CI# 30954

LIN3 – ESP Gas Flow Modification

REDACTED

April 30, 2010

NOVA SCOTIA
POWER
An Emera Company

NOVA SCOTIA POWER
An Emera Company

UARB APPROVAL SHEET

Project Title: **LIN3-ESP Gas Flow Modification**

CI Number: 30954

- [x] Capital Project Authorization
- [ ] ATO
- [ ] Final Cost

Head Office Use:

Project Number:

Date: April 30, 2010

Location:

Division:

Expenditure Profile

YEAR	Budget Estimate	Project Estimate
2010	573,642	447,273
2011	900,347	1,049,792
Total	$1,473,990	$1,497,064

Schedule

Estimated Start Date	2010-06
Estimated In-Service Date	2011-10
Estimated Close Date	2011-11

COMMENTS

Submitted on behalf of NOVA SCOTIA POWER INCORPORATED

April 28/2010

Authorized Signatory DATE
Mark Savory
VP Technical and Construction

Approved on behalf of NOVA SCOTIA UTILITY AND REVIEW BOARD

DATE

CI Number : 30954 - LIN3-ESP Gas Flow Modification Project Number

Parent CI Number : -

Cost Centre : 301 - 301-Lingan Admin./Common Capital Budget Version - 2010 03/09 Forecast

	Forecast
Start :	06/30/2010
Operational :	10/01/2011
Final Cost :	11/25/2011
2010	$447,272.67
2011	$1,049,791.79
Total :	$1,497,064.46
Original Cost :	$0.00

The Lingan Unit #3 electrostatic precipitator (ESP) requires upgrading in order to support the combustion of low sulphur compliance coal.

Summary of Related CI's +/- 2 years
2009 - CI 38442 LIN2-ESP Gas Flow Modification $1,716,730
2010 - CI 36902 LIN1- ESP Gas Flow Modification $1,500,000

CI Number : 30954 - LIN3-ESP Gas Flow Modification **Project Number**

Parent CI Number : - **Approved Date**

Cost Centre : 301 - 301-Lingan Admin./Common Capital **Budget Version** 2010 ACE Plan (New AFUDC)

Capital Item Accounts

Acct	Actv	Account	Activity	Forecast Amount	Amount	Variance
094		094 - Interest Capitalized		17,092	0	17,092
012	004	012 - Materials	004 - SGP - Misc.Equipment	450,000	0	450,000
013	004	013 - POWER PRODUCTION Contracts	004 - SGP - Misc.Equipment	945,000	0	945,000
095	005	095-Thermal & Hydro Contracts AO	005 Indirect Costs	61,897	0	61,897
			Total Cost:	1,473,990	0	1,473,990
			Original Cost:			

CI Number :	30954	- LIN3-ESP Gas Flow Modification	**Project Number**
Parent CI Number :		-	**Approved Date**
Cost Centre :	301	- 301-Lingan Admin./Common Capital	

Capital Item Justification

Justification Criteria : THERMAL
Sub-Criteria : Heat Rate
Name of Report :
Document Location :
Person Responsible :

Why do this project?

Sulphur Dioxide and Mercury compliance coal has a lower specific energy, higher ash content and a lower sulphur content which results in a unit de-rating in order to remain in compliance with opacity limits. An engineering investigation has determined the ESP performance can be improved to support increased unit loading by correcting existing flue gas flow distribution within the ESP.

This project is recommended to proceed to improve Unit #3 ESP performance on compliance low sulphur fuels and avoid replacement energy costs that would otherwise be associated with capacity de-rating of the unit.

Why do this project now?

This project will provide an immediate benefit of improved ESP performance and fuel operating range and must be implemented at the earliest opportunity.

Why do this project this way?

NSPI evaluated commercially available alternatives to improve ESP operating performance at Lingan. All of the alternatives start with maximizing the performance capacity and range of the existing ESP. To achieve this, the flue gas flow devices must be upgraded to provide flue gas flow distribution which meets industry guidelines for this equipment. This step is required before additional ESP performance and capacity options can be considered for implementation.

CI Number :	30954	- LIN3-ESP Gas Flow Modification	**Project Number**
Parent CI Number :		-	**Approved Date**
Cost Centre :	301	- 301-Lingan Admin./Common Capital	

Reason for Variance / Over Expenditure / Final Costing

13925232

The variance between ACE 2010 and revised submission is due to the estimate being revised since ACE 2010.

Generation Services

Station: Lingan G. S.
CI Numbe 30954

Project: LIN3 ESP Flow Modifications
System: Unit 3 ESP Flow Up-grades
Project Budget Estimate
Date: 24-Mar-10
Rev. 0

Item	Description	Unit 1 Budget Estimate	Totals
1.1	**NSP In - House Engineering Services**		
	Generation Services	15,000	
	Plant Engineering	15,000	
	Site Supervision	15,000	
	Plant Labour - Env. Equip. - Reg.	0	
	Plant Labour - Env. Equip. - Term		
	Plant Labour - Env. Equip. - OT		
	Plant Labour - Ash Equ. - Reg.		
	Plant Labour - Ash Equ. - Term		
	Plant Labour - Ash Equ. - OT		
	Regular Labour NSP	50,000	
	OT Labour NSP	15,000	
			$110,000.00
1.2	**NSP Term - Engineering Services**		
	Sub-Total NSP Resources	0	$0.00
1.3	**Engineering Consulting Services**		
	Sub-Total Consulting Resources	0	$0.00
1.4	**Engineer & Construct Non-Labour**		
	Expenses & Materials	20,000	
	Meals	2,000	
			$22,000.00
2	**Materials**		
	Flow distribution devices	[redacted] (1)	
	Shipping	7,000	
	Misc Materials, Field	25,000	
	Inlet fall out hopper ash removal replacement materials.	[redacted] (2a)	
	Fallout hopper outlet valves	[redacted] (2b)	
	New rappers for inlet screen & control card	Inc	
	Sub-Total System Materials		$435,764.00
3	**Contracts**		
	Engineering Design	0	
	Site Supervision	[redacted] (3)	
	In Situ Test	25,000	

Generation Services

Station: Lingan G. S.
CI Numbe 30954

Project: LIN3 ESP Flow Modifications
System: Unit 3 ESP Flow Up-grades
Project Budget Estimate
Date: 24-Mar-10
Rev. 0

Item	Description	Unit 1 Budget Estimate	Totals
	Boiler installation contract services: Estimate based on Unit 2 ESP Flow Modifications project in 2009 (CI#38442)	[redacted] (4)	
	Insulation & cladding repair/replace.	50,000	
	ESP inspection services	0	
	Misc. site services	25,000	
	Staging	5,000	
	Fossil Power	[redacted] (5)	
	ESP water wash	90,000	
	Installation of additional access platforms.	50,000	
	Project Contract Contigency	78,335	
	Sub-Total System Contracts		$808,335.00
	Total Project Estimate, (No Interest or A/O)		**$1,376,099.00**
4	**A/O Charges**		
	Interest Capitalized	38,903	
	Regular Labour	52,946	
	Contract	29,117	
	Sub-Total A/O Charges		$120,965.46
	Total Project Estimate (With A/O and Interest)		**$1,497,064.46**

USD Exchange Rate - $1.04 CDN

LIN3 ESP Flow Modification
Reference Notes

Budget Year	2010
Division	Power Production
Department	Lingan Generating station

Date	22-Mar
CI number	30954

Note 1	Flow distribution device	As per the estimate submitted by Neundorfer, the capital cost associated with the flow distribution device is [redacted] (exchange rate 1.04).
Note 2a.	Inlet Fall out hopper ash removal replacement materials	As per the estimate supplied by Diamond Canapower, material cost associated with the hopper ash removal replacement is [redacted] An additional [redacted] was added to the estimate as contingency to cover the cost of potential items that may arise over the course of construction.
Note 2b.	Fallout hopper outlet valve	As per Diamond Canapower the costs associated with the fallout hopper outlet valve is $5,914.
Note 3	Neundorfer site supervision	As per the estimate supplied by Neundorfer, site supervision will account for [redacted] of the total project. An additional [redacted] was added as contingency based on experience gained from identical scope recently completed on Unit 2.
Note 4	Boiler Installation contract services	The estimate of [redacted] is based on the experience gained from the Unit 2 ESP flow modification project completed in 2009.
Note 5	Fossil Power	As per the estimate created by Fossil Power systems, the cost associated with Allen Bradley hardware, engineering services, and commissioning support is [redacted]

NEUNDORFER
PARTICULATE KNOWLEDGE

February 10, 2010

[redacted]
Nova Scotia Power
1894 Barrington Street
Halifax, NS Canada B3J 2W5

Subject: Lingan Station Unit 1
Flow Modifications Proposal
Ref #09-3210 Rev C

Dear [redacted]

We are pleased to submit the following proposal for the ESP flow modifications resulting from scope optimization recommendations learned from Unit 2 installation, and from additional Physical Modeling done for your Lingan precipitators.

The tables below summarize the results that we have produced during various periods of this flow modeling effort:

Table 1: Inlet Plane Results

Description	Baseline	Original Solution (7/09)	Modified Solution (1/10) (Inlet Mods. Only)
RMS % Standard Deviation	38%	16%	20%
% of Points below 115%	66%	85%	77%
% of Points below 140%	85%	99%	99%

Table 2: Outlet Plane Results

Description	Baseline	Original Solution (7/09)	Modified Solution (1/10) (Inlet Mods. Only)
RMS % Standard Deviation	22%	13%	15%
% of Points below 115%	75%	95%	91%
% of Points below 140%	99%	100%	100%

Under the current configuration, the Inlet Plane results for our "Modified Solution" *do not* meet ICAC Standards. ICAC states that 85 % of points must be below 115% of the average.

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NOTE: ICAC Standards do not include RMS % Standard Deviations. This is something we use as one of the inputs for the performance model. Our goals are generally to get the inlet RMS % below 15% and the outlet below 12%.

Using the constraints that you have outlined, and the modeling that we have completed, we would be able to guarantee results that match what we have tested. Our future intent is to perform some additional modeling in order to improve the results and provide a guarantee that is within ICAC standards at a reduced RMS %.

Scope of ESP Flow Modifications Unit 1

1. Add turning vanes in the inlet duct elbow.
2. Add Inlet perforated screen, and move it 12 inches upstream from that used previously on Unit 2.
3. Add perforated screen on the inlet of the ESP (downstream)
4. Add Horizontal and Vertical Straighteners between first 2 Perforated plates
5. Add inlet Egg Crate distribution device
6. Add Hopper Baffles
7. Inlet perforated plate rappers
8. No change to ESP Outlet Nozzle, existing vertical strips to remain.
9. Revised installation drawings of flow devices and materials supplied
10. Final Modeling Report to be provided for Unit 1.
    This report will also include additional recommendations for improving flow distribution at the bottom of Unit 2. – Confirm installation and re-test first.

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Pricing

The following prices are for materials, and installation supervision for one Unit. All pricing is in US dollars.

Recommendation	Pricing
Flow Modeling & Report	[redacted]
Inlet Turning Vanes	[redacted]
Inlet Perforated Screen #1	[redacted]
Inlet Perforated Screen #2	[redacted]
Hopper Baffles	[redacted]
Inlet Egg Crate	[redacted]
Horizontal and Vertical Straighteners	[redacted]
Additional Modifications Inlet Turning Vanes & Hopper Baffle adders	[redacted]
Engineering Services (Modeling) **Total Materials** **Neundorfer Supervision T&M Rates apply** **Total Project (labor not included)**	[redacted] (1) (3)

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Fossil Power Systems Inc.
Commercial & Technical
Proposal Number 10x17 Rev.0
For
Lingan Generating Station
Fly Ash Hopper Reinstatement Project Hardware & Engineering Supply

Pre-Collection Hoppers

Attention [redacted]
Nova Scotia Power, Lingan GS
New Waterford, Nova Scotia, Canada,
[redacted]

March 9th 2010
Prepared By: [redacted]

Fossil Power Systems Inc. 10 Mosher Drive Dartmouth, Nova Scotia, Canada B3B 1N5
Bus. 1-902-468-2743 Fax. 1-902-468-2323 Email. Sales@Fossil.ca www.Fossil.ca

The following proposal is being submitted to Nova Scotia Power, Lingan Generating Station based on telephone and email discussions between [redacted] and me.

The proposal is submitted for the purpose of supplying, engineering service and Allen Bradley I/O hardware necessary for the fly ash hopper reinstatement project at the Lingan Power Station for Unit 1. All of the individual items offered will be detailed throughout this proposal.

The proposal is subject to the attached "FPS Terms and Conditions" and the "FPS Warranty" documents.

Fossil Power Systems Inc. (FPS) is a Canadian company that has been supplying system hardware/software and services to international customers for more than 25 years. By providing exceptional expertise and technical knowledge Fossil has become a trusted world class leader in the supply of control solutions and instrumentation for electrical utilities, pulp and paper processing plants, petro-chemical facilities, agricultural research facilities and food processing plants. Our outstanding customer service and industry knowledge distinguish Fossil as a leader in the industry. Fossil is highly active in the research and development of new and existing products. A dedicated team of professionals are constantly working towards innovative solutions. This approach has allowed Fossil to continually refine our product line, and develop new products as we focus on the future.

All FPS products are fully engineered and assembled at our headquarters in Nova Scotia, Canada. This 35,000 square foot facility has in house capabilities for electronics fabrication, system fabrication and check-out, CNC machining, welding, and product assembly. FPS believes in sourcing Canadian content materials whenever possible for use in our products. The manufacturing facility maintains a full CSA (Canadian Standards Association) certification.

Fossil Power Systems Inc. wishes to thank Nova Scotia Power, Lingan Generating Station for the opportunity to submit this proposal and to assure both companies that should this Proposal result in a Contract, the Contract will be executed in accordance with industry standards of good engineering practice and fabricated and delivered in a timely manner. Points of contact for questions and/or additional information are as follows:

Fossil Power Systems Inc. [redacted] - Controls System Engineer
[redacted]
Fax: 1 902 468 2323
[redacted]

SECTION 1 – ALLEN BRADLEY I/O HARDWARE SUPPLY

The following equipment will be supplied as part of this contract:

1) Quantity of two (2) Allen Bradley 8pt 120VAC Digital input cards (1771-IA2).Utilized for monitoring the reinstated hoppers and the associated segregation valve.
2) Quantity of one (1) Allen Bradley 8pt 120VAC Digital Output card (1771-OA). Utilized for initiating open/close for the reinstated valves.
3) I/O cards detailed in 1 and 2 wired to terminals supplied on DIN rail.

SECTION 2 –ENGINEERING SERVICES

The following engineering services and deliverables will be supplied as part of this contract:

1) Wiring drawings for the additional I/O cards for the new hoppers and the associated segregation valve. Information is required from site as to the current rack layout including card types and rack and slot IO card assignment.
2) Graphics and database modifications to animate and control the additional I/O added as part of this project.
3) Programming changes in the PLC to control the reinstated hoppers.

SECTION 3 –COMMISSIONING SUPPORT

The commissioning services will be supplied as part of this contract:

1) Travel and Expenses to site based on one day of travel and two days at site for commissioning.
2) Implementation of the modified graphics and database modifications to animate and control the additional I/O added as part of this project.
3) Site Commissioning services.

All pricing is in Canadian Dollars and all products are FOB FPS Factory Nova Scotia, Canada. Payment is [redacted].

Project Price: [redacted] (5)

Which Includes:

Allen Bradley Equipment: [redacted]
Engineering Service:

Commissioning Support: [redacted]

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Generation Responses

Request IR-G17:

With respect to page 42, CI# 36902, L1N1 - ESP Gas Flow Modification, and page 48, CI# 30954, LIN 3 ESP Gas Flow Modification.

a) Please provide copies of correspondence, studies and reports that require this work be done in 2010.

b) For L1N3, why is the expenditure forecast over 2 years? The description indicates that a planned maintenance outage in the Spring 2010 is long enough for the project to be completed. Also, please clarify why the Unit 2 outage is relevant to this project.

c) Provide a breakdown of the estimated $1,500,000 cost for L1N1 and $1,473,990 for L1N3.

Response IR-G17:

a) This project is a continuation of the Electrostatic Precipitator (ESP) flow modification program, which started with the Lingan Unit #2 project (CI# 38442) in 2009. All of the reports filed under CI# 38442 are applicable to this project. These reports were filed with the Board on February 1, 2010 in response to IRs pertaining to CI# 38442.

b) The duration of the 2010 LIN 3 outage is two weeks, which is not long enough for the installation to be completed. The LIN 3 project is now scheduled to start with the procurement of materials in 2010 and installation to follow in 2011. It was an oversight by NSPI to state the planned maintenance outage in the Spring of 2010 was long enough for the project to be completed. The reference to the Unit #2 outage is not relevant to this project as this was an oversight as well.

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Response IR-G17: (cont'd)

c) CI# 30954 – LIN 3:

Materials - [redacted]

Regular Labour - $110,000

Power Production Contracts - [redacted]

Expenses (Travel / Meals) - $22,000

Interest / AO - $95,145

CI 36902 – LIN1

Materials - [redacted]

Regular Labour - $110,000

Power Production Contracts - [redacted]

Expenses (Travel / Meals) - $22,000

Interest / AO - $104,555

To protect value for customers and mitigate the risk of prospective proponents having access to project budget information, the estimated costs for materials and power production contracts are confidential. All purchase orders and contracts for supply of materials and installation have not yet been issued or finalized.

The more a supplier is aware of NSPI's specific requirements, the better their ability to obtain the highest price, reduce competition and ultimately increase the cost for NSPI and its customers. The cost of such transparency is not always immediately evident. Information from regulatory proceedings can provide competitive advantages over other suppliers, and that could be advantageous in bidding or negotiation. Higher prices, or avoidable contractual constraints, will result in unnecessary higher costs to customers.