advance and the fuel costs are passed through to PREPA. While coal pricing is not specifically proscribed in the PPOA, when coal procurement was initiated under the PPOA, it was based upon fixed pricing, i.e., US dollars per tonne delivered to Puerto Rico. This practice continued through the audit period even though the long-established industry best practice is to procure using index-based pricing.

The next key finding of our review is that, except in 2018, the contract price for coal purchased by AES PUERTO RICO was significantly above market as calculated against two other coal industry benchmarks: (1) the price of FOB Colombia coal delivered to Puerto Rico and (2) the estimated delivered cost of coal to Puerto Rico based on the API 2 index. The API 2 index is the most liquidly traded coal index in the world and is based upon transactions for coal delivered to Northwest Europe. Had AES PUERTO RICO coal purchases been tied to an index, fuel costs over the review period would have been materially lower.

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### **Findings Summary**

- The PPOA between PREPA and AES Puerto Rico was executed in 1994.
- The coal purchase costs are pass-through items in the contract.
- PREPA has significant rights in the PPOA related to fuel procurement. Namely, PREPA is allowed input into and review of: the Bidder’s List, the RFP, the selection of fuel supplier, and the fuel supply agreement.
- Changes are warranted with respect to at least the following two items:
  - Timing of the procurements (well in advance and for at least two years).
  - The use of fixed versus indexed pricing.
- Between 2005 and 2007, the API 2 index, which reflects the price of thermal coal delivered to northwest Europe, became the industry standard for pricing steam coal contracts in the Western Hemisphere. Colombian coal contracts were typically priced as API2 minus BCI7 plus a factor. (BCI7 represents ocean freight rates from Bolivar to Northwest Europe in a typical Capesize vessel).
  - Index pricing became attractive because it floats with the market price and because it allows buyers to both physically and financially hedge the price of coal. This became important because once-stable coal prices became increasingly volatile in the early 2000’s. Because of this volatility, when requiring a firm, fixed price for two years, producers typically add a price premium to contracts in order to account for the potential of a “market bump.”
- There is no indication that PREPA sought any contract changes during the review period.
- There is no indication that AES Puerto Rico would not have agreed to a change. Further, it is believed that AES purchases significant quantities of index-priced coal in the global market.

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- While not all requested documents were produced, it appears that during the review period PREPA nominally complied with the fuel-related oversight and the nominal terms of the PPOA.
- A valuable provision in the coal supply contracts is the right to increase or decrease volumes by 20 percent and/or the right to request test burns of coal from alternate suppliers. There is no indication that, even when the market price was significantly below the contract price, this option was exercised by AES Puerto Rico or was pursued by PREPA with AES Puerto Rico.
- In discussions with PREPA, it was not clear that PREPA was aware of the significant differences between the AES Puerto Rico price and the market price that were noted during the audit period.
- It is believed that during the audit period PREPA did not have the internal solid fuel procurement expertise to (1) identify problems associated with the coal procurement or (2) the ability to execute on viable alternatives.
- A specific problem was identified in the most recent coal procurement that was reviewed in the fuel audit. Due to a lack of supply options, PREPA agreed to contract with AES Puerto Rico for the supply of coal for the next two-year contract starting July 1, 2022. The RFP that solicited coal for this period specifically noted that the contract volume may be adjusted up or down by 20 percent for any reason. The contract entered into with AES Puerto Rico limits the volume optionality originally sought in the RFP process.

**Recommendations**

- PREPA should supplement its expertise to better manage its coal procurement rights under the AES PPOA, either through additional staff assistance or through third party support.
- PREPA should amend its PPOA with AES Puerto Rico to adjust the fuel contracting provisions so that they are more in line with current industry practice.
- Because of the significant market shifts in the cost of coal supply delivered to the AES Puerto Rico plant and the fact that the cost of some of the LNG-fueled power supply has recently been lower than the per-MWh cost of the purchased power from the AES Puerto Rico plant, and the fact that the AES Puerto Rico plant has been scheduled for near-term retirement due to environmental requirements, further follow-through and additional investigation of the AES Puerto Rico coal supply, agreements and transportation by PREPA or LUMA with respect to AES Puerto Rico delivered cost of coal issues could be appropriate through the limited remaining operational period of the AES Puerto Rico coal-fueled generating plant.

**Change in General Market Conditions Subsequent to the Audit Period**

There have been pronounced changes in general energy and fuel commodity market conditions subsequent to the period covered by the PREPA fuel audit. The Colombian coal market has been

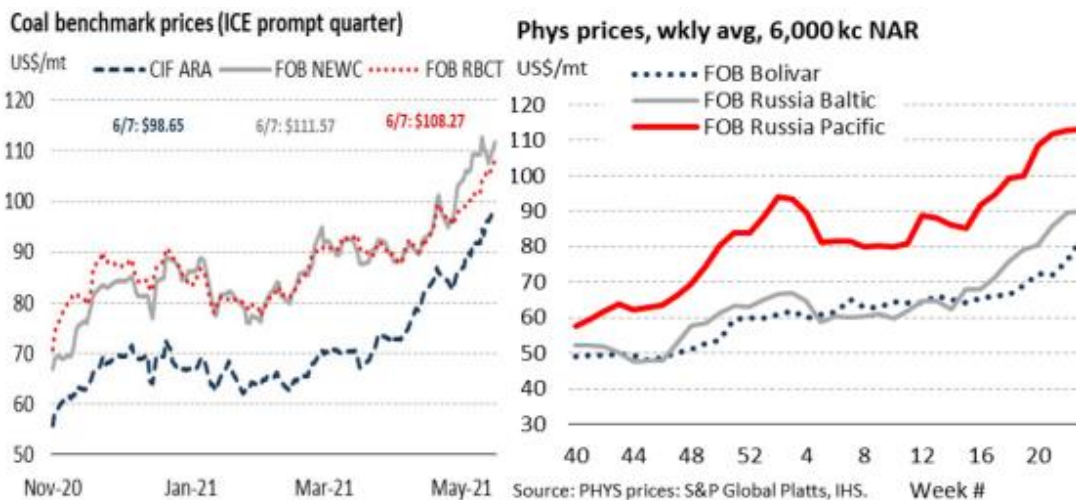
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affected by a contraction in supply as the number of producers has fallen from four to two. CNR and Prodeco are not currently operating and are not likely to return. This leaves Cerrejon Mining Company (CMC) and Drummond. CMC, which is owned equally by Glencore, Anglo, and BHP, is expected to undergo an ownership change as both Glencore and BHP appear to want to exit. Itochu, a Japanese trading company has sold its 20% interest in Drummond mines back to Drummond Company Inc. This uncertainty likely explains why AES PUERTO RICO's most recent RFP received poor results.

The global coal market has also taken a turn in 2021 due to numerous factors including:

- A dispute between China and Australia over the origins of COVID 19 resulting in an effective embargo by China of Australian coal,
- A faster-than-expected global economic recovery from COVID 19,
- Labor and critical part shortages reducing the ability for industry participants to resume higher production and/or transport their product, and
- ESG concerns, which have both reduced capital available to the thermal coal industry and encouraged thermal coal industry participants to exit the space.

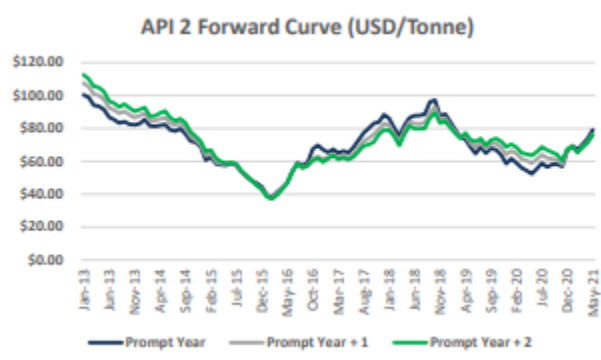
As shown below, in the first six months of 2021 CIF ARA (API2) has increased from \$55 per tonne to close to \$100 per tonne. The price of coal FOB Bolivar has increased from \$50 to \$80 per tonne.



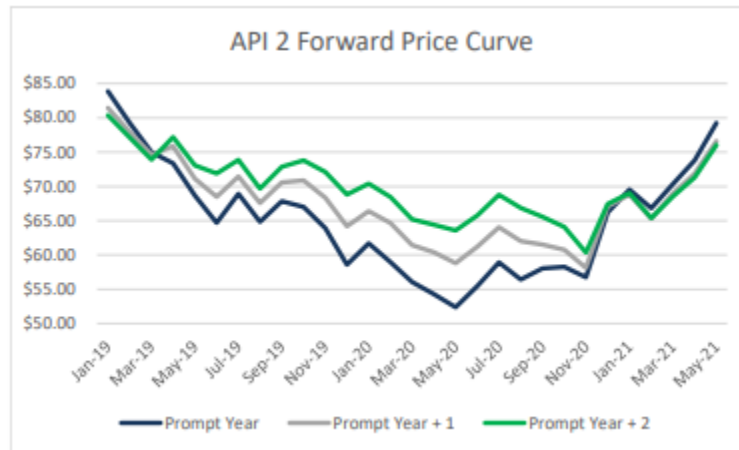
Based on changes in the coal commodity market subsequent to the fuel audit period, the AES PUERTO RICO coal contracts appear advantageous to PREPA. The forward curve for API 2 has jumped from around \$60 per tonne to close to \$80. The problem for PREPA is that the AES PUERTO RICO contracts are unlikely to remain advantageous through the remaining operational life of the AES Puerto Rico generating plant.



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Forward price curves are typically in contango, which means future prices are expected to be higher than current prices. The current forward price curve is backward-dated, meaning future prices were expected to be below current levels, as of the date of that forward market review.



It is always difficult to project the inflection point in a price curve. It is clear, however, that coal pricing has trended higher and has approached the levels that were unsustainable in 2017 and 2018. As shown in the chart above, the last time the curve was backwarddated, coal prices fell rather dramatically. A strategy should be put in place, if possible, to benefit from a potential future decline in thermal coal pricing.



# **5 PURCHASING PERFORMANCE FOR LNG, DIESEL AND BUNKER**

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## **Overview of Performance**

### **No. 2 Fuel Oil**

PREPA's methodology for purchasing No. 2 fuel oil (low sulfur diesel) was robust and competitive with well-developed evaluation criteria and risk management procedures implemented in both RFPs that were reviewed during the study period. We evaluated two RFP processes run in 2017 and 2019, and we were provided with detailed bidder lists, evaluation criteria and evidence that the evaluation criteria were used to make prudent decisions regarding fuel supply contracts. The contract prices were based on an index plus an escalation factor that was in-line with market pricing.

### **No. 6 Fuel Oil**

A well-designed framework for No. 6 fuel oil (bunker) purchases was developed, but document production did not provide any evidence that bids were properly evaluated. The initial 2015 RFP for No. 6 fuel oil resulted in a contract with Freepoint Commodities that has since been amended five times and extended for five years beyond its initial tenor. The RFP process for bunker that was run in 2015 was not repeated during the audit period, even though it was designed to be run at least every two years. Instead, PREPA has chosen to continue buying all bunker volumes from one supplier over an extended period. This practice presents risks that more-competitive pricing and deal terms have been and are being missed.

### **LNG**

There was no evidence of an RFP process for PREPA's LNG contract that supplies its Costa Sur plant. The contract, signed in 2012, was designed to procure LNG supply for the next 20 years. While this significantly limits the flexibility of PREPA's LNG procurement, such a long-duration contract was typical in 2012, when that deal was signed.

Through contract amendments to pricing, the LNG contract has remained consistent with market prices for delivery of LNG in the Caribbean and has been appropriately linked to the US Henry Hub gas price index. We compare the LNG contract to the liquid Japan-Korea Marker (JKM) price below to illustrate this point. We note that the process of renegotiating and amending this long-term LNG contract is a best practice that should also be implemented to revise PREPA's long-term PPOA with AES Puerto Rico.

## **Findings Summary**

- We independently evaluated PREPA's RFP process and resultant contract purchases of liquid fuels for all of the power stations that PREPA operates. These fuel purchases are made directly by PREPA, rather than by a third party. This differs from the coal purchasing procedure discussed above, which was executed by a third party.

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- We excluded from our analysis PREPA’s LNG contract for its San Juan plant with New Fortress Energy (NFE) as an in-depth review of this contract had already been performed and evaluated by the PREB.

**No. 2 Fuel Oil Purchases**

- We reviewed a full set of documents (RFP, bidders, evaluation criteria, etc.) for two No. 2 fuel oil (diesel) RFPs run in 2017 and 2019. These documents showed that PREPA followed best practices to select the lowest cost bidder that met its evaluation criteria. The resulting contracts with Puma Energy Caribe were in-line with market pricing for No. 2 fuel oil deliveries in the Caribbean during the audit period.
- The diesel contracts with Puma were linked to index pricing and used an average of pricing at NY Harbor and in the US Gulf Coast to avoid basis risk (the risk that pricing varies significantly from one geographical point to the other, distorting the prices paid by the buyer at its location).
- The diesel contracts specified index pricing that was an average of prices published by two different Price Reporting Agencies, Argus and S&P Global Platts, increasing the likelihood of an unbiased, accurate index price.

**No. 6 Fuel Oil Purchases**

- In the case of its No. 6 fuel oil purchases, PREPA linked its contracted volumes to liquid and visible price assessments published by S&P Global Platts, plus an escalation factor. We find that the escalation factor of \$5.71/bbl for the San Juan and Palo Seco plants and \$7.78/bbl for the Aguirre and Costa Sur plants (if paid within 62 days), was a reasonable adder to the S&P Global Platts price index for deliveries to PREPA’s facilities during the audit period.

Our estimate of the cost of PREPA’s LNG purchases for its Costa Sur plant are shown in the chart and table below:

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**PREPA LNG price under Naturgy contract**

US\$/MMBtu



/MMBtu	1Q	2Q	3Q	4Q
2021	\$ 8.80	\$ 9.71	n/a	n/a
2020	\$ 8.42	\$ 7.30	\$ 7.70	\$ 8.17
2019	\$ 9.33	\$ 9.24	\$ 9.21	\$ 9.26
2018	\$ 8.87	\$ 9.33	\$ 9.82	\$ 9.61
2017	\$ 8.46	\$ 8.28	\$ 8.26	\$ 8.71
2016	\$ 6.64	\$ 7.29	\$ 7.71	\$ 8.44
2015	\$ 9.30	\$ 8.56	\$ 7.68	\$ 7.30
2014	\$ 14.01	\$ 13.81	\$ 13.88	\$ 11.68

Contract price Tier 1	
Contract price Tier 1	
Contract price Tier 1	

In the case of LNG purchases, PREPA made effective decisions to link its contract to US Henry Hub gas prices, which is a liquid regional hub with limited basis risk to the delivery point at PREPA’s plants. We found that PREPA’s contracting process for LNG for its Costa Sur plant resulted in fuel prices that were at a modest premium to spot LNG prices (represented by the S&P Global Platts Japan-Korea Marker price, JKM), as summarized in the chart below:

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**Costa Sur LNG contract: premium to JKM**



Most global contract prices for LNG during the audit period have been at a premium to JKM, sometimes a significant premium due to a pricing linkage with crude oil. The premium above JKM prices paid by PREPA is reasonable compared with best practices for global fuel procurement processes.

Part of the rationale in switching PREPA's Costa Sur power plant to operating on LNG was fuel savings over the cost of No. 6 fuel oil, in addition to environmental benefits. We find that PREPA was successful in reducing costs compared to No. 6 fuel oil based on its LNG contracting for Costa Sur. This LNG delivery contract began by referencing fuel oil prices but transitioned to a linkage with the Henry Hub price through a contract amendment in 2015, which ultimately saved PREPA significantly on LNG fuel costs. We show below that PREPA's LNG purchases were cost competitive with No. 6 fuel oil prices, especially over our study period from 2017-2020, during which PREPA was procuring LNG based on the gas price at Henry Hub plus a fixed charge.

**Costa Sur LNG contract: discount to No. 6 Fuel Oil**



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**Recommendations**

- PREPA should seek to run an RFP process for No. 6 fuel oil once its current contract with Freepoint Commodities expires in 2022. This will ensure that No. 6 fuel oil supplies are procured at the most competitive prices and with the best terms for PREPA.
- PREPA should use its process and evaluation criteria for diesel procurement as a template for future RFPs for other fuels. The diesel RFP process was robust and competitive with well-developed evaluation criteria and risk management procedures.