



Attachment B: Updated Assessment of the Net Economic Benefits of the Proposed Fishermen's Atlantic City Windfarm

Prepared for the New Jersey Division of Rate Counsel,
Docket No. EO11050314V
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Executive Summary

- This filing represents the second attempt by Fishermens' Atlantic City Windfarm ("FACW") to attain approval for a proposed offshore wind farm.
- FACW is proposing to utilize **five (5) MW "direct drive" turbines** for its 25 MW offshore wind project. The direct drive turbines will be supplied by Xiangtan Electric Manufacturing Group, Ltd ("XEMC"). **XEMC only has two prototype operational direct drive turbines.**
- XEMC New Energy is owned primarily by XEMC Group, a company that is primarily owned by a provincial government entity that is part of the Peoples' Republic of China.
- The project will be [redacted] percent debt financed and [redacted] percent equity financed. XEMC will also be a major financial partner owning [redacted] percent of the project.
- FACW is proposed to be located 2.8 miles offshore.
- The FACW project is anticipated to cost **$[redacted] million**, or **$[redacted] per kW**. FACW's proposed cost per installed kW is considerably higher than other offshore wind projects constructed and operational in Europe.
- FACW's proposed cost per kW is also higher than any other proposed U.S. offshore wind projects.
- If developed, FACW will likely be the third most expensive offshore wind farm, on a cost per kW basis, of any in the world.
- FACW is currently requesting ratepayer financial support of some **$[redacted] per offshore renewable energy credit ("OREC")**. The amount will increase by [redacted] percent per year and have a termination value of $[redacted] per OREC.
- The net present value ("NPV") of the anticipated stream of ratepayer financial support for the project is estimated to be **$[redacted] million**.

Executive Summary (continued)

- The net economic impacts associated with the proposed FACW project can be estimated by comparing the negative economic impacts associated with the rate increase needed to financially support the project and the positive construction-related economic impacts and other benefits created by the offshore facility.
- The FACW project is estimated to **impose over $208 million in rate increases** to New Jersey ratepayers in NPV terms.
- This rate increase will result in a **$286 million NPV reduction in New Jersey economic output**, a cumulative reduction of some **9,263 job-years**, a **$169 million NPV reduction in New Jersey labor income**, and a **$239 million NPV reduction in other value added** components of the economy.
- The construction and operation of the FACW project is estimated to generate over **$154 million NPV increase in New Jersey economic output**, a cumulative increase of some **1,154 job-years**, a **$57 million NPV increase in New Jersey labor income**, and a **$93 million NPV increase in other value added** components of the economy.
- **Overall, the FACW project is estimated to result in negative net economic impacts**. In other words, the estimated costs associated with the proposed FACW project are greater than its estimated benefits.
- The FACW project is estimated to result in a **$132 million NPV reduction in New Jersey economic output**, a cumulative reduction of **some 8,109 job-years**, a **$113 million NPV reduction in New Jersey labor income**, and a **$147 million NPV reduction in other value added** components of the economy.

Summary of Primary Recommendation

The FACW project should not be approved and its proposed OREC plan should be rejected because **neither are in the public interest** and do not meet the statutory requirements of the OSWEDA (N.J.S.A. 48:3-87 et seq.) since the project, and its proposed OREC prices, **do not result in a net economic benefit** to New Jersey ratepayers and will likely lead to a **negative net economic impact of over $132 million in NPV terms**.

Summary of Additional Recommendations & Conclusions

The FACW project also leaves open a number of unanswered questions including:

1) FACW is proposing to use a relatively new turbine vendor and technology for this project:

   a. FACW has not provided any evidence that the direct drive technology will result in lower overall project costs and OREC prices, relative to a gearbox technology.

   b. There appears to be no price discount by the vendor to compensate or serve as an offset for its relatively new technology or lack of experience in Western renewable energy markets.

   c. Share prices for XEMC, the Company's vendor and financial partner, have shown a number dramatic and consistently downward movements over the past 18 months comparable to other Chinese wind manufacturing companies.

   d. U.S.-Chinese trade relationships for renewable energy manufacturing have become increasingly constrained. The U.S. Department of Commerce ("USDOC") has opened a number of investigations on this matter leading to negative final or preliminary findings. To date, XEMC has not been specifically identified by the USDOC as a company engaging in questionable anticompetitive trade practices.

Summary of Additional Recommendations and Conclusions (Continued)

2) At $[redacted]/kW, FACW's proposed project is more expensive, on a per kW basis, than most completed wind projects in Europe. FACW's proposal is also between $[redacted]/kW to $[redacted]/kW more expensive than four proposed U.S. wind projects. If approved, FACW will be the fourth most expensive OSW project in the world.

3) FACW's OREC proposal is too high and not competitive with other proposed U.S OSW projects.

4) FACW has not been able to provide specific details on how its project will be financed. Based upon the information currently available, it appears the FACW project will be heavily debt-financed.

5) To date, FACW has not provided a complete set of translated financial statements.

6) If approved, the FACW project will impose unreasonable rate impacts on ratepayers. The rate impact analysis included in FACW's application overstates various offsets to its proposed OREC costs and understates the negative impact this proposal could have on ratepayers.

7) FACW's net economic benefit results are flawed and unreasonable and based upon: (a) over-estimated in-state expenditures; (b) over-estimated impacts per dollar investment and/or under-estimates of the negative consequences of project rate impacts; and (c) the inclusion of several questionable benefits that are not known and measurable with any degree of certainty.

1. Summary of Proposal

Project at a Glance

- In May 2012, Fishermen's Atlantic City Windfarm, LLC ("FACW" or "the project") submitted an Amended Application to the New Jersey Board of Public Utilities requesting permission to build a state waters offshore windfarm project.[1]
- FACW proposes to use five (5) 5 MW offshore wind turbine generators for a total project capacity of 25 MW.[2]
- The turbines will be supplied by Xiangtan Electric Manufacturing Group, Ltd ("XEMC"). [3]
- The project will be built in state waters, approximately 2.8 miles east of the coastline of Atlantic City, New Jersey. [4]
- The project is expected to cost $[redacted] million and FACW is requesting ratepayer financial support at a starting rate of $[redacted] per offshore renewable energy credit ("OREC"). [5] The OREC price will escalate at an annual rate of [redacted] percent. [6]
- The net present value of the anticipated stream of ratepayer financial support for the project is estimated to be $[redacted] million.

Source: [1]Amended Application, p. 1-2; [2]Amended Application, Testimony Exhibit 3, p. 3; [3]Staff Letter to FACW, July 13, 2012; [4]Amended Application, p. 2; [5]Amended Application, p. 2; and Amended Application, Testimony Exhibit 9, p. 5; and [6]Amended Application, Testimony Exhibit 9, p. 5.

Offshore Project Location

The project is proposed to be developed in New Jersey state waters, within 2.8 miles of the coast. The project will be visible from the beaches of Atlantic City. In fact, an increase in tourism associated with viewing the project has been claimed by the developers as a major economic benefit.

Source:
Verified Petition, February 9, 2011, Appendix 1, Attachment 1a.

Total Project Cost and Capital Expenditure Profile

The FACW project is currently expected to cost $[redacted] million.

The installed cost for the project is estimated to be $[redacted] per kW of capacity.

The project levelized cost is $[redacted] per MWh generated.

Almost [redacted] percent of the project's development expenditures are associated with capital investments in the turbine, equipment and installation.

Development costs (engineering, interconnection, insurance) comprise [redacted] percent, while "other" costs such as contingencies and unidentified "Other project costs" comprise almost [redacted] percent.

		Cost ($)	Percent of Total (%)
Construction Costs	$	[redacted]	[redacted]%
Construction related costs	$	[redacted]	[redacted]%
Other costs	$	[redacted]	[redacted]%
Total Cost	**$**	[redacted]	**100.0%**
Total Cost ($/kW)	**$**	[redacted]	
Total Cost ($/MWh)[1]	**$**	[redacted]	

Source: Amended Application, Testimony Exhibit 4, p. 26; and Amended Application, Testimony Exhibit 4, MM Report.

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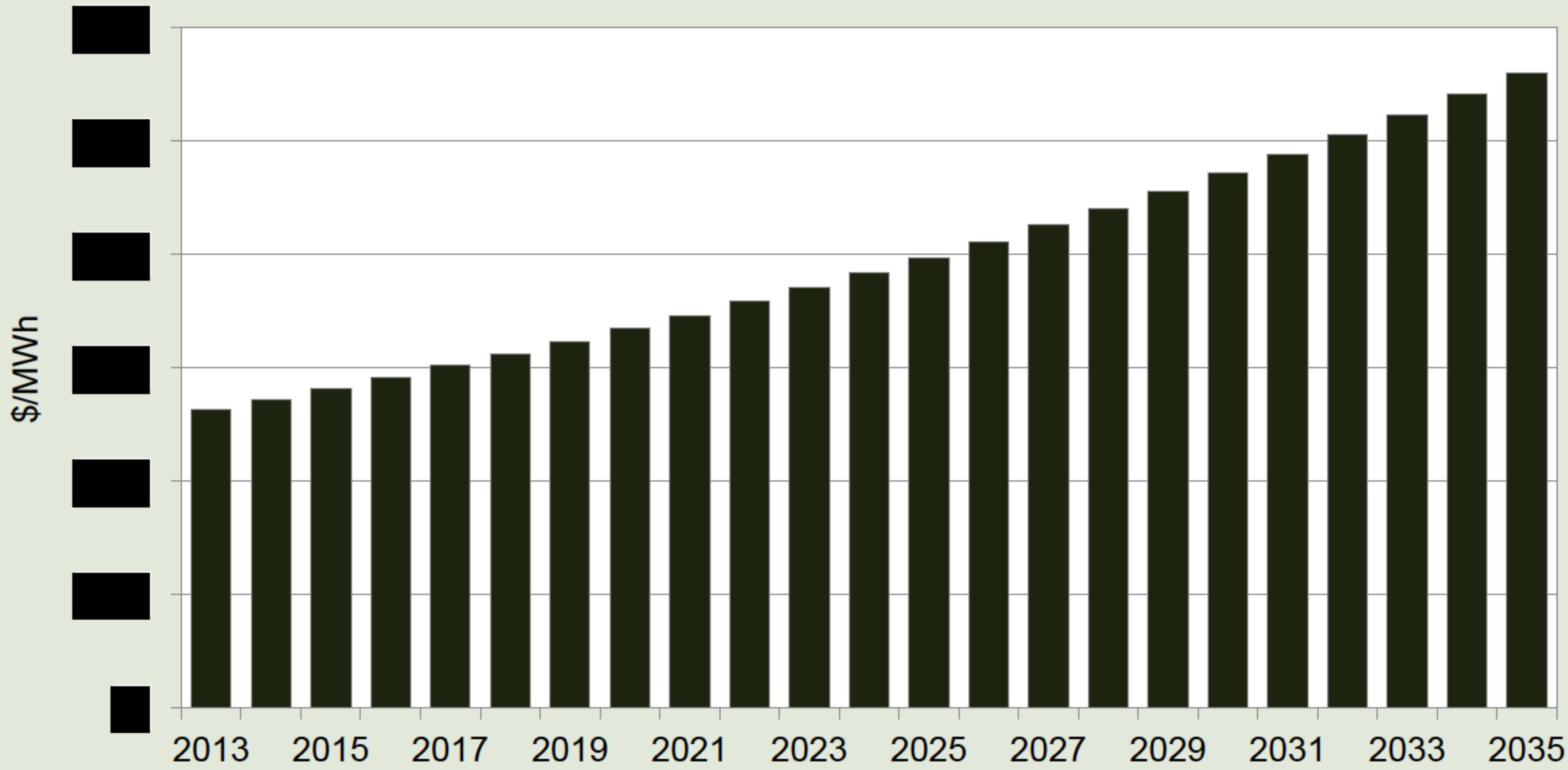
1. Summary of Proposal

Current OREC Proposal, Price

FACW is requesting financial support from an OREC starting at $[redacted] per MWh in 2013, increasing by [redacted] percent per year to $[redacted] per MWh in 2035.



Source: Amended Application, Appendix D, Optimized Project C-B Analysis.xlsx.

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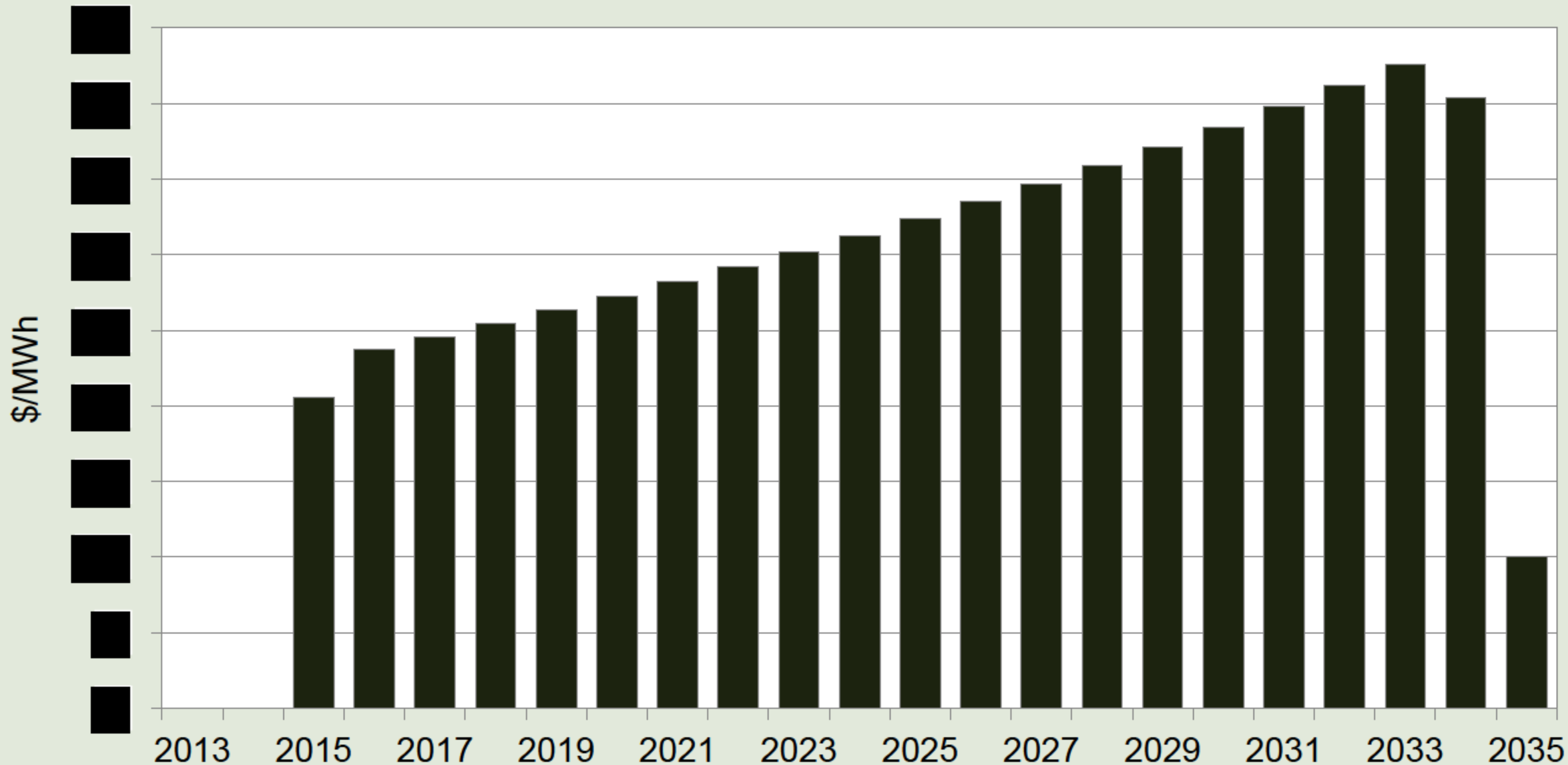
Current OREC Proposal, Proposed Project Revenues

FACW's proposed OREC pricing will generate between $[redacted] million to over $[redacted] million in annual project revenues over the next twenty years. Total revenues collected under the current proposal will amount to over $[redacted] million, or $[redacted] million on an NPV basis.[1]



Note: [1]The Net Present Value ("NPV") calculation discounts a future stream of dollars to compare the value of a dollar today to the value of that same dollar in the future. The discount rate used is 8.37 percent.

Source: Amended Application, Appendix D, Optimized Project C-B Analysis.xlsx.

Current and Previous FACW Proposals, Capital Cost

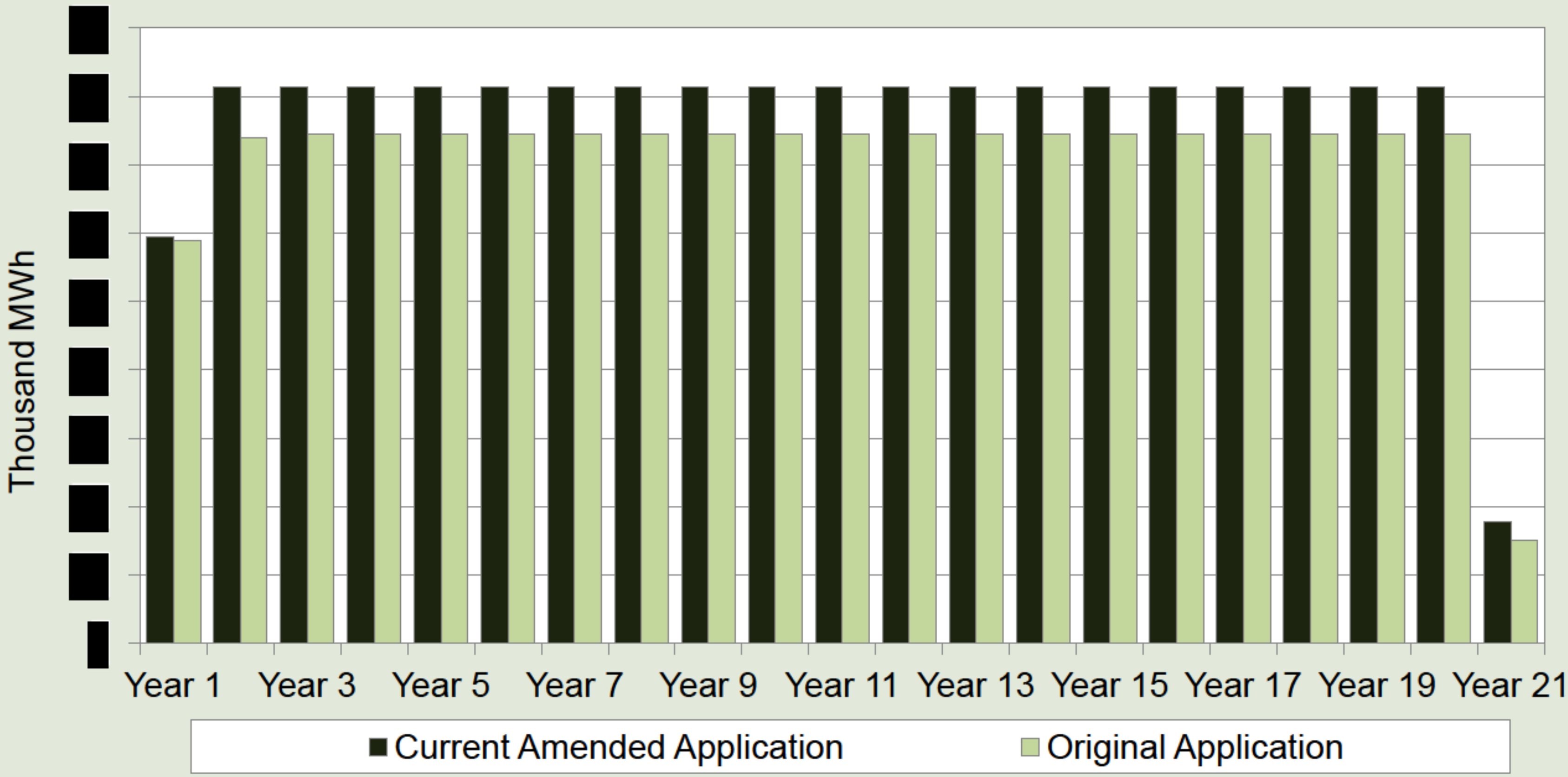
FACW's proposed project capital cost in its current Amended Application is [redacted] percent less than the capital cost in its original application.

	Current Amended Application		Original Application	
	Cost ($)	Percent of Total (%)	Cost ($)	Percent of Total (%)
Construction Costs	[redacted]			
Construction related costs				
Other costs				
Total Cost				
Total Cost ($/kW)				
Total Cost ($/MWh)[1]				

Source: Amended Application, Appendix D, Optimized Project C-B Analysis.xlsx;
Petition Supplement No. 1, June 8, 2011, Table 11.x.1; and Response to data request RCR-PF-3.

Current and Previous FACW Proposals, Project Output

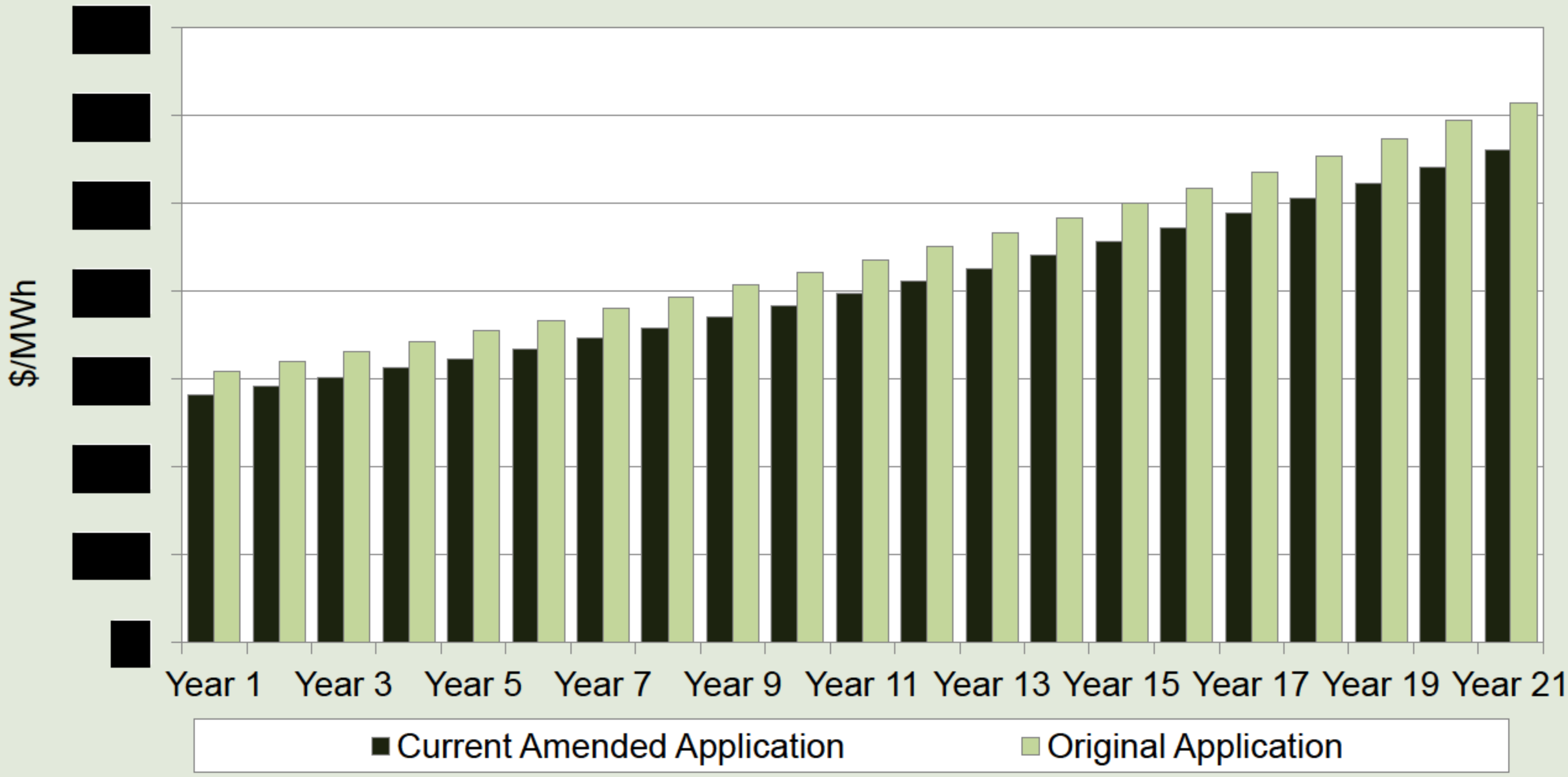
FACW's proposed project output is about [redacted] percent greater in its current Amended Application than the proposed project output of its original application.



Source: Amended Application, Appendix D, Optimized Project C-B Analysis.xlsx; and Response to data request RCR-PF-10.

Current and Previous FACW Proposals, OREC Prices

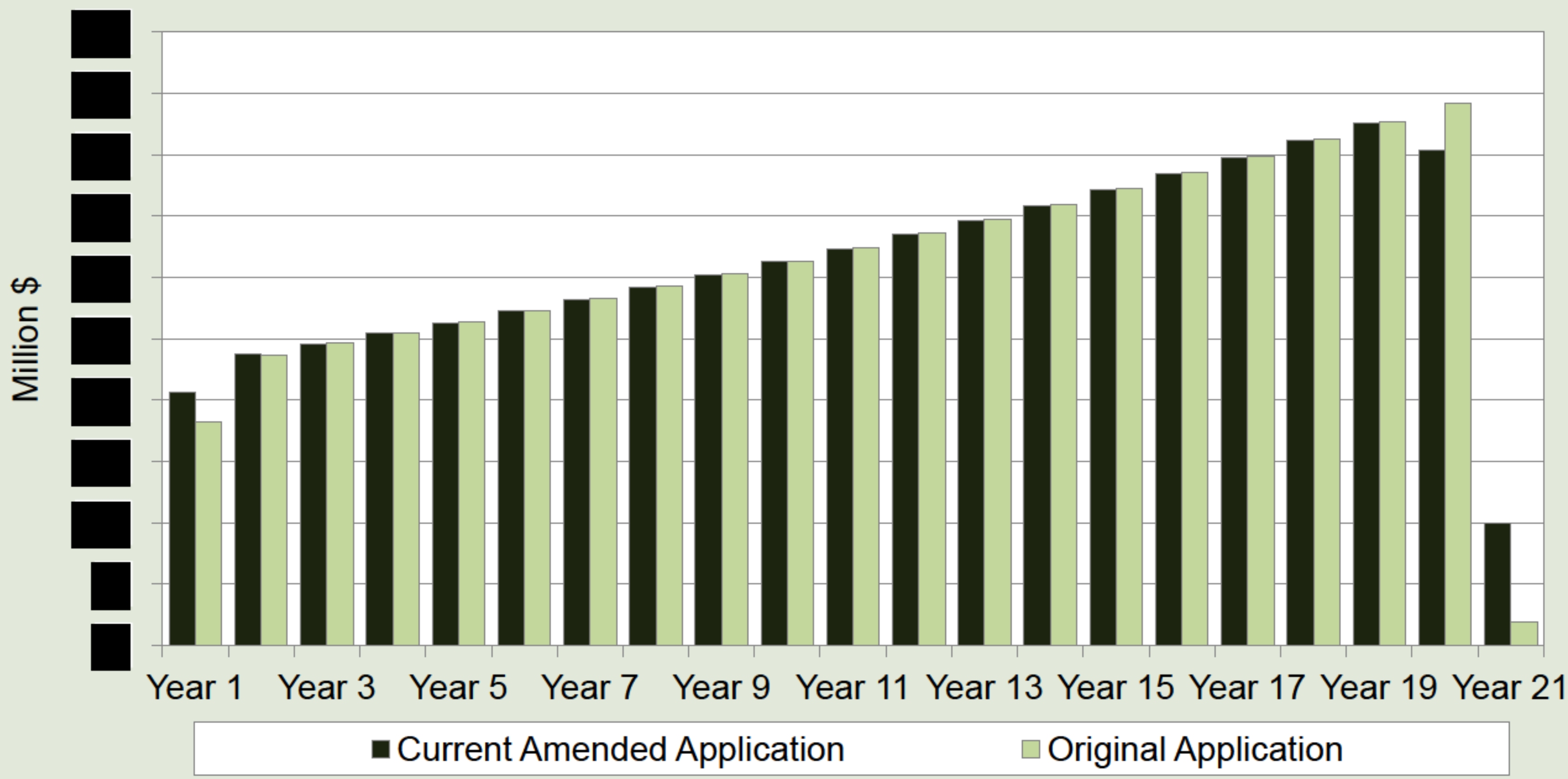
FACW's proposed OREC prices are about [redacted] percent less in its current Amended Application than the proposed OREC prices of its original application.



Source: Amended Application, Appendix D, Optimized Project C-B Analysis.xlsx; and Response to data request RCR-PF-10.

Current and Previous FACW Proposals, Project Revenues

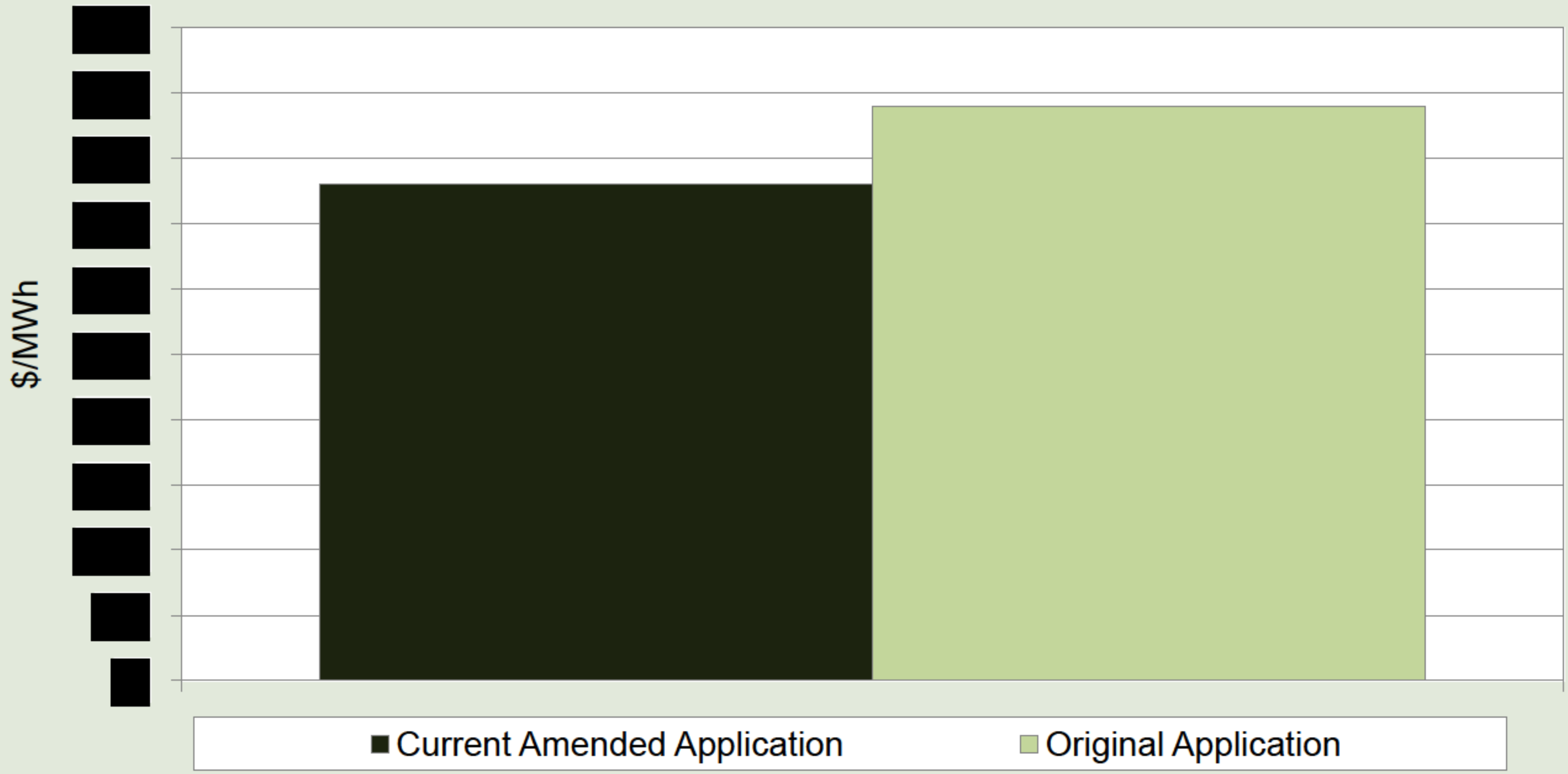
FACW's proposed OREC revenues differ by less than [redacted] percent between its current Amended Application and its original application.



Source: Amended Application, Appendix D, Optimized Project C-B Analysis.xlsx; and Response to data request RCR-PF-10.

Current and Previous FACW Proposals, Levelized Cost

OREC revenues are comparable between the two applications since the proposed OREC price decrease is made up by increased project generation included in the current application.



Source: Amended Application, Appendix D, Optimized Project C-B Analysis.xlsx; and Response to data request RCR-PF-3 and RCR-PF-10.

Timeline of FACW Project Delivery Schedule

	2009				2010				2011				2012				2013				2014			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Project Implementation		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Wind Resource Data						■	■	■	■	■	■													
OREC							■	■	■	■	■	■	■	■	■	■								
Permitting		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■							
Financing										■	■	■	■	■	■	■								
Front End Engineering						■	■	■	■	■	■	■	■	■	■	■	■							
Engineer										■	■	■	■	■	■	■	■	■						
PROCURE			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Foundation Engineering														■	■	■	■	■						
Foundation Fabrication																	■	■	■	■				
Turbines														■	■	■	■	■						
Tower Fabrication & Supply															■	■	■	■	■					
Turbine Blades																	■	■	■					
WTG Head Assembly																	■	■	■	■	■			
Cables																	■	■	■					
Substation Design													■	■	■	■	■	■	■					
Project Certification			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
CONSTRUCTION																	■	■	■	■	■	■	■	
Laydown Yards in AC																			■	■	■	■	■	
Civil Construction																			■	■	■			
Substation Construction																	■	■	■	■	■			
Operations Center																	■	■	■					
SCADA/Communications																			■	■	■			
Marine Construction																						■		
Commissioning / Start-Up																						■	■	
Reporting and Final Acceptance																							■	■

Source: Amended Application, Appendix A, Exhibit F, Project Implementation Plan.

FACW Filing Timeline – June 1, 2012 to present

June 2012

Jun-1: FACW files Amended Application, with proposals for two different turbine technologies and vendors.

Jun-12: FACW files replacement exhibits to Amended Application.

Jun-19 to 22: Rate Counsel submits data requests RCR PF2-1 through RCR PF2-109, responses expected July 3, 2012.

Jun-25: Staff letter requesting FACW to choose one turbine technology/vendor.

Jun-27: Prehearing teleconference to set procedural schedule.

July 2012

Jul-3: FACW letter to Staff declining to choose turbine technology/vendor.

Jul-3: FACW letter to Rate Counsel requiring additional time to respond to discovery.

Jul-13: Staff letter determining XEMC as turbine technology/vendor.

Jul-19: FACW responds to Rate Counsel data requests RCR PF2-1 through RCR PF2-57.

Jul-31: FACW responds to Rate Counsel data requests RCR PF2-58 through RCR PF2-109.

August 2012

Aug-13: FACW requests extension in review period to reassess its Application.

Aug-17: FACW seeks an "up to thirty 30 day suspension of the current review."

Aug-28: Board order suspending procedural schedule.

FACW Filing Timeline – June 1, 2012 to present (continued)

Sept 2012

- Sep-17: FACW files letter stating it is ready to proceed and commits to provide documentation from PriceWaterhouse regarding the financial standing of XEMC.
- Sep-20: Status conference to amend procedural schedule; FACW commits to providing PriceWaterhouse documentation by October 1, 2012.
- *Sep-25: FACW informs Staff it will need until October 25 to provide PriceWaterhouse documentation.*

Oct 2012

- Oct-18: FACW submits PriceWaterhouse documentation (much of which is in Chinese).

Nov 2012

2. Project Developers and Equipment Vendors
   a. Technology Selection
   b. Vendor Selection

2. Project Developers and Equipment Vendors

a. Technology Selection

Overview: FACW considered both gearbox (Siemens) and direct drive (XEMC) technologies. Each have their corresponding costs and benefits. Worldwide, the Siemens turbine is the most common offshore turbine.[1] FACW, however, proposes to use the XEMC direct drive turbine, even though it has currently been utilized in only two applications.[2]

Source:
[1] Amended Application, Testimony Exhibit 3, p. 15.
[2] Amended Application, Testimony Exhibit 3, p. 16; and http://www.xemc-darwind.com/.

Project Capacity and Technology

- In its Amended Application, FACW proposed two different turbines: the Siemens SWT 3.6-120; and the XEMC D115-5MW. [1]
- Gearbox-based wind turbines are the most common technology used for offshore wind applications and have lower installed cost per kW. [2] Direct drive turbines are a newer technology, and are generally considered to be more expensive on an installed cost per kW, but are thought to have lower lifetime maintenance costs.[3]
- For instance, direct drive turbines are reported to have 15 to 20 percent higher capital costs than gearbox installations and produce about four percent less in average generation output. [4]

Source:
[1] Amended Application, Testimony Exhibit 3, p. 3.
[2] Amended Application, Testimony Exhibit 3, p. 15.
[3] World Wind Energy Association, "An Example for a Direct Drive System." Web. 9 December 2012.
[4] Patel, Prachi. "GE Grabs Gearless Wind Turbines." *Technology Review*. MIT, 23 Sept. 2009. Web. 13 November 2012. <http://www.technologyreview.com/energy/23517/>.

Project Capacity and Technology

- Maintenance cost differences are reportedly attributed to a large number of moving pieces in gearboxes that are not found in direct drives. Individual component failures can lead to failures in the entire gearbox, resulting in a complete turbine shutdown. Use of direct drives, on the other hand, cut downtime and repair costs which makes turbines more reliable.[1]
- A larger number of moving parts can lead to higher maintenance costs, especially in off-shore areas where wind gusts and speeds are substantially higher than on-shore turbines. These cost differentials can be important in hard to access, and more difficult offshore marine environments.[1]
- GE is currently developing a hybrid solution called the "IntegraDrive"[2] that is projected to be less expensive than a direct drive but has lower maintenance costs than the gearbox-based turbines. While FACW has considered GE technologies for its proposed project, it does not appear to have discussed the potential for alternatives like the IntegraDrive design.

Source:
[1] Patel, Prachi. "GE Grabs Gearless Wind Turbines" *Technology Review.* 23 Sept. 2009. <http://www.technologyreview.com/news/415425/ge-grabs-gearless-wind-turbines/>.
[2] Larsen, Kari. "Making Wind More Efficient?" *Renewable Energy Focus*. 1 Dec. 2008. Web. 13 November 2012. <http://www.renewableenergyfocus.com/view/3271/making-wind-more-efficient-/>.

Conclusions: Technology Selection

- It is not uncommon, in the regulatory review of a proposed generation technology, to assess the net present value revenue requirement of each technology, taking into account capital, O&M, and fuel costs, among other considerations.
- For instance, in assessing the relative merits of a natural gas fired generator, as opposed to a coal unit, a utility is likely to examine the NPV costs of both technologies taking into account a wide range of objective, and often subjective, factors as well as a wide range of sensitivities impacting those outcomes.
- FACW has provided no comparable analysis of the direct drive technologies to the gearbox technologies.

2. Project Developers and Equipment Vendors

b. Vendor Selection

Overview: FACW has selected a 5 MW direct drive technology manufactured by XEMC.

XEMC is relatively new to both offshore wind development and the manufacturing of direct drive offshore wind turbines. FACW has not shown that the risk associated with using a relatively new technology and vendor has been offset with any corresponding cost discount or other compensating offset.

Vendor Selection Process and Rationale

- In its Amended Application, filed on June 1, 2012, FACW proposed two different turbines: the Siemens SWT 3.6-120; and the XEMC D115-5MW. [1]
- On June 25, 2012, Staff requested FACW to choose a turbine technology/vendor.[2] FACW responded on July 3, 2012 stating that it had no obligation to do so. [3]
- On July 13, 2012, Staff determined that FACW's selected turbine technology/vendor would be XEMC. [4]
- According to the XEMC-Darwind website just two prototypes of the XEMC offshore turbine, the XD115 have been installed: one in the Netherlands, and one in China.[5]
- FACW will use the same XD115.[6]

Source:
[1] Amended Application, Testimony Exhibit 3, p. 3.
[2] Staff Letter to XEMC, June 25, 2012.
[3] FACW Letter to Mr. Gertsman, July 3, 2012.
[4] Staff Letter to XEMC, July 13, 2012.
[5] XEMC Darwind. Web. 13 November 2012. <http://www.xemc-darwind.com/index.php/solutions/offshore.html>.
[6] Amended Application, Testimony Exhibit 3, p. 3

XEMC XD115 Specs

XD115 Specifications

Operational data

- Cut in wind speed: 4 m/s
- Cut out wind speed: 25 m/s
- Rated wind speed: 12 m/s

Turbine

- Rotor diameter: 115 meters
- Speed (rpm): Variable 9-18
- Blade material: Glass fiber, reinforced epoxy

Weight

- Rotor (hub + blades): 97 tons
- Generator: 137 tons
- Nacelle: 47 tons
- Total top mass: 281 tons

Source: "Close up -- XEMC's XD115/5MW offshore turbine". Windpower Monthly. September 2011; and XEMC Darwind. Web. 13 November 2012. http://www.xemc-darwind.com/index.php/solutions/offshore.html.

XEMC: Overview

- XEMC is a Chinese company founded in 1936.
- It has been involved with manufacturing of equipment in China, having produced more than 1,000 products over its lifetime.[1]
- XEMC was listed publicly in July 2002 and is traded on the Shanghai Stock Exchange (SHA:600416). [2]
- Today, XEMC manufactures numerous products such as electric machinery, pumps, heavy equipment, wind generators, electric lifts, and ceramic machines. [3]
- XEMC's primary offshore turbine is based on technology formerly-owned by Darwind, a company whose former majority shareholder was Econcern. XEMC has a separate division that develops offshore wind projects called XEMC-Wind.

Source:
[1] "Corporate Introduction." *XEMC*. XEMC. Web. 07 July 2011. <http://www.xemc.com.cn/en/about/about.html>.
[2] "Xiangtan Electric Manufacturing Co.,Ltd." *Google Finance*. Web. 14 July 2011. <http://www.google.com/finance?q=SHA:600416>.
[3] "Electric machine." *XEMC*. XEMC. Web. 07 July 2011. <http://www.xemc.com.cn/en/product/productList.asp>.

Source of Financing

[redacted]

Source: Amended Application, Appendix C, p. 6.

The Evolution of XEMC's OSW Business Development: Econcern (Darwind Predecessor)

- Econcern was founded in 1984 and was based in Utrecht, Netherlands.
- Econcern was an international holding company with five operating companies all engaged in sustainable energy projects.
- It had operations all over the world: Belgium, Brazil, Bulgaria, Canada, the Czech Republic, Curaçao, Chile, China, France, the Gambia, Germany, Hong Kong, Italy, the Netherlands, Poland, Spain, Switzerland, Turkey, the United Kingdom, and the United States.
- Econcern declared bankruptcy on June 15, 2009.[1, 2]
- Prior to this bankruptcy, Econcern was the majority shareholder in Darwind, the original developer of the 5MW direct drive turbine proposed by FACW.

Source:
[1] "Econcern NV: Private Company Information." *Bloomberg Businessweek*. Web. 13 July 2011. <http://investing.businessweek.com/research/stocks/private/snapshot.asp?privcapId=10620654>.
[2] "Dutch Energy Firm Econcern Files for Receivership." *Reuters*. 26 May 2009. Web. 13 July 2011. <http://www.reuters.com/article/2009/05/26/dutch-econcern-idUSLQ23289420090526?sp=true>.

The Evolution of XEMC's OSW Business Development: Darwind Acquisition

- Darwind was founded in 2006 and was based in Utrecht, the Netherlands.
- Econcern was the majority shareholder in Darwind.
- From 2006 to 2009, Darwind developed a 5-MW direct-drive turbine now being proposed by FACW.
- The 2009 Econcern bankruptcy also placed Darwind in financial trouble.
- The Econcern bankruptcy led to XEMC's acquisition of Darwind's hardware and intellectual property,[1] starting a new company that is today known as XEMC-Darwind.[2]

Source:
[1] Vries, Eize De. "Optimism in Offshore Wind." *Renewable Energy World*. 9 Dec. 2009
[2] "Welcome to XEMC-Darwind." *XEMC Darwind*. Web. 14 July 2011. <http://www.xemc-darwind.com/>.

XEMC: Ongoing Projects

- Currently XEMC-Darwind has two prototypes of its offshore XD115 5 MW turbine running: one in the Netherlands and the other in China.[1]
- The first prototype was erected at a test site at Wieringermeer Wind Farm in the Netherlands in June 2011.[2]
- This was the first XEMC wind turbine installed in overseas areas. [3]
- The second prototype was installed in March 2012 on a coastal cape in Fuqing, Fujian province.[4]

Source:
[1] XEMC Darwind. Web. 13 November 2012. <http://www.xemc-darwind.com/index.php/solutions/offshore.html>.
[2] "The Netherlands: XEMC Darwind Completes Installation of XD115 5MW Wind Turbine." OffshoreWIND.biz. 13 November 2012. <http://www.offshorewind.biz/2011/07/01/the-netherlands-xemc-darwind-completes-installation-of-xd115-5mw-wind-turbine/>.
[3] "XEMC begins testing on 5MW offshore turbine." Wind Power Monthly. August 2011. Web. 13 November 2012. <http://www.windpowermonthly.com/news/1084569/XEMC-begins-testing-5MW-offshore-turbine/>.
[4] "China approves 50MW Fujian offshore project." Wind Power Monthly. October 2012. 13 November 2012. <http://www.windpowermonthly.com/channel/offshore_wind_power/news/1154043/China-approves-50MW-Fujian-offshore-project/>.

XEMC's U.S. Relationships: Twin Brothers' Marine

- According to *Recharge*, XEMC announced in May 2010 that it was planning to either purchase or become an equity shareholder in a steel rolling mill owned by Twin Brothers Marine in Louisiana to support a 75-turbine wind farm near Galveston Island.[1]
- There have been no other media reports regarding the status of this potential relationship.
- On July 15 2011, ACG contacted David Webster with Twin Brothers Marine Company. Mr. Webster did confirm Twin Brothers' discussions with XEMC last year, but no serious negotiations or actions ever materialized. Mr. Webster indicated that Twin Brothers had not heard from XEMC in about a year now and that there are currently no plans for a business deal with XEMC.

Source:
[1] Kessler, Richard A. "China's XEMC Reveals Plans for Louisiana Factory - Wind - Renewable Energy News - Recharge - Wind, Solar, Biomass, Wave/tidal/hydro and Geothermal." *Recharge*. 14 May 2010. Web. 07 July 2011. <http://www.rechargenews.com/energy/wind/article214822.ece>.

XEMC's U.S. Relationships: Timken

- Timken, a U.S. company in Canton, OH, entered into a joint venture with XEMC in 2010.[1]
- The construction of Timken's China facility started in January 2009. Timken is providing ultra large bore bearings to XEMC that are used in the production of wind turbines.
- Timken has built a $39 million USD plant in Xiangtan City to make these bearings.[2]

Source:

[1] "Timken-XEMC Joint Venture in China Shipping Ultra-Large Bore Bearings from Its Xiangtan, Hunan Facility." *Mfrtech*. 1 July 2010. Web. 07 July 2011. <http://www.mfrtech.com/articles/3591.html>.

[2] "Timken Xiangdian (Hunan) Bearing Co., Ltd." *XEMC*. Web. 07 July 2011. <http://www.xemc.com.cn/en/cooperation/coop_enter_timken.html>.

XEMC's U.S. Relationships: Light Engineering

- Light Engineering (LE), another U.S. company, and XEMC have also recently set up a joint venture. [1,2]
- They created a new company that is called XELE and will be located in Xiangtan, China. According to LE, this is a long-term strategic manufacturing partnership.
- XELE currently has an 80,000 square foot manufacturing facility located in XEMC's Xiangtan campus in China.[3]
- According to XEMC's website, XEMC also has a cooperation agreement with General Electric Company in the United States on 220 tons of electric wheel drive systems.[4]

Source:
[1] Johnston, Mathew. "LE and China Technology Leader Xiangtan Electric Manufacturing Corporation Form Partnership." *RedOrbit*. 11 Jan. 2011. Web. 7 July 2011. <http://www.redorbit.com/news/business/1977768/le_and_china_technology_leader_xiangtan_electric_manufacturing_corporation_form/>.
[2] "LE and China Technology Leader Xiangtan Electric Manufacturing Corporation Form Partnership." *IStockAnalyst*. 11 Jan. 2011. Web. 20 July 2011. <http://www.istockanalyst.com/article/viewiStockNews/articleid/4803333>.
[3] "Maufacturing." *LE: Powering Your Innovation*. Light Engineering, 2009. Web. 18 July 2011. <http://www.lt-eng.com/innovation/innovation-manufacturing.html>.
[4] "Successful Projects." *XEMC*. 2008. Web. 20 July 2011. <http://www.xemc.com.cn/en/cooperation/coop_ralation.html>.

XEMC's U.S. Relationships: Delaware and New Jersey

- Currently, no Chinese wind turbine vendors have plants within the United States, but plans have been announced to possibly build a facility in upcoming years.[1]
- Since 2010, XEMC has been looking to build a manufacturing plant in the United States. Originally, sites in both Louisiana and Delaware were considered.[2]
- XEMC reportedly signed an agreement with the State of Delaware in 2011 with provisional plans to set up a turbine factory. However, construction of the plant will only commence if there are enough orders. Reports indicate that the first turbines for any new U.S. OSW installations would initially be shipped from XEMC's Chinese plant.[3]
- More recently, New Jersey has been mentioned as a potential site for XEMC's future plant. [4]

Source:
[1] Kessler, Richard A. "XEMC remains keen on US offshore wind turbine factory." *Recharge*. October 14, 2012.
[2] Ibid.
[3] "Financial muscle is helping propel XEMC's overseas expansion." Recharge. February 17, 2012.
[4] Kessler, Richard A. "XEMC remains keen on US offshore wind turbine factory." *Recharge*. October 14, 2012.

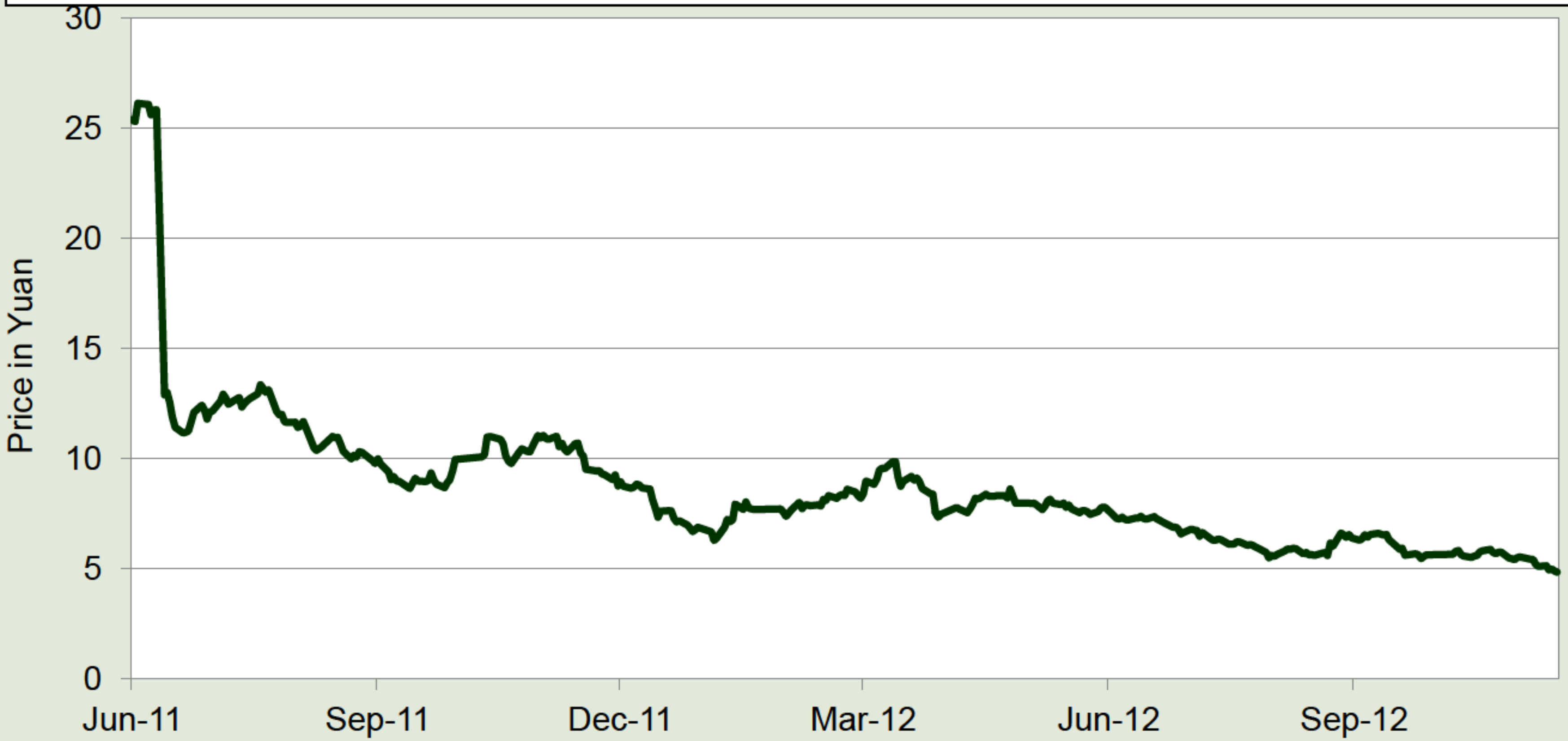
XEMC Share Prices

XEMC's share prices experienced substantial growth from early 2009 to about early spring, 2011. The Company's share prices fell dramatically in June, 2011 and have not rebounded to their prior levels. XEMC's reported share prices have continued to fall since about July, 2011.

Source:
Google Finance.

XEMC Share Prices (2011 to current)

In after-hour trading of June 10-13, 2011, the XEMC stock price went from 25.85 Yuan to 12.90 Yuan. This is almost a 50 percent loss in value over the weekend. XEMC has paid a dividend by the end of June each year for the last eight years, but did not do so in 2011. XEMC's currently reported share prices are about half their summer 2011 level.



Source:
Google Finance.

Public Reports on XEMC Share Price Decreases

- On November 8, 2008, XEMC announced that due to shortage of cash, it would give up the priority purchase right to buy the 27 percent interest of XEMC Windpower Co., Ltd, which was sold out by the Japanese Philip Nissan. This news was reported to have surprised many investors.
- XEMC had a non-public offering on June 2, 2011.
- Reporting services noted that an important investor, Dongfeng (East Wind) Assets, did not inject capital into XEMC as expected.
- Reporting services noted that during May and June 2011, four out of five institution investors dumped their stock holdings after finding that the major stockholder is intensifying its efforts to empty XEMC.

Source:
Google Finance.

FACW Explanation for XEMC Share Price Decrease

- FACW notes that:

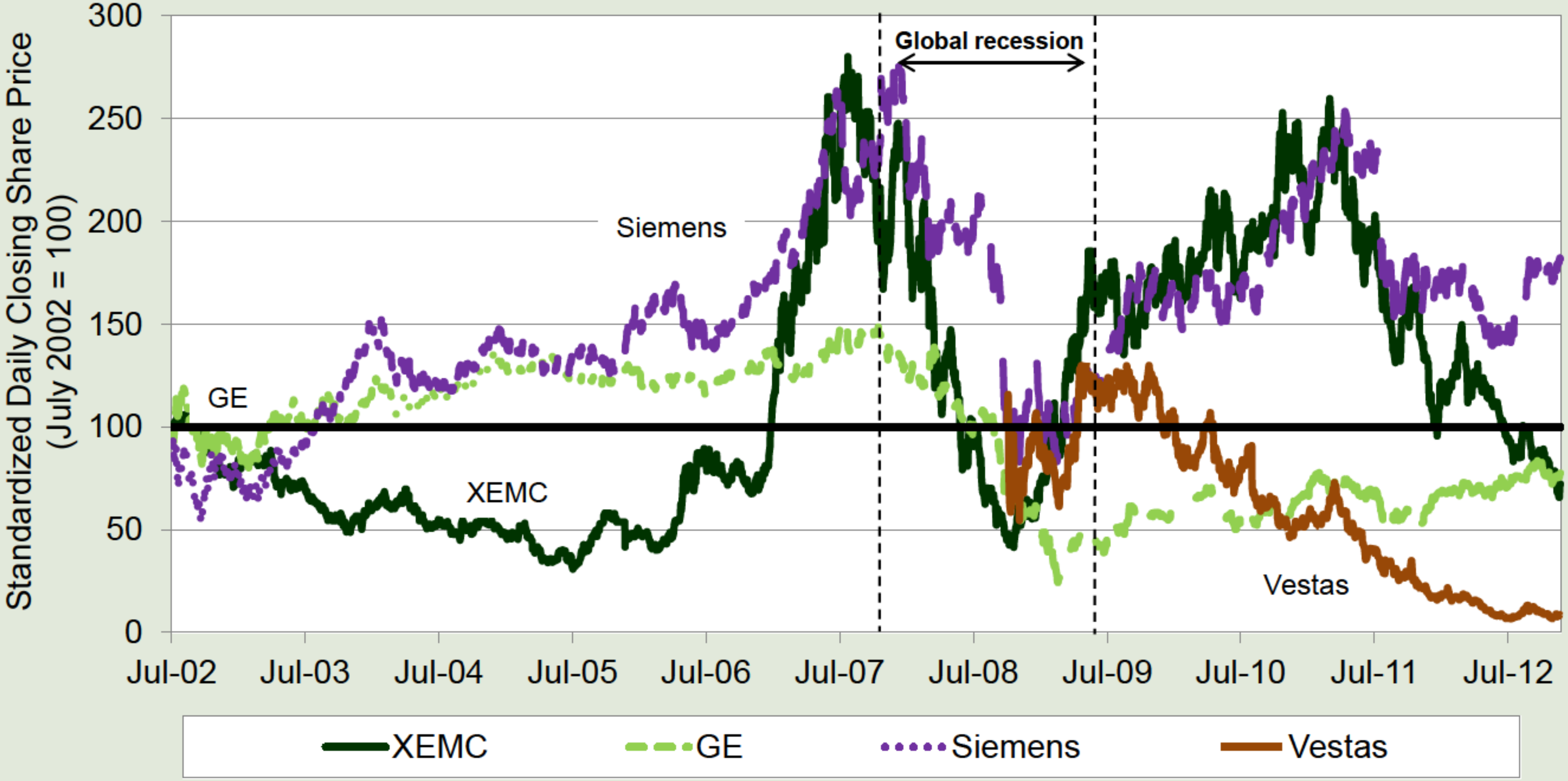
  [redacted][1]

- Further research suggests that XEMC did issue new shares.
- It is not clear however, if the issuance of new shares was the only factor leading to the decreased share price since there is mixed financial news reported during this period.
- XEMC also had a stock split on December 8, 2005. There was, however, no significant decline in share price subsequent to this split.[2]
- Appendix 1 provides additional news articles on XEMC's recent share price performance.

Source:
[1] Additional Supplemental Update. Impact of XEMC's Participation to the FACW Filing, August 1, 2011.
[2] Google Finance.

Comparative Closing Share Prices (Standardized)

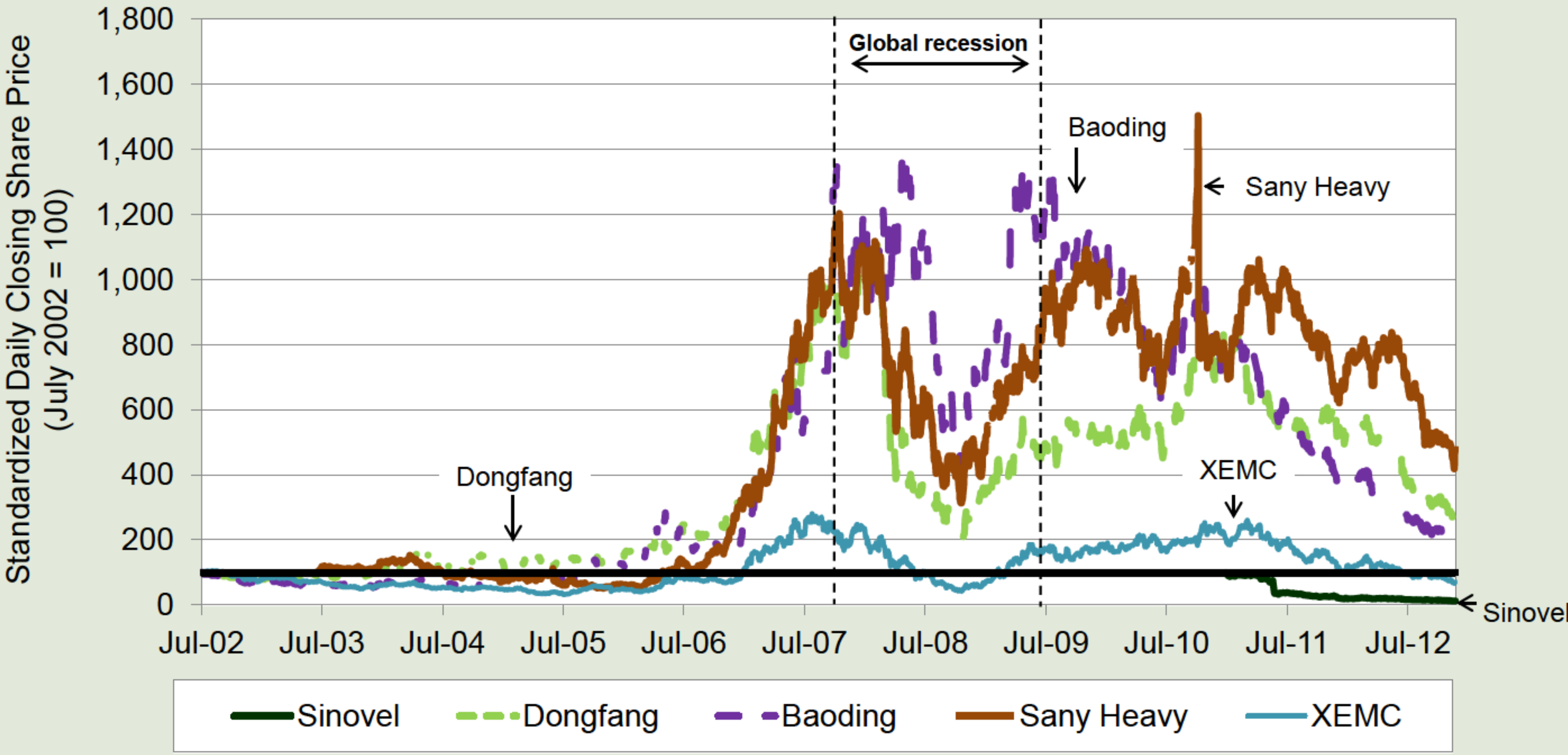
Standardized closing share prices from 2002 to present indicate that XEMC's share prices have been more volatile than GE, Siemens and Vestas.[1] XEMC and Vestas share price trends, however, have moved in similar downward trends over the past year.



Note: [1] Vestas historical price data only available starting in 2008 and it is therefore standardized using October 2008 as the base date.
Source: Google Finance.

Comparative Closing Share Prices (Standardized)

Chinese wind manufacturing firm share prices have exhibited trends similar to XEMC.



Source: Google Finance.

XEMC Financial Statistics

XEMC is trading currently at about $0.86 USD per share. Its price-to-earning ("P/E") is considerably higher than GE and Siemens, while its return on assets ("ROA") ratio is considerably lower than both GE and Siemens. XEMC's P/E is considerably higher than both the S&P 500 Heavy Construction Industry Composite Index as well as the Shanghai Stock Exchange ("SSE") Index.

Company	Current Trade Price		Return on Assets	Price-to-Earnings Ratio
XEMC (SHA:600416)	4.84	CNY	0.14	164.96
GE (NYSE:GE)	20.15	USD	2.01	14.95
Siemens AG (NYSE:SI)	98.27	USD	4.88	13.50
S&P 500 Electric Utilities	972.80	USD		15.60
SSE Index	2,061.79	CNY		11.16

Source:
Google Finance.

Recent Claims Regarding Chinese Anti-Competitive Practices

The FACW project will be financed, in large part, by entities ultimately and directly supported by the Peoples' Republic of China ("PRC" or "China"). XEMC itself is owned, in part, by a provincial government entity that is part of the PRC.

US-Chinese trade relationships have become increasingly strained over the past 12 to 24 months, particularly in areas associated with renewable energy manufacturing. While media reports on these relationships in the energy sector have focused largely on Chinese anticompetitive practices in solar panel manufacturing, similar anticompetitive claims have been raised about Chinese lending and banking practices as well as Chinese wind energy manufacturing practices.

Regulatory Concerns Relating to Unfair Lending Practices

U.S. Department of Commerce: Final Determination in the Countervailing Duty Investigation of Coated Free Sheet from the People's Republic of China (Oct. 17, 2007)

As part of its investigation into anti-trade practices, the U.S. Department of Commerce ("Commerce") found particular problems within the Chinese banking sector stemming from the highly controlled nature of the sector causing distortive effects preventing normal market forces from functioning normally.[1] Commerce reaffirmed this finding in response to complaints regarding subsidies to utility scale wind towers from China.[2]

DOC Findings on the State-Controlled Nature of Chinese Banking

"As an initial matter, China's banking sector remains almost entirely state-owned. While state-owned banks are a feature in many economies, the data provided by the (Organization for Economic Co-operation and Development) demonstrate that state ownership in the Chinese banking sector is much more widespread than in any other major world economy. (…)"[3]

"This remains true after the limited initial public offerings these banks have undergone and the sales of minority stakes in these banks to foreign banks. Foreign investment in (Chinese) banks is tightly constrained, with total forcing ownership limited to 25 percent in existing (banks) **and the (Government of China) has signaled its intention to preserve this control over the banking sector indefinitely."**[4]

Source:
[1]Coated Free Sheet Paper from the People's Republic of China: Final Affirmative Countervailing Duty Determination, 72 FR 60645 (October 25, 2007). ("Coated Paper from PRC")
[2]Utility Scale Wind Towers From the People's Republic of China: Preliminary Affirmative Countervailing Duty Determination, 77 FR 33422 (June 6, 2012). ("Wind Towers Preliminary Countervailing Duty Determination")
[3]Coated Paper from PRC, Memorandum to File at p. 67, emphasis added and internal citations removed. ("Coated Paper from PRC Memorandum)
Coated Paper from RPC Memorandum at p. 67, emphasis added and internal citations removed.

U.S. Department of Commerce's Investigation of Chinese Banking

<u>DOC Findings on Chinese Policy Distorting Lending Rates</u>

"While the record evidence does suggest that supervision of and management in the (banks) is improving, the way interest rate formation is regulated in China **both distorts lending rates and provides an explicit recognition that banks in China are not yet fully able to set interest rates on a market basis."**[1]

"For example, China maintains both a deposit rate cap and a lending rate floor. (…) **What sets China apart (from other countries with regulated banking), however, is the fact that China maintains both a deposit rate cap and lending rate floor simultaneously, and that the (People's Bank of China) has set these restrictions in such as to guarantee the banks a considerable profit margin on each of their loans** (…)"[2]

"In addition, resource allocations in and out of the banking sector illustrate the distortive effect of government policies and the fact that 'prices' there do not function normally. For example, the cap on deposit rates was both binding in 2005 and set at a level that was barely higher than inflation. (…) This means that savers in China were prevented, by law, from receiving more than a negligible real return on their savings. **This means that banks in China do not compete on deposit rates and have access to the savers' capital at very little cost."**[3]

Source:[1] Coated Free Paper from PRC Memorandum, p.68, emphasis added and internal citations removed.
[2] Coated Free Paper from PRC Memorandum, p.68, emphasis added and internal citations removed.
[3] Coated Free Paper from PRC Memorandum, p. 69, emphasis added and internal citations removed.

U.S. Department of Commerce's Investigation of Chinese Banking Practices

DOC Conclusions on Chinese Banking Practices:

"Given the fact that government policy channels China's savings to the banking sector, that banks cannot compete on deposit rates, and that the government permits only a low return on deposits, the concern about the banks driving interest rates down on their own to unsustainable levels is not surprising."[1]

Source:
[1]Coated Free Paper from PRC Memorandum, p. 69.

U.S. Department of Commerce's Determination of Chinese Wind Turbine Subsidies

Utility Scale Wind Towers From the People's Republic of China: Preliminary Affirmative Countervailing Duty Determination (June 6, 2012). "Therefore, given the evidence demonstrating the (Government of China's) objective of developing the renewable energy sector and wind power in particular, through loan and other financial incentives, we preliminarily determine there is a program of preferential policy lending specific to wind tower producers (…)"[1]

"Under Article 8 of the 'Income Tax Law of the People's Republic of China for Enterprises with Foreign Investment and Foreign Enterprises' ("FIE") an FIE that is 'productive' and scheduled to operate for more than ten years is exempt from income tax in the first two years of profitability and pays income taxes at half the stand rate for the next three years. According to the (Government of China), the program was terminated effective January 1, 2008, (…) but companies already enjoying the preference were permitted to continue paying taxes at reduced rates."[2]

Utility Scale Wind Towers From the People's Republic of China: Preliminary Determination of Sales at Less Than Fair Value and Postponement of Final Determination (August 2, 2012). "The Department has preliminarily determined that the following weighted average dumping margins exist for the period April 2011 through September 2011:"[3]

Exporter	Producer	Weighted-Average Dumping Margin (%)
Chengxi Shipyard Co., Ltd	Chengxi Shipyard Co., Ltd	30.93
Titan Wind Energy (Suzhou) Co., Ltd	Titan (Lianyungang) Metal Product Co., Ltd	20.85
Titan Wind Energy (Suzhou) Co., Ltd	Titan Wind Energy (Suzhou) Co., Ltd	20.85
CS Wind Corporation	CS Wind China Co., Ltd	26.25
Guodian United Power Technology Baoding Co., Ltd	Guodian United Power Technology Baoding Co., Ltd	26.25
Sinovel Wind Group Co., Ltd	Sinovel Wind Group Co., Ltd	26.25
China-Wide Entity		72.69

Source: [1]Wind Towers Preliminary Countervailing Duty Determination, p. 33432.
[2]Wind Towers Preliminary Countervailing Duty Determination, p. 33432.
[3]Utility Scale Wind Towers From the People's Republic of China: Preliminary Determination of Sales at Less Than Fair Value and Postponement of Final Determination, 77 FR 46034 (August 2, 2012), p. 46042.

Conclusions: Vendor Selection

The selection of XEMC as the turbine vendor as well as a major financial backer of the project raises a number of important questions and concerns.

XEMC's affiliate will take an exceptionally large ownership position in the FACW project. If this project is approved, a large share of the project's profits will likely leave New Jersey and the U.S.

XEMC has clearly attempted to build prior U.S. relationships and enter U.S. markets. The FACW project, however, will likely be XEMC's first U.S. partnership.

XEMC appears to have no existing U.S. supply-chain relationships for the development of an OSW project.

Conclusions: Vendor Selection

XEMC's share prices have historically been volatile over the past several years. The company's share prices fell dramatically in June, 2011 and, to date, have not rebounded to their prior levels. XEMC's share prices have continued to fall after its large June 2011 movement. XEMC share prices today are half their level in July 2011.

There are varying and inconsistent explanations in the trade press regarding the causes of XEMC's share price decrease in the trade press although many other Chinese wind manufacturing firms have seen comparable volatile movements.

XEMC has installed just two offshore direct drive turbine prototypes.

XEMC is not a highly-tested company in offshore wind development. XEMC does not appear to be giving FACW any discount, price break, or other concession to compensate for its lack of experience and familiarity in U.S. or European wind energy markets despite reports in the trade press noting that such concessions would be offered in early turbine deals. For instance, XEMC Windpower's Vice President, Long Xin was quoted as admitting XEMC's lack of experience with these new turbines, but countered with the assurances that "contract terms" would compensate for this inexperience.[1]

Note: [1] "Financial Muscle is Helping Propel XEMC's Overseas Offshore Expansion." ReCharge. February 17, 2012.

Conclusions: Vendor Selection

The FACW project will use turbine and will be financed by entities ultimately and directly supported by the PRC. XEMC itself is owned, in part, by a provincial government entity that is part of the PRC.

US-Chinese trade relationships have become increasingly strained over the past 12 to 24 months, particularly in areas associated with renewable energy manufacturing. The U.S. Department of Commerce has already raised a number of issues related to Chinese anticompetitive practices in lending and banking practices as well as Chinese wind energy manufacturing practices.

To date, XEMC has not been specifically identified by USDOC as a company engaging in questionable trade practices.

3. Project Development Economics

Total Project Cost and Capital Expenditure Profile

The FACW project is currently expected to cost $[redacted] million.

The installed cost for the project is estimated to be $[redacted] per kW of capacity.

The project levelized cost is $[redacted] per MWh generated.

Almost [redacted] percent of the project's development expenditures are associated with capital investments in the turbine, equipment and installation.

Development costs (engineering, interconnection, insurance) comprise [redacted] percent, while "other" costs such as contingencies and unidentified "Other project costs" comprise almost [redacted] percent.

		Cost ($)	Percent of Total (%)
Construction Costs		[redacted]	[redacted]
Foundation supply	$	[redacted]	[redacted]
Foundation installation		[redacted]	[redacted]
Scour Protection		[redacted]	[redacted]
Wind turbine supply		[redacted]	[redacted]
Wind turbine installation		[redacted]	[redacted]
Cable supply - offshore and onshore		[redacted]	[redacted]
Cable installation - offshore		[redacted]	[redacted]
Cable installation - onshore (supply and install)		[redacted]	[redacted]
Onshore substation		[redacted]	[redacted]
Sub-total Construction costs	**$**	[redacted]	[redacted]
Construction related costs		[redacted]	[redacted]
Owner's engineer	$	[redacted]	[redacted]
Fishermen's Energy costs		[redacted]	[redacted]
Port		[redacted]	[redacted]
Interconnection		[redacted]	[redacted]
Development		[redacted]	[redacted]
Insurance		[redacted]	[redacted]
Project Certification		[redacted]	[redacted]
Sub-total Construction related costs	**$**	[redacted]	[redacted]
Other		[redacted]	[redacted]
Contingencies	$	[redacted]	[redacted]
Maintenance building and set up and service vessel		[redacted]	[redacted]
Other project costs		[redacted]	[redacted]
Sub-total Other costs	**$**	[redacted]	[redacted]
Total Cost	**$**	[redacted]	[redacted]
Total Cost ($/kW)	**$**	[redacted]	[redacted]
Total Cost ($/MWh)[1]	**$**	[redacted]	[redacted]

Source: Amended Application, Testimony Exhibit 4, p. 26; and Amended Application, Testimony Exhibit 4, MM Report.

Comparison of FACW Proposal to Other Completed/Operational OSW Projects

The FACW project, if developed, will be one of the world's most expensive OSW projects.

The Thornton Bank project in Belgium is just below FACW in cost. This project (comprised of 6 turbines) is being developed in the North Sea in 39 to 92 feet of water, some 71 miles from shore.

Alternatively, FACW will be developed in about 33 to 42 feet of water some 17 miles from shore.

Wind Farm	Location	Year Constructed	Capacity (MW)	Overnight Cost (2012 $) million ($)	Overnight Cost (2012 $) ($/kW)
Yttre Stengrund	Sweden	2001	10	16.36	1,636.32
Nysted	Denmark	2002	158	313.47	1,984.02
Samsø	Denmark	2002	23	45.93	1,996.95
Vindpark Vanern	Sweden	2007	30	60.79	2,026.23
North Hoyle	UK	2003	60	136.95	2,282.47
Blyth	UK	2000	4	9.37	2,342.23
Middelgruden	Denmark	2000	40	99.36	2,483.90
Horns Rev	Denmark	2002	160	400.59	2,503.67
Utgrunden	Sweden	2000	10	25.34	2,533.61
Lillgrund	Sweden	2006	110	305.45	2,776.85
Egmond aan Zee	Netherlands	2006	108	301.10	2,787.97
Irene Vorrink	Netherlands	1996	17	48.57	2,857.03
Kentish Flats	UK	2004	90	260.83	2,898.13
Horns Rev 2	Denmark	2008	209	645.15	3,086.87
Bockstigen	Sweden	1998	3	9.39	3,131.26
Rødsand 2	Denmark	2009	207	649.57	3,138.00
Gunfleet Sands	UK	2008	173	549.43	3,175.88
Scoby Sands	UK	2003	60	197.18	3,286.35
Barrow	UK	2005	90	320.31	3,558.97
Avedøre Holme	Denmark	2009	10.8	40.16	3,718.49
Vindeby	Denmark	1991	5	21.24	4,248.01
Rhyl Flats	UK	2007	90	401.35	4,459.46
Burbo Bank	UK	2006	90	410.10	4,556.70
Arklow Bank Phase 1	Ireland	2003	25.2	121.22	4,810.20
Robin Rigg	UK	2007	180	869.21	4,828.95
Prinses Amaliawindpark	Netherlands	2006	120	584.79	4,873.28
Tunø Knob	Denmark	1995	5	25.03	5,006.46
Greater Gabbard	UK	2009	504	2,724.34	5,405.44
Kemi Ajos Phase I	Finland	2006	15	81.13	5,408.36
BARD Offshore	Germany	2010	400	2,187.48	5,468.70
Alpha Ventus	Germany	2008	60	345.61	5,760.19
Thanet	UK	2007	300	1,746.99	5,823.28
Belwind Phase 1	Belgium	2009	165	961.11	5,824.88
EnBW Baltic I	Germany	2010	48	288.53	6,011.08
Lely	Netherlands	1992	2	12.20	6,100.04
Lynn/Inner Downsing	UK	2006	97	699.58	7,212.19
Thornton Bank	Belgium	2008	30	222.50	7,416.79
FACW	**USA**	**2012**	**25**	[redacted]	[redacted]
Beatrice Demonstration	UK	2006	10	79.04	7,903.94
Walney Phase 1	UK	2010	184	1,703.63	9,258.86

Source: 4 C Offshore, http://www.4coffshore.com/; and Dong Energy, http://www.dongenergy.co.uk/.

Comparison of FACW to Typical OSW Development Costs, All Capacity Levels

The relationship of overnight cost and capacity shows that when compared to other offshore wind projects, FACW is more expensive than the average offshore wind project.

[redacted]

Source: 4 C Offshore, http://www.4coffshore.com/; and Dong Energy, http://www.dongenergy.co.uk/.

Comparison of FACW to Typical OSW Development Costs, Less than 100 MW

When plotted with projects of comparable size, FACW's total project costs are well above average total development costs.

[redacted]

Source: 4 C Offshore, http://www.4coffshore.com/; and Dong Energy, http://www.dongenergy.co.uk/.

Comparison of FACW to Typical OSW Development Costs, All Capacity Levels

FACW was also compared to other projects on a per unit cost, or a cost per kW basis. Average costs for a project of FACW's size are estimated at $[redacted] per kW, not the $[redacted] per kW currently projected by FACW.

[redacted]

Source: 4 C Offshore, http://www.4coffshore.com/; and Dong Energy, http://www.dongenergy.co.uk/.

Comparison of FACW to Typical OSW Development Costs, Less than 100 MW

FACW was also compared to a sub-sample of other small projects on a per unit cost, or a cost per kW basis. FACW's proposed cost is higher than all but two other projects included in the small-sized sample comparison.

[redacted]

Source: 4 C Offshore, http://www.4coffshore.com/; and Dong Energy, http://www.dongenergy.co.uk/.

Recently-Announced U.S. OSW Projects

FACW's proposed costs are also considerably higher than all recently-announced/proposed U.S. offshore wind projects. If developed, FACW will be the most expensive offshore wind project (on a cost per kW basis) of any proposed U.S. offshore wind project.

State	Project	Project Cost (million $)	Capacity (MW)	per Capacity Cost ($/kW)	Difference from FACW ($/kW)	Project Cost at FACW Capacity Cost (million $)
New Jersey	Fisherman's Energy	$ [redacted]	25.0	$ [redacted]		
Massachusetts	Cape Wind	$ 2,620.0	468.0	$ 5,598	[redacted]	[redacted]
Rhode Island	Deepwater Wind	$ 205.4	28.8	$ 7,132	[redacted]	[redacted]
Delaware	NRG Bluewater	$ 1,000.0	450.0	$ 2,222	[redacted]	[redacted]
New York	BP - Cape Vincent	$ 300.0	200.0	$ 1,500	[redacted]	[redacted]

Source: 4C Offshore, http://www.4coffshore.com/; In Re: Review of amended power purchase agreement between Narragansett Electric Company d/b/a National Grid and Deepwater Wind Block Island, LLC pursuant to R.I. Gen Laws 39-26.1-7. Rhode Island PUC, Docket No. 4185. August 16, 2010; and Application of Cape Vincent Wind Power, LLC for a Certificate of Environmental Compatibility and Public Need to Construct an Approximately 200-285 Megawatt Wind Electric Generating Facility in the Town of Cape Vincent, New York, State of New York Board on Electric Generation Siting and the Environment, Case Number 12-F-0410, September 17, 2012.

Cost Comparison – Mott MacDonald

[redacted]

- [redacted]
- [redacted]
- [redacted]
- [redacted]

Source: Amended Application, Testimony Exhibit 4.

Conclusions: Project Economics

- FACW's development costs were compared, using differing statistical and sampling approaches, to other completed OSW projects developed between 1998 and 2011. Since all of these completed projects are in Europe, exchange rate differentials between projects and time were corrected, and all dollars were converted into inflation-adjusted overnight dollars. The statistical methods used in this analysis controlled for various project differences such as capacity, year of development, offshore location, and water depth.
- FACW is more expensive, by a considerable margin, than most of these completed European offshore wind projects on a cost per kW basis. FACW proposes a $[redacted] per kW installation cost.
- FACW is also some $[redacted] per kW to $[redacted] per kW more expensive than four proposed U.S. offshore wind projects to be located in Massachusetts, Rhode Island, New York, and Delaware.
- If developed, FACW will be the fourth most expensive project in the world on a cost per kW basis.

4. Project Finance

Project Finance: Summary Pro forma Assumptions

FACW Proforma	
Total Project Cost (million $)	[redacted]
Capacity (kW)	
Capacity Factor (%)	
Annual Output (MWh)	
Starting OREC Price ($/MWh)	
Depreciable Life	
Debt Cost (%)	
Weighted Average Cost of Capital (%)	
Debt/Equity Ratio	
Rate of Return on Equity (%)	
Pre-tax Cash Flow (million $)	
Pre-tax Cash Flow - NPV (million $)	
After-tax Cash Flow (million $)	
After-tax Cash Flow - NPV (million $)	

Source:
Amended Application, Testimony Exhibit 5, p. 3-4; Amended Application, Appendix D, Optimized Project C-B Analysis.xlsx; and Amended Application, Appendix C, Copy of Exhibit A – Proforma XEMC.xlsx.

FACW Proposed Project Financing

The FACW project is anticipated to be highly leveraged with [redacted] percent of its overall project finance coming in the form of debt.

Debt financing will be provided at a rate of [redacted] percent.

FACW anticipates close to $[redacted] million in project equity.

Total Project Cost: $[redacted] million

[redacted]

Note: The cost of the FACW project and corresponding proposed OREC price used in this report is based upon the pro forma provided in the Company's Amended Application, Appendix C. These files are the most recent financial analysis complete and consistent with state statute received to date. These files are based on a 25 MW facility with a total cost of $[redacted] million and a starting OREC price of $[redacted]/MWh.

Proposed Financing

Overview

XEMC New Energy ([redacted] percent owner) will provide the financing for the FACW project, which will be structured as [redacted] percent debt and [redacted] percent equity. XEMC New Energy plans to obtain loans from the Chinese Development Bank.[1,2]

Complexities and Concerns about Financing

The proposed financing method is both ambiguous and uncertain.

FACW has not committed to the portion of XEMC New Energy's financing that will be debt versus equity financed, although it suggests it will be [redacted] percent debt and [redacted] percent equity. This suggestion, however, was not confirmed in response to NJBPU-Econ-17.

Source:
[1] Amended Application, Testimony Exhibit 5, p. 4.
[2] Amended Application, Testimony Exhibit 24, Attachment 1, p. 3.

XEMC Group and Relationship to Affiliates

[redacted]

Source: Amended Application, Appendix C, p. 6.

XEMC Group and Relationship to Affiliates: Organization

XEMC Group

The parent company, XEMC Group, was established in 1936 and is wholly-owned by the people's government of Hunan Province. Today it employs over 11,000 full-time employees, and its subsidiaries produce generators and other heavy electrical and industrial equipment.

XEMC New Energy

XEMC New Energy is majority-owned by XEMC Group and serves as the finance and project development arm of XEMC Group. It is proposed to be the financier of FACW project.

XEMC Manufacturing

Through its subsidiaries XEMC Windpower and XEMC Darwind, XEMC Manufacturing will design and manufacture the wind turbines and associated equipment for FACW. It will engage in contractual arrangements with FACW to provide technical support, ongoing service, and spare parts. Its equity shares are traded on the Shanghai Stock Exchange.

Source:
Amended Application, Testimony Exhibit 24, Attachment 1, pp. 1-3.

XEMC Group and Relationship to Affiliates: Financial Relationships

China Development Bank

The China Development Bank ("CDB") was established in 1994 and has assets totaling more than $980 million. As a government-controlled bank, it typically funds government infrastructure projects. It is the second largest bond issuer after China's Ministry of Finance.[1]

The CDB is owned by China's Ministry of Finance, Central Huijin Investment Ltd. - which is in turn controlled by Chinese sovereign-wealth fund China Investment Corp. - and the government's social security fund.[1] In 2008, the CDB underwent a restructuring to become a commercial bank. It has since expanded its services to include leasing operations, securities, and private equity.[1]

Moody's has currently rated the CDB as Aa3, citing its strong, ongoing support from the Chinese government.[2] The most recent S&P rating of CDB is AA-/Stable, again due to its integral link with the Chinese government.[3] Likewise, Fitch rated the CDB as A+ with Stable Outlook.[4]

At CCXI Moody's Conference on Credit Risk in China held on November 23, 2012, concerns were raised about lack of transparency for some of the financing deals the Chinese banks are making.[5]

Source: [1]Ho, Prudence. "Chinese Bank Takes Great Leap Forward." Wall Street Journal. September 4, 2012. [2] "Moody's Disclosures on Credit Ratings of China Development Bank." Moody's Investors Service. May 4, 2012. [3] "Regulatory Disclosure – China Development Bank." S&P . February 6, 2012. [4] "Fitch Affirms 3 Chinese Policy Banks." Fitch Ratings. April 11, 2012. [5] "CCXI Moody's credit risk jointly organized the meeting to explore China's economic and credit trends." Xin International Credit Rating Co. Ltd. November 23, 2012. Translated.

Regulatory Concerns Associated with Differing Accounting Standards

Recent SEC Allegations

The differences in Chinese and U.S. accounting standards recently made headlines when the Securities and Exchange Commission (“SEC”) brought an administrative proceeding against the Chinese affiliates of big global accounting firms, as a result of serious accounting discrepancies at several publicly-traded Chinese firms led to shareholder losses in the billions of dollars. One such defendant, PricewaterhouseCoopers Shong Tian CPAs Ltd. Co, is the auditor of XEMC Manufacturing, which will manufacture the FACW project wind turbines.[1]

According to SEC Commissioner Luis Aguilar, the agency is investigating "accounting irregularities at dozens of China-based companies that are publicly traded in the United States," and that some of the probes "have been hampered by the lack of access to relevant documents.“

The SEC maintains that firms that audit U.S.-traded companies have to follow U.S. law, and the Sarbanes-Oxley Act requires foreign audit firms to hand over documents about U.S.-listed clients at the SEC's request. However, under China's law, the auditing documents are treated similarly to state secrets, and auditors could be jailed if they turn the documents over to the SEC without permission.

[1] XEMC Manufacturing and XEMC New Energy are owned by the same parent company XEMC Group.
Source: Rapaport, Michael and Dummet, Ben. “U.S. Sues Big Firms over China Audits.” *Wall Street Journal*. December 4, 2012.

Challenges of Analyzing Chinese-Owned Companies

Availability of Public Information

Much of XEMC's financial information is not publicly available. Web-based information is in Chinese, and although there are web-based tools that allow for translation, it is not perfect, thus limiting the analyses.

FACW offered to present an English translation of XEMC's financial statements with an affidavit that testifies to the accuracy of the translation.[1] To date, FACW has only provided translated versions of XEMC New Energy's balance statement, income statement, and statement of cash flows for year ending 2011.[2] No notes to the financial statements were provided. This is an important omission since notes to the financial statements are an integral part of the statement and often provide important context for analyzing a company's financial position. The failure of FACW to provide the translated notes of the financial statements limits hinders a complete analysis of XEMC's financial position.

The translated financial statements for XEMC Group remain outstanding.

Source:
[1]Amended Application, Testimony Exhibit 6, p. 8.
[2]Amended Application, Appendix C, Exhibit N-1.

Differences in Chinese and U.S. Accounting Standards

Differences between Chinese Account Standards ("CAS"), International Financial Reporting Standards ("IFRS"), and Generally Accepted Accounting Principle ("GAAP") can cause problems in interpreting financial statements. The difference can be significant enough in some areas as to make it difficult to accept the quality of financial reporting compared to U.S. GAAP standards.

Chinese Accounting Standards ("CAS")

CAS was introduced by the Chinese Ministry of Finance ("MoF") in 2006, consisting of one basic criteria and 38 specific criteria with application guidelines.[1] [redacted][2] XEMC Group and its subsidiaries XEMC Manufacturing and XEMC New Energy have each adopted CAS.[3]

Source:
[1]Yuting, Liu. "Chinese Accounting Standards System: Architecture, Convergence and Equivalent." China Accounting Standards Committee.
[2]Amended Application, Testimony Exhibit 24, Attachment 5, pp. 1-9.
[3]Amended Application, Testimony Exhibit 24, Attachments 2-4.
[4]IFRS Foundation/IASB. "Who We Are and What We Do." February 2012.

Differences in Chinese and U.S. Accounting Standards

International Financial Reporting Standards ("IFRS")

IFRS are standards developed by the International Accounting Standards Board ("IASB"). Its objective is to develop a single set of high quality, enforceable, and globally-accepted financial reporting standards. IFRS are developed through a collaboration of standard-setting organizations around the world.[1]

Although CAS was developed with the intention of ultimately being in compliance with IFRS, it is not a literal translation. There are differences between the two sets of standards for issues specific to China's economic environment. [redacted][2]

U.S. Generally Accepted Accounting Principles ("GAAP")

GAAP refers to the standards developed by the Financial Accounting Standards Board ("FASB"). Since 1973, FASB has been responsible for establishing standards for financial reporting standards for reports used by investors. GAAP is recognized by the U.S. Securities and Exchange Committee ("SEC") and the American Institute of Certified Public Accountants.[1]

Source:
[1]"Facts About FASB." Financial Accounting Standards Board.
[2]Amended Application, Testimony Exhibit 24, Attachments 2-4.

Regulatory Concerns Associated with Differing Accounting Standards

Examples of Differences and Problems

[redacted]

[redacted]

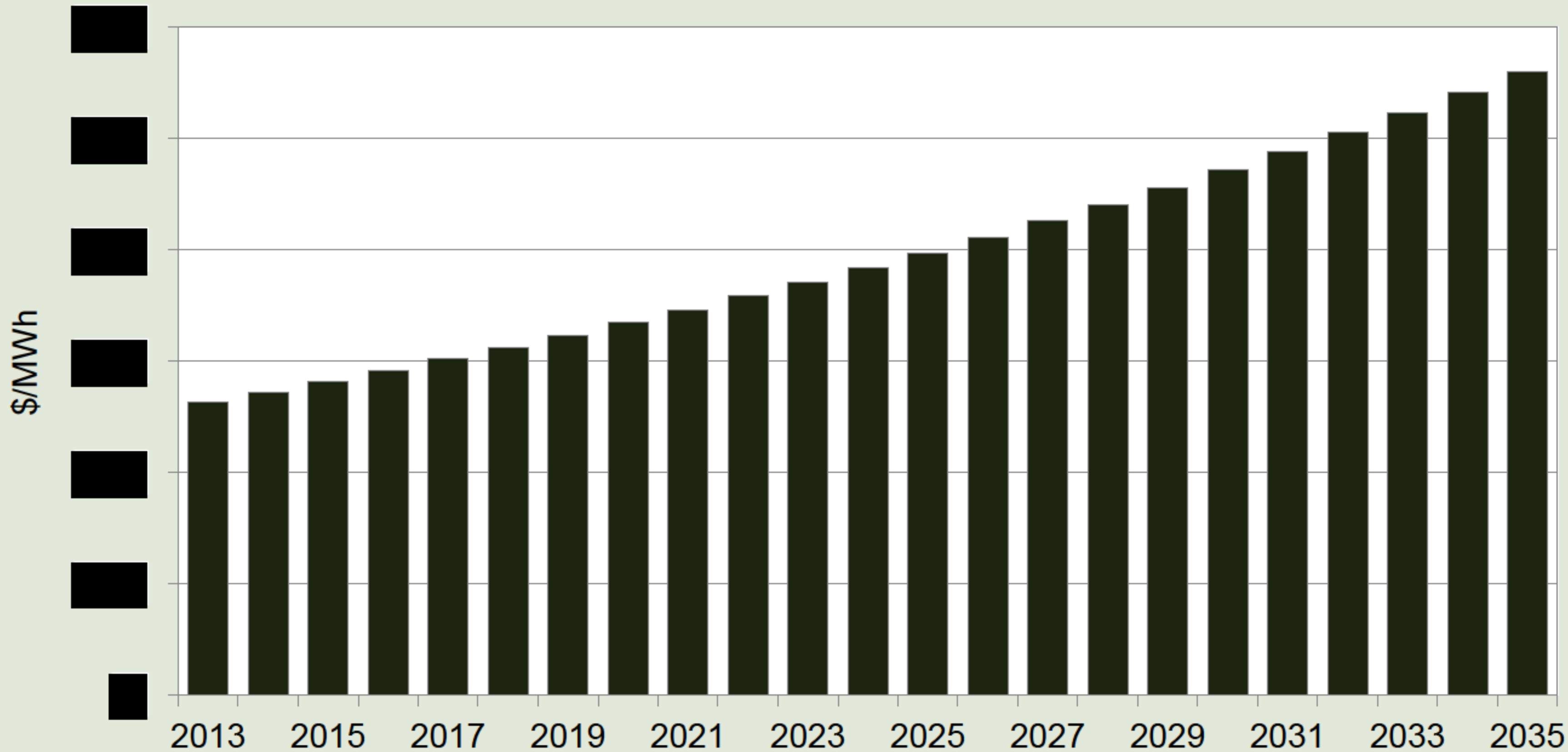
[redacted]

[redacted]

Source:
Amended Application, Testimony Exhibit 24, Attachment 5; “IFRS and US GAAP: Similarities and Differences.” PriceWaterhouse Coopers. October 2012.

OREC Proposal: Price

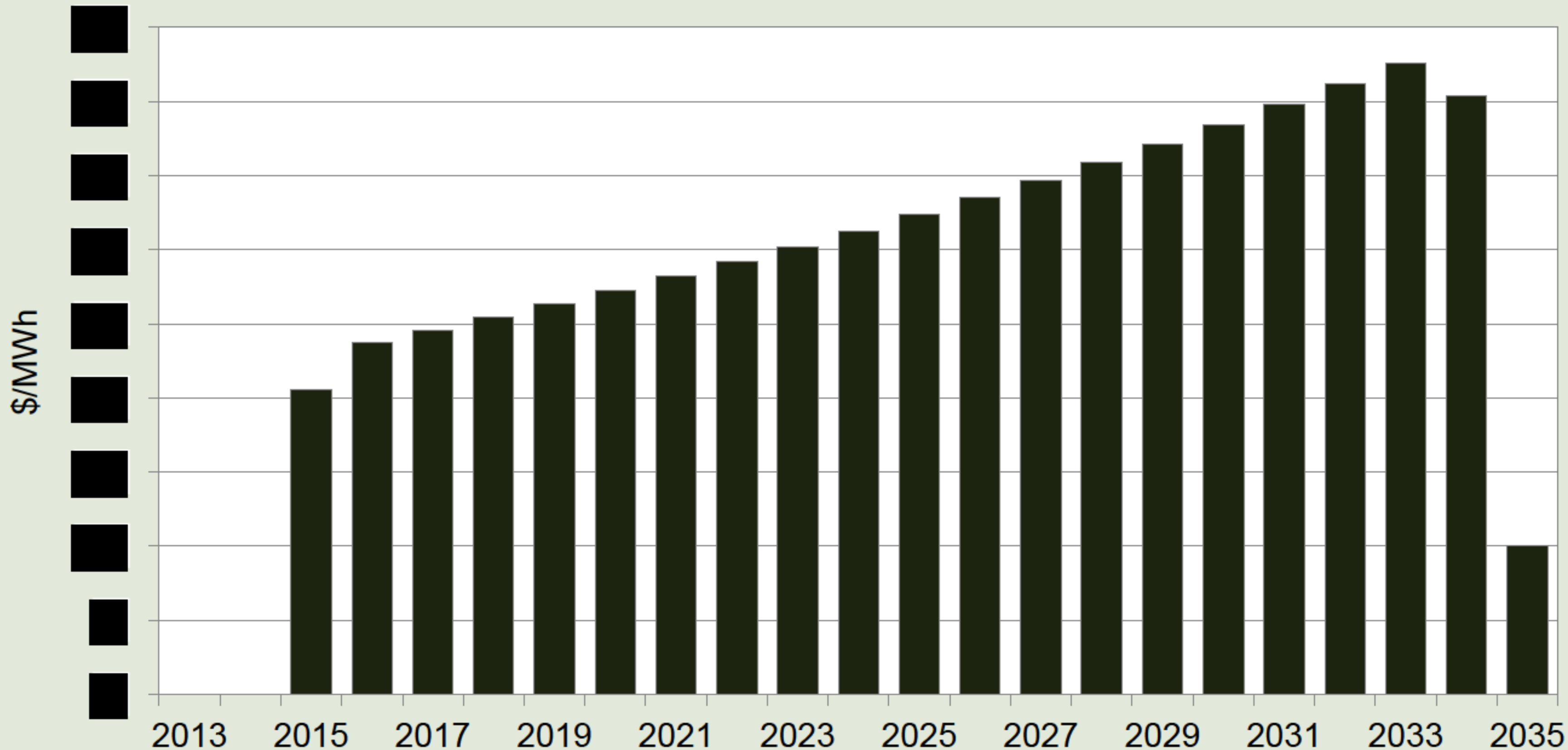
FACW is requesting financial support in the form of OREC starting at $[redacted] per MWh in 2013, increasing by [redacted] percent per year to $[redacted] per MWh in 2035.



Source:
Amended Application, Appendix D, Optimized Project C-B Analysis.xlsx.

OREC Proposal: Proposed Project Revenues

FACW's proposed OREC pricing will generate between $[redacted] million to in excess of $[redacted] million in annual project revenues over the next twenty years. Total revenues collected under the current proposal will amount to over $[redacted] million, or $[redacted] million on an NPV basis.[1]



Note: [1]The Net Present Value ("NPV") calculation discounts a future stream of dollars to compare the value of a dollar today to the value of that same dollar in the future. The discount rate used is 8.37 percent.
Source: Amended Application, Appendix D, Optimized Project C-B Analysis.xlsx.

OREC Proposal: FACW Estimated Project Earnings (After-tax Equity Cash flow)

FACW's proposed OREC pricing will generate a total after-tax equity cash flow of $[redacted] million, or $[redacted] million on an NPV basis.

[redacted]

Source: Amended Application, Appendix C, Copy of Exhibit A – Proforma XEMC.xlsx.

Comparison of Prices, Other State PPAs

If approved, FACW will have the highest per MWh level of financial support of any currently proposed OSW project in the U.S. The FACW project will be a full [redacted] percent higher, on a comparable per OREC (MWh) basis, than the next highest U.S. based project (Rhode Island).

State	Seller / Purchaser	Starting Price ($/MWh)	Annual Escalation (%)	Contract Duration (years)
New Jersey	Fisherman's Energy / BPU	$ [redacted]	[redacted]%	[redacted]
Massachusetts	Cape Wind / National Grid	$ 187.50	3.5%	15
Rhode Island[1]	Deepwater Wind / National Grid	$ 244.00	3.5%	20
Delaware[2]	NRG Bluewater / Delmarva	$ 140.23	2.5%	25

[redacted]

Note: [1]The final price is dependent upon the construction cost; $244/MWh is the maximum price; [2]The PPA price for Delaware includes an energy price, capacity price and REC price.
Source: Massachusetts D.P.U. Docket No. 10-54; Rhode Island PUC Docket No. 4185; and Delaware PSC Docket No. 06-241.

Estimated ORECs Using Alternative Costs

OREC prices should be considerably lower for the FACW project.

If the FACW project faced a more reasonable, statistically-adjusted installed cost of $[redacted]/kW (consistent with the historic trend of projects constructed to date), the OREC needed to generate a [redacted] percent ROE would only be $[redacted]

	FACW Proposal	Estimated Reasonable Cost
Total Project Cost (million $)	$ [redacted]	$ 137.7
Total Project Cost ($/kW)	$ [redacted]	$ 5,509
Starting OREC Price ($/MWh)	$ [redacted]	$ 200.5
Return on Equity (%)	[redacted]	[redacted]

Note: The cost of the FACW project and corresponding proposed OREC price used in this report is based upon the pro forma provided in Exhibit A to Appendix C of the Amended Application.

Implied Rates of Return Using Alternative Costs

In today's market, a reasonably cost OSW project of $[redacted]/kW receiving a $[redacted] OREC price would likely earn a windfall profit of over [redacted] percent.

Thus, the FACW project is either (a) too expensive or (b) proposing to receive a rate of return greatly in excess of what is needed to develop an OSW project along the eastern seaboard.

	FACW Proposal	Estimated Reasonable Cost
Total Project Cost (million $)	$ [redacted]	$ 137.7
Total Project Cost ($/kW)	$	$ 5,509
Starting OREC Price ($/MWh)	$	$ 263
Average Debt Service Coverage		[redacted]
Return on Equity (%)		**28.64%**

Note: The cost of the FACW project and corresponding proposed OREC price used in this report is based upon the pro forma provided in Exhibit A to Appendix C of the Amended Application.

OREC Proposal, Comparison of Project Earnings Under Differing Cost Assumptions

FACW estimates total earnings under its the current proposal of over $[redacted] million.
Total earnings using a reasonable (industry average) cost of $[redacted]/kW, and an OREC price proposal that reflects these costs ($[redacted]/OREC) would result in an ROE of [redacted] and earnings of over $[redacted] million.
Total earnings using a reasonable (industry average) cost of $[redacted]/kW, but FACW's current OREC proposal of $[redacted]/OREC will result in a ROE of 28.64% and result in earnings of over $151 million.

[redacted]

XEMC New Energy Financial Indicators

	EBITA/Average Assets	Debt/EBITDA	EBITA/Interest Expense	FFO/Debt	Operating Margin	Debt/Total Capital	Return on Year-End Assets	Return on Year-End Equity
[redacted]								

Note: [1] Year-End data was used for EBITA/Average Assets because average was not available. [2] Data is not presented for XEMC Group because the translated financial statements have not been provided. [3] Financial ratios for XEMC New Energy were developed from Chinese translated financial statements. There may be differences between these XEMC New Energy translated financial statements and the Moody's financial metrics used for comparison.

Source: Company Response to RCR-PF2-170 and RCR-PF2-174; Moody's Financial Metrics Key Ratios by Rating and Industry for North American Non-Financial Corporations: December 2011.

XEMC New Energy Pertinent Financial Disclosures

[redacted]

[redacted]

[redacted]

Source: Company Response to RCR-PF2-174.

XEMC Group Pertinent Financial Disclosures

[redacted]

[redacted]

Source: Company Response to RCR-PF2-174.

XEMC Manufacturing Pertinent Financial Disclosures

[redacted]

Source: Company Response to RCR-PF2-174.

Moody's Ratings Scale

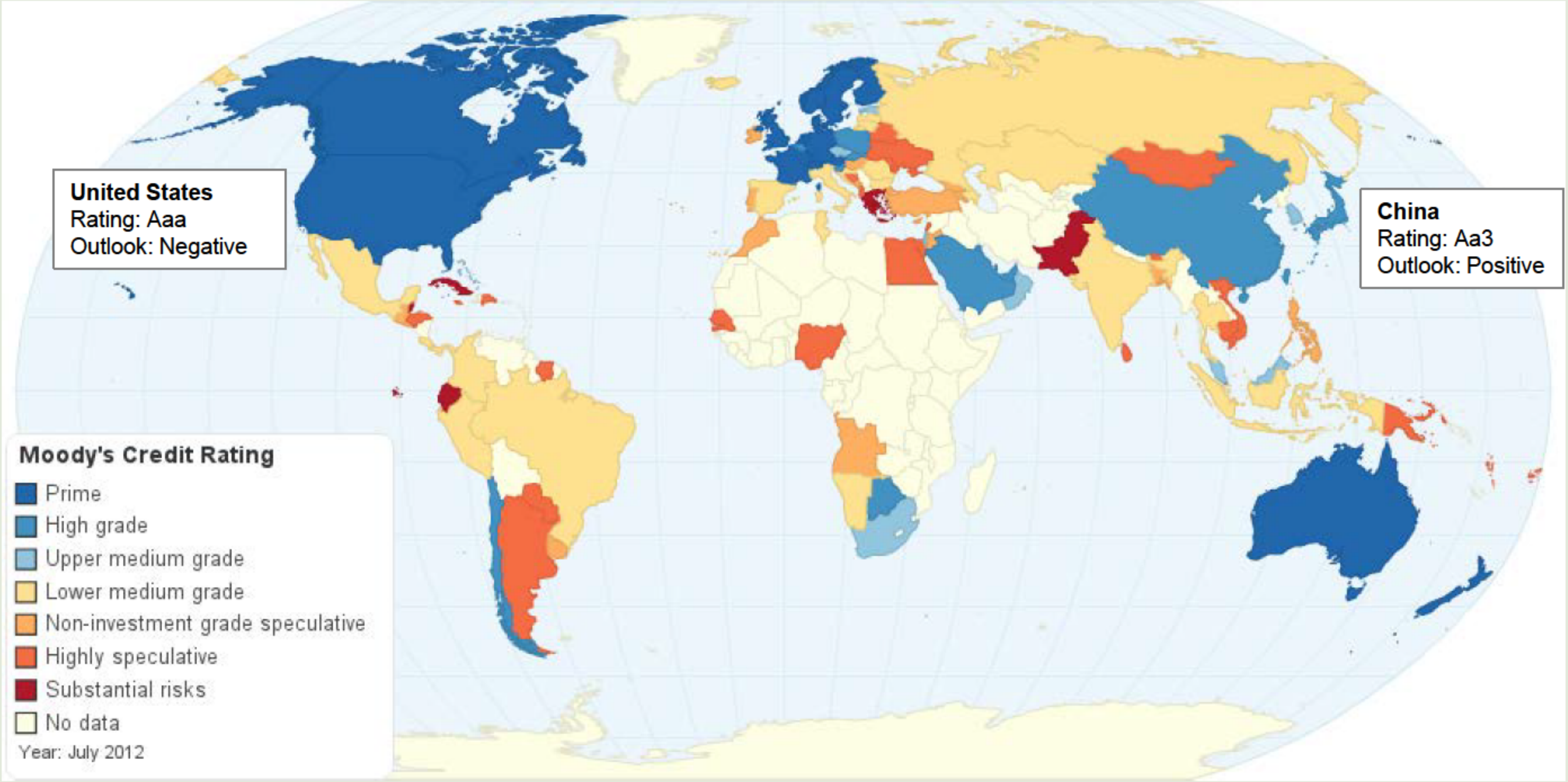
Global Long-Term Rating Scale	
Aaa	Obligations rated Aaa are judged to be of the highest quality, subject to the lowest level of credit risk.
Aa	Obligations rated Aa are judged to be of high quality and are subject to very low credit risk.
A	Obligations rated A are judged to be upper-medium grade and are subject to low credit risk.
Baa	Obligations rated Baa are judged to be medium-grade and subject to moderate credit risk and as such may possess certain speculative characteristics.
Ba	Obligations rated Ba are judged to be speculative and are subject to substantial credit risk.
B	Obligations rated B are considered speculative and are subject to high credit risk.
Caa	Obligations rated Caa are judged to be speculative of poor standing and are subject to very high credit risk.
Ca	Obligations rated Ca are highly speculative and are likely in, or very near, default, with some prospect of recovery of principal and interest.
C	Obligations rated C are the lowest rated and are typically in default, with little prospect for recovery of principal or interest.

Note: Moody's appends numerical modifiers 1, 2, and 3 to each generic rating classification from Aa through Caa. The modifier 1 indicates that the obligation ranks in the higher end of its generic rating category; the modifier 2 indicates a mid-range ranking; and the modifier 3 indicates a ranking in the lower end of that generic rating category. Additionally, a "(hyb)" indicator is appended to all ratings of hybrid securities issued by banks, insurers, finance companies, and securities firms.*

* By their terms, hybrid securities allow for the omission of scheduled dividends, interest, or principal payments, which can potentially result in impairment if such an omission occurs. Hybrid securities may also be subject to contractually allowable write-downs of principal that could result in impairment. Together with the hybrid indicator, the long-term obligation rating assigned to a hybrid security is an expression of the relative credit risk associated with that security.

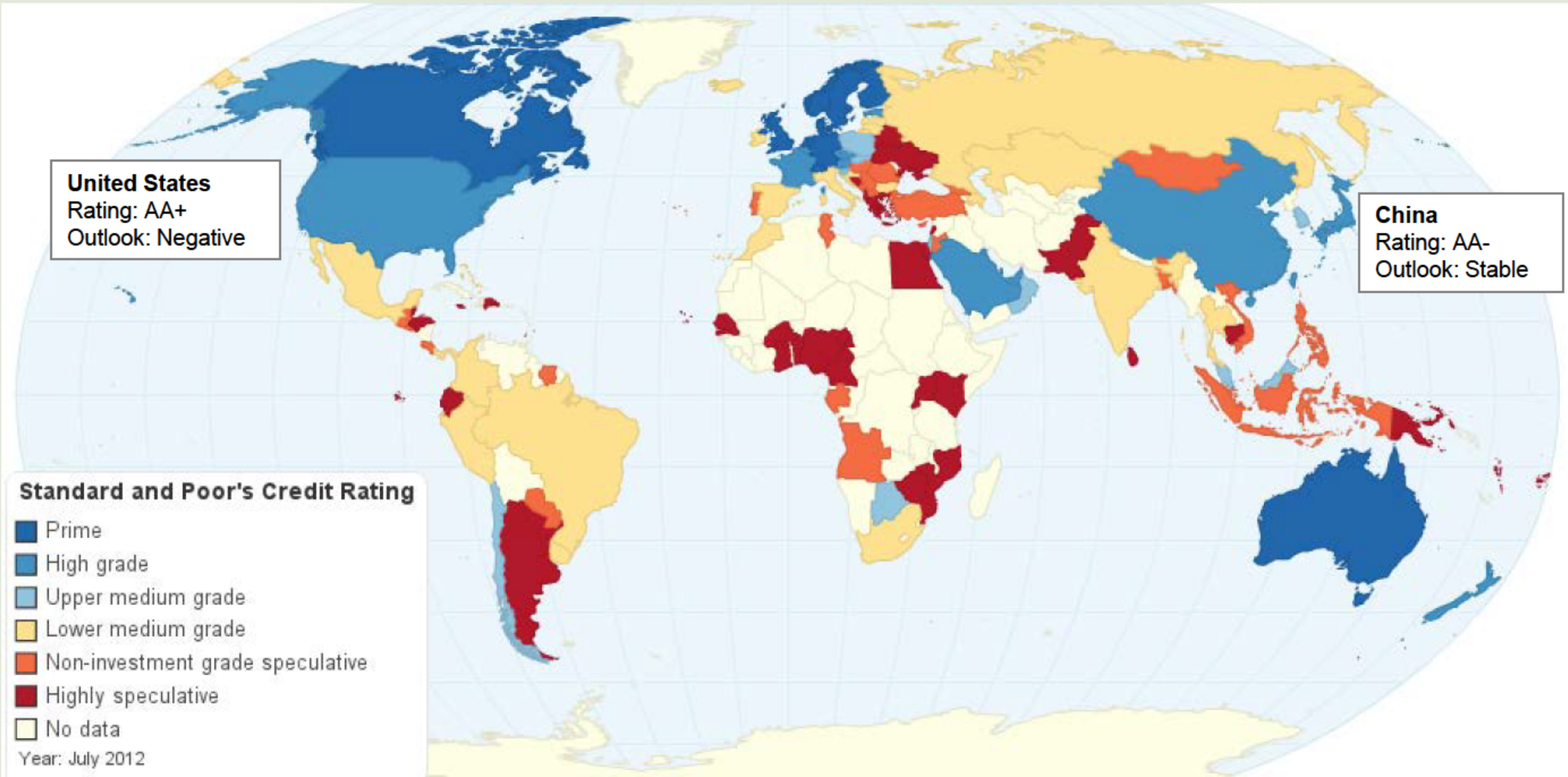
Source:
"Ratings Symbols and Definitions." Moody's Investors Service. November 2012.

Moody's Credit Ratings of U.S. and China



Source:
ChartsBin. 2012.

S&P Credit Ratings of U.S. and China



Source:
ChartsBin. 2012.

Conclusions: Project Finance, OREC Proposal

- FACW's OREC proposal is too high, not competitive with other proposed OSW projects in the U.S., and not in ratepayers' best interest.
- The uneconomic nature of FACW's OREC proposal appears to be based upon its high development costs, which appear to be orders of magnitude greater than other similarly-sized OSW projects.
- If the FACW projects were priced at a cost comparable to other similarly-sized OSW projects, the proposed project would be more affordable and would have the potential to create ratepayer benefits.
- If the FACW project faced a cost comparable to other similarly-sized project, but still priced the project at an OREC starting at $[redacted] project investors would likely earn a return in excess of close to 29 percent.

Conclusions: Project Finance, Capital Structure Ambiguities

FACW has not been able to provide exact details of how the project will be financed.

While FACW's pro forma analysis shows that the project will be financed by [redacted] percent debt and [redacted] percent equity, the Company's response to BPU discovery did not commit to this specific financing arrangement.

Instead, the Company stated:

[redacted]

Source:
[1]Response to NJBPU-Econ-17.

Conclusions: Project Finance, Capital Structure

If the FACW does finance its project as suggested, the level of debt it proposes to use, while attractive from an earnings perspective, is risky from a financial integrity and ownership perspective. FACW's Pro forma Analysis produces a Debt Service Coverage Ratio of [redacted] which is generally considered below investment grade.

A high debt ratio increases the risk of default and therefore increases the risk to ratepayers, unless regulatory protection mechanisms are created to insulate ratepayers. A [redacted] percent equity investment makes it easier to walk away from an investment without problems relative to an investment with a [redacted] percent or more equity stake.

The financing affiliate XEMC New Energy's earnings-based financial metrics compared to its peers suggest that its financial integrity is comparable to a U.S. company with a bond rating in the C to Ba range. However, its debt-based financial metrics are much higher, comparable to a U.S. company with a bond rating in the Aa to Aaa range.

5. Project Rate Impacts

FACW Rate Impact Model: Overview of Approach

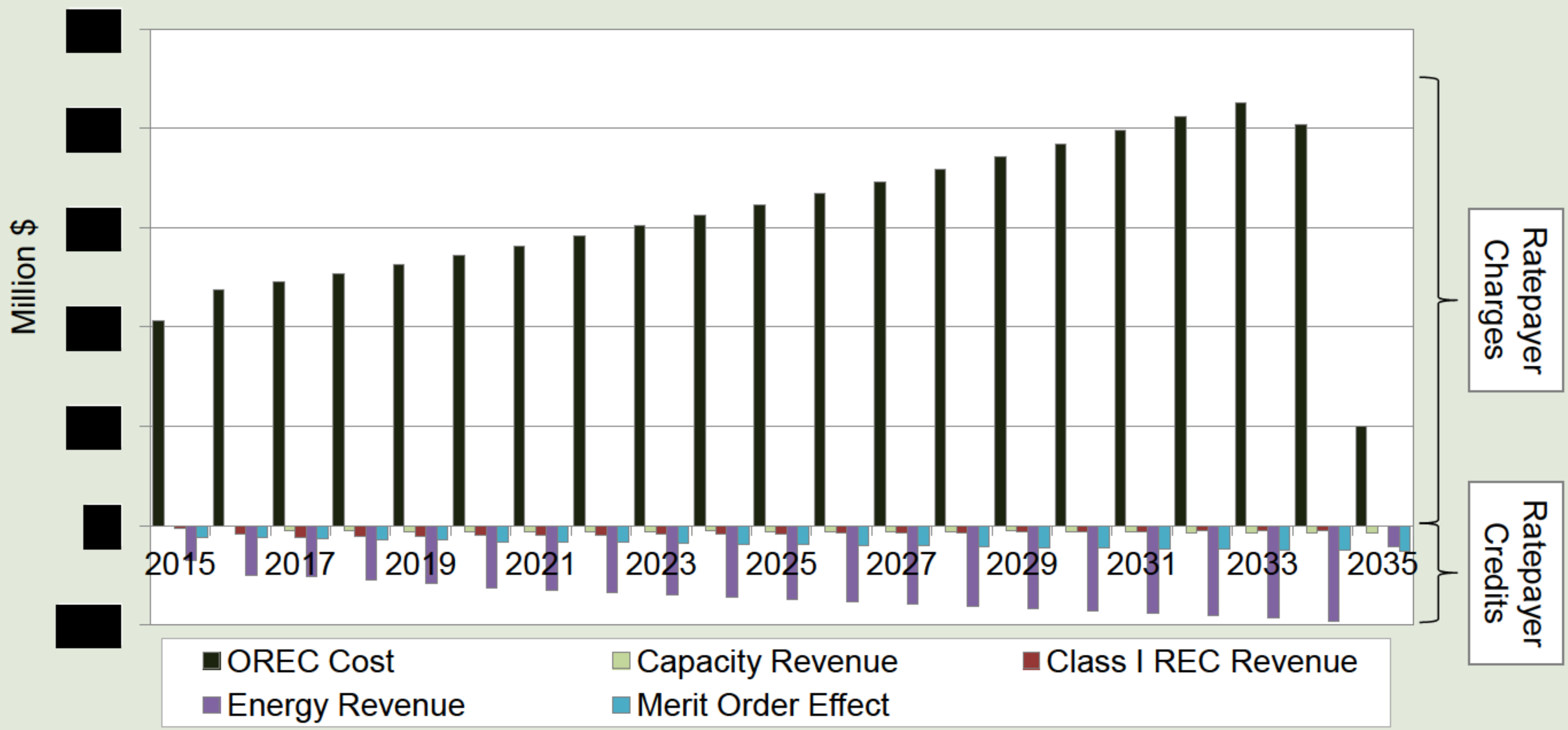
FACW's application includes a rate impact model that attempts to estimate the net rate impacts associated with the proposed OREC plan. In this FACW rate impact model, costs are created by the negative rate impacts of the proposed OREC rate. OREC costs are offset by offsetting credits or beneficial revenue streams.

The first set of credits in the FACW rate impact analysis include the energy revenue and capacity credits the project will sell into the PJM day-ahead market. These credits are directly accounted for and credited against ratepayer charges if the FACW project is developed.

The second set of credits included in the FACW rate impact analysis are more speculative and attempt to quantify such benefits as Class 1 REC savings and merit order effect (regional electricity supply savings created by lowering the overall regional power supply curve). This set of credits are highly speculative and, even if estimated correctly, are not credits that are itemized or directly credited against ratepayer OREC charges.

FACW Rate Impact Model: Estimated Rate Impacts

The FACW (net) rate impact estimates include ratepayer charges (increases to rate impacts) and ratepayer credits (reductions to rate impacts).



Source:
Amended Application, Appendix D, Optimized Project C-B Analysis.xlsx.

FACW Rate Impact Model: Unrealistic Assumptions

The FACW rate impact model includes a number of unrealistic assumptions that significantly bias its rate impact analysis. These unreasonable assumptions include:

- **Capacity credits** based upon an assumed level of capacity for FACW in excess of that commonly recognized by PJM for wind resources.
- Generous **capacity prices**.
- Exceptionally high **Class I REC prices**.
- **Wholesale energy prices** that are also unnecessarily inflated.

Each of these unreasonable assumptions were revised based upon a number of different factors.

FACW Rate Impact Model: Assumed Capacity Availability

FACW Assumed Capacity Availability:

FACW used a capacity value of [redacted] percent for each year of operation.[1] The PJM manual, however, sets the effective class average capacity factor at 13 percent. Once a project has "three or more years of applicable operational data" a capacity value may be calculated.[2]

FACW's rate impact model is inconsistent with PJM operational standards since the FACW model includes a higher capacity factor for the first three years. Increasing the capacity factor to [redacted] percent with no reasonably-measured data to judge new direct-drive technology, with just two operating prototypes recently constructed, places rate impact risk onto ratepayers if this value fails to materialize.

FACW's capacity assumptions will, all else equal, artificially increase the project capacity revenues and reduce the project's rate impacts.

Model Correction for Revised Rate Impact Analysis:

Capacity values were set to 13 percent for the entire operating period. FACW's assumed [redacted] percent capacity value should not be used until "applicable operational data" is calculated and verified since the use of anything different, at this time, is unknown and immeasurable with any degree of certainty.

Source: [1] Amended Application, Appendix D, Optimized Project C-B Analysis.xlsx.
[2] "Rules and Procedures for Determination of Generating Capability, PJM Manual 21." Prepared by System Planning Department, PJM. Effective Date: May 1, 2010.

FACW Rate Impact Model: Assumed Capacity Prices

FACW Assumed Capacity Prices:

FACW estimated its capacity prices using the Resource Clearing Price ("RCP") Forecast provided in the Long-Term Capacity Agreement Pilot Program ("LCAPP") proceeding.

The use of LCAPP-based prices is inappropriate for valuing potential OSW capacity sales since the use of the LCAPP prices will overstate the beneficial capacity revenues associated with the project, and thereby understate estimated rate impacts.

LCAPP-based prices were developed to show likely outcomes should a new regional electrical generation facility not be developed. Legislation, as well as Board action, have reduced the likelihood of these dire outcomes. More reasonable capacity price outcomes, based on the actions taken by New Jersey, are more appropriate. Further, the quarterly State of the Market Report for PJM in June 2012 shows 79,186 MW of capacity in generation request queues (representing construction through 2018), and an average installed capacity of 183,000 MW.[1]

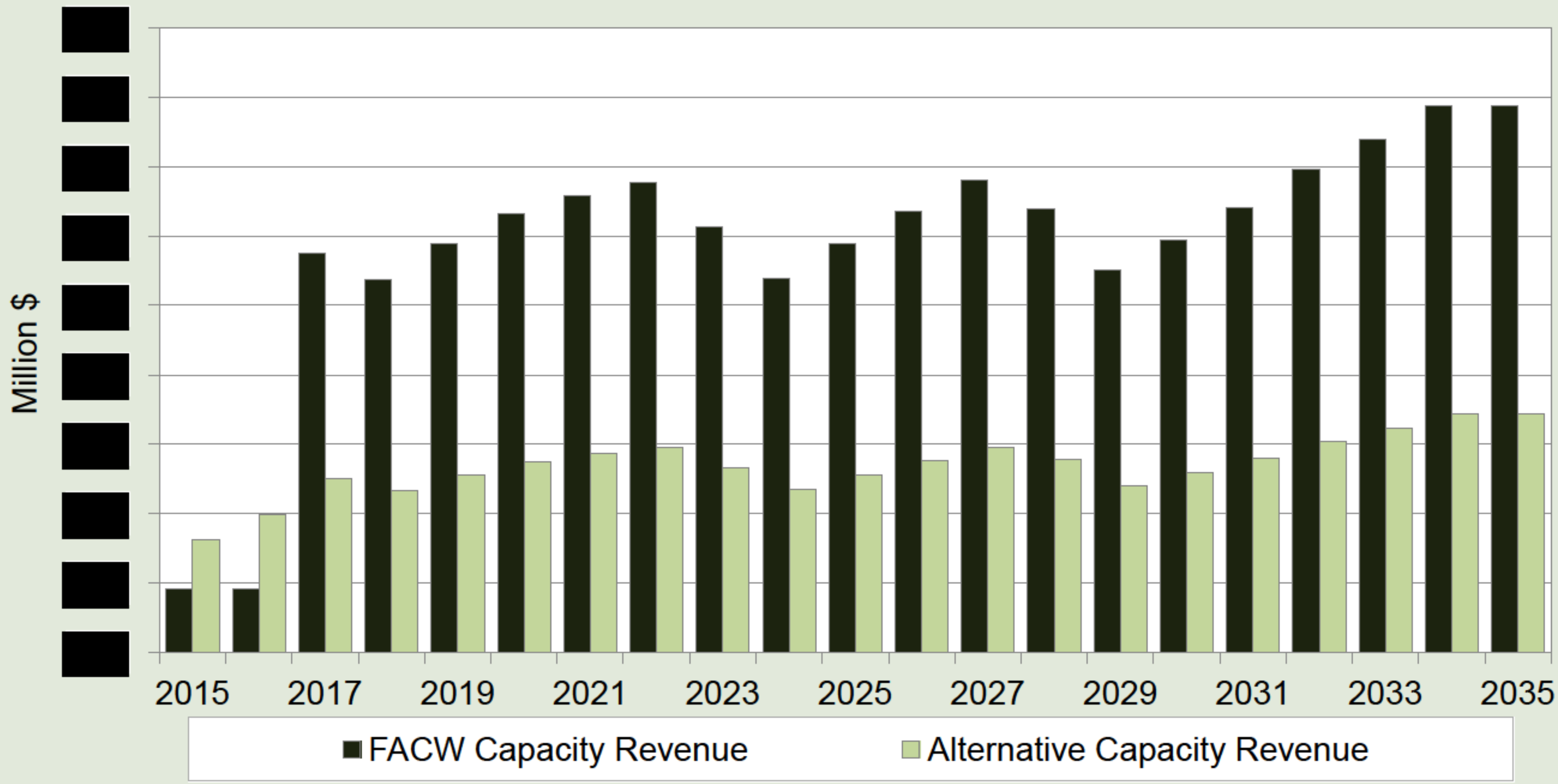
Model Correction for Revised Rate Impact Analysis:

The addition of new regional generation capacity should result in a reduction to the RCP forecast. Prices for 2015 and 2016 were changed to reflect actual and updated data, and for the remaining years, the forecast used by FACW was reduced by 33 percent.

Source: [1] "State of the Market Report for PJM." Monitoring Analytics, LLC. August 16, 2012.

FACW Rate Impact Model: Alternative Capacity Prices and Revenues

FACW's anticipated capacity revenues total $[redacted] million (or $[redacted] million NPV). The use of an alternative capacity factor and prices results in total capacity revenues of $[redacted] million (or $[redacted] million NPV), a reduction of [redacted] percent.



Source:
Amended Application, Appendix D, Optimized Project C-B Analysis.xlsx.

FACW Rate Impact Model: Assumed Class I REC Prices

FACW Assumed Class I REC Prices

FACW uses an aggressive and artificially escalated rate of increase in Class I REC prices. These assumptions will increase the Class I REC credit included in FACW's rate impact analysis thereby increasing Class I REC revenues and reducing the overall rate impact of the FACW project.

FACW's rate impact model assumes Class I REC prices will increase from their current rate of $[redacted]/MWh to $[redacted]/MWh to $[redacted]/MWh in 2016 and $[redacted]/MWh in 2017. This represents an increase of 400 percent from 2013 to 2017.

The 2010 OCE RPS Draft report showed Class I REC prices at $2/MWh, as does data posted on Flett Exchange.

FACW's analysis also fails to account for the lost economic benefits associated with avoided Class I renewable projects. These benefits will be lost of Class 1 renewable projects are squeezed out of the market by FACW.

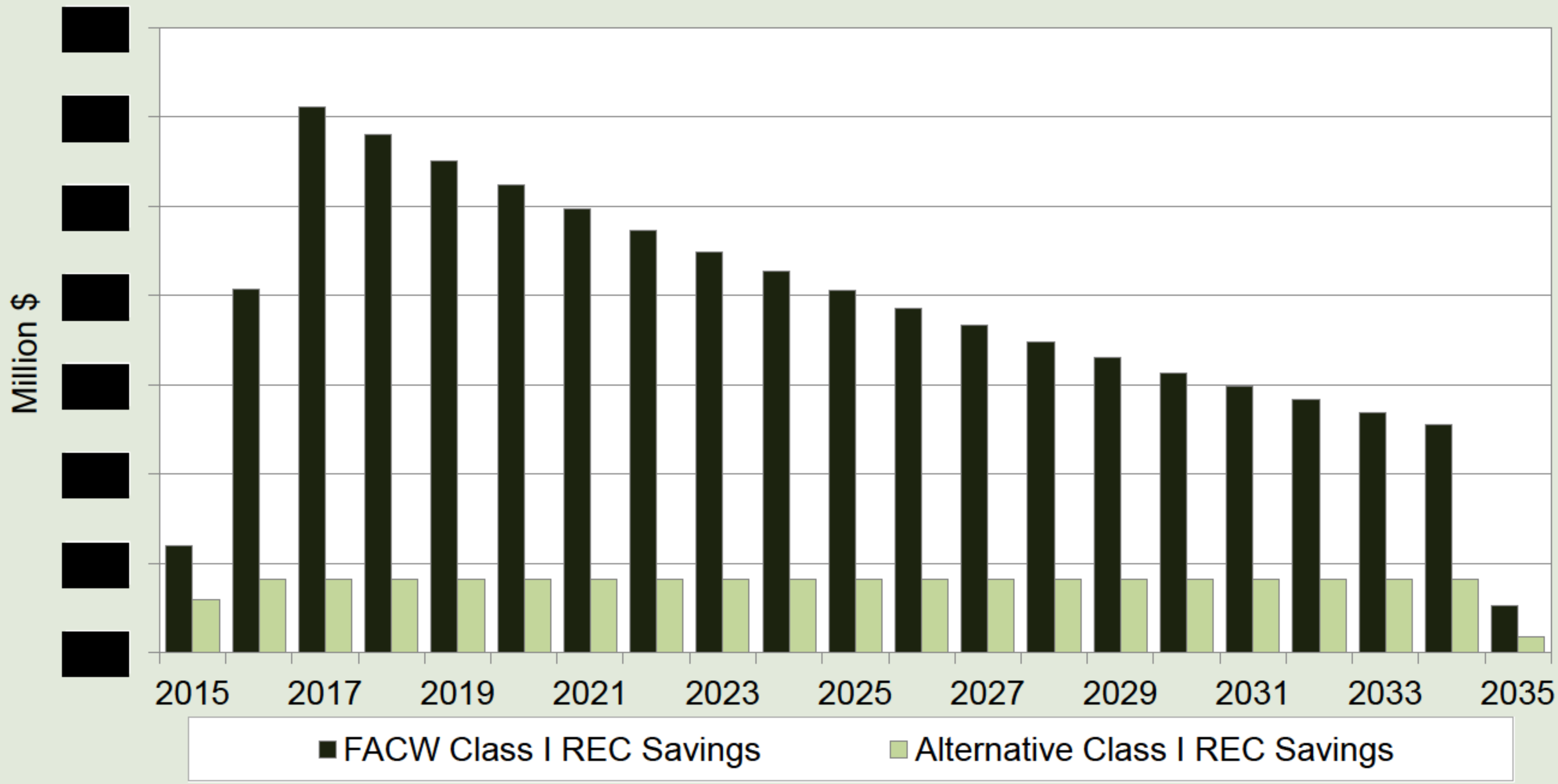
Model Correction for Revised Rate Impact Analysis:

Class I REC prices will stay low and constant at $2/MWh for the entire operating period.

Source:
Flett Exchange, http://www.flettexchange.com/index.php (last updated December 12, 2012).

FACW Rate Impact Model: Alternative Class I REC Revenues

FACW's anticipated Class I REC savings total $[redacted] million (or $[redacted] million NPV). The corrected Class I REC savings total $3.2 million (or $1.3 million NPV), a reduction of [redacted] percent.



Source:
Amended Application, Appendix D, Optimized Project C-B Analysis.xlsx.

FACW Rate Impact Model: Assumed Wholesale Energy Prices

FACW Assumed Wholesale Energy Prices

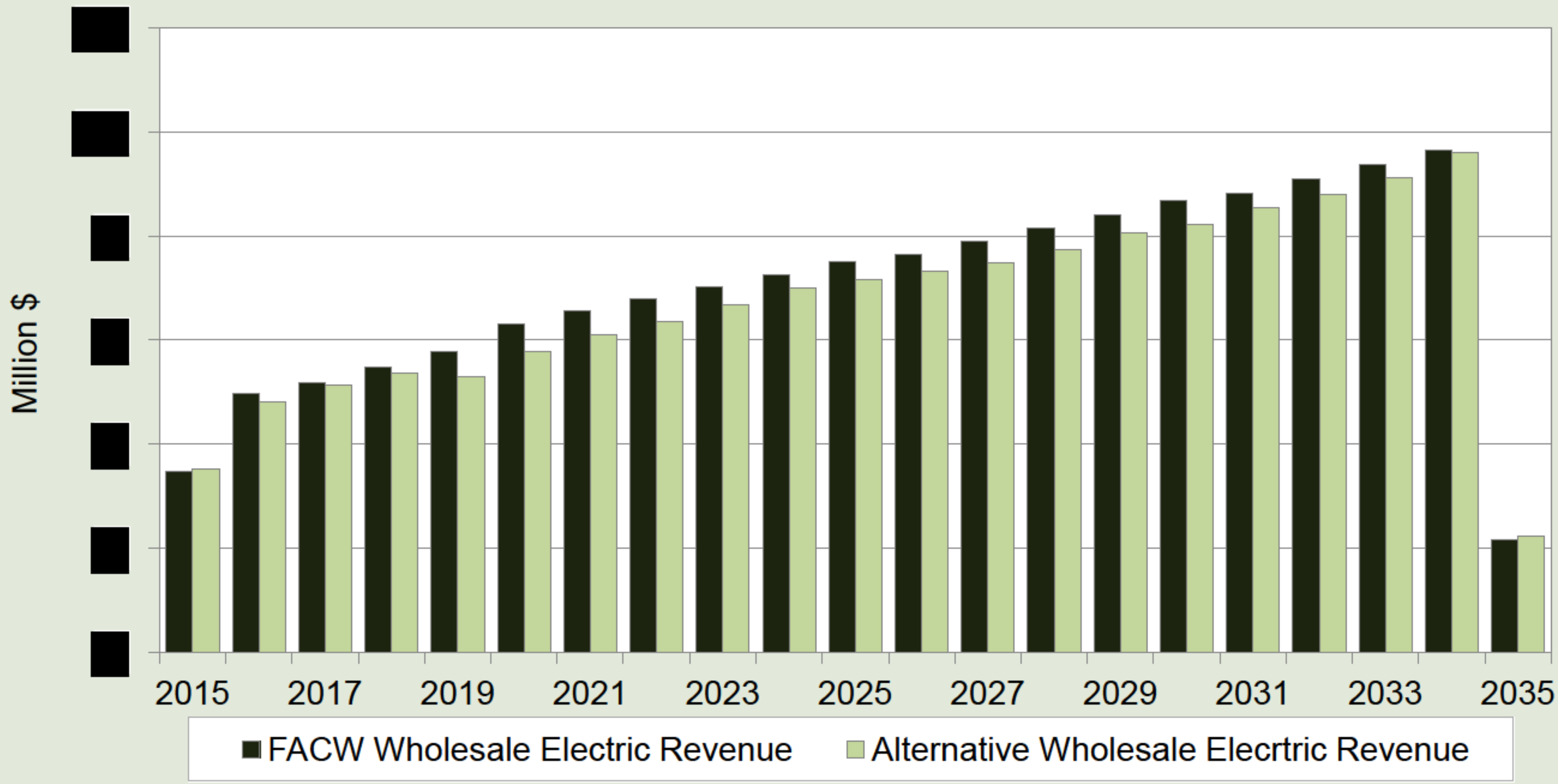
FACW applies a revenue credit for project wholesale power sales against project OREC costs in its rate impact model. FACW's wholesale prices are based on the Energy Information Administration's ("EIA") Annual Energy Outlook 2011 Reference Case long-term forecast. Rather than use the EIA prices published in nominal terms (based on a forecasted long-term inflation rate of 1.8 to 1.9 percent), FACW used the prices in 2009 $/kWh and then inflated them by its assumed inflation rate of [redacted] percent.

Model Correction for Revised Rate Impact Analysis:

Updated wholesale prices use the nominal prices published in EIA's Annual Energy Outlook 2012 Reference Case.

FACW Rate Impact Model: Alternative Wholesale Energy Prices

FACW's anticipated wholesale electric revenues total $[redacted] million (or $[redacted] million NPV). The corrected wholesale electric revenues total $140.3 million (or $50.8 million NPV), a reduction of [redacted] percent.



Source:
Amended Application, Appendix D, Optimized Project C-B Analysis.xlsx.

FACW Rate Impact Model: Assumed Merit Order Effect

FACW Assumed Merit Order Effect

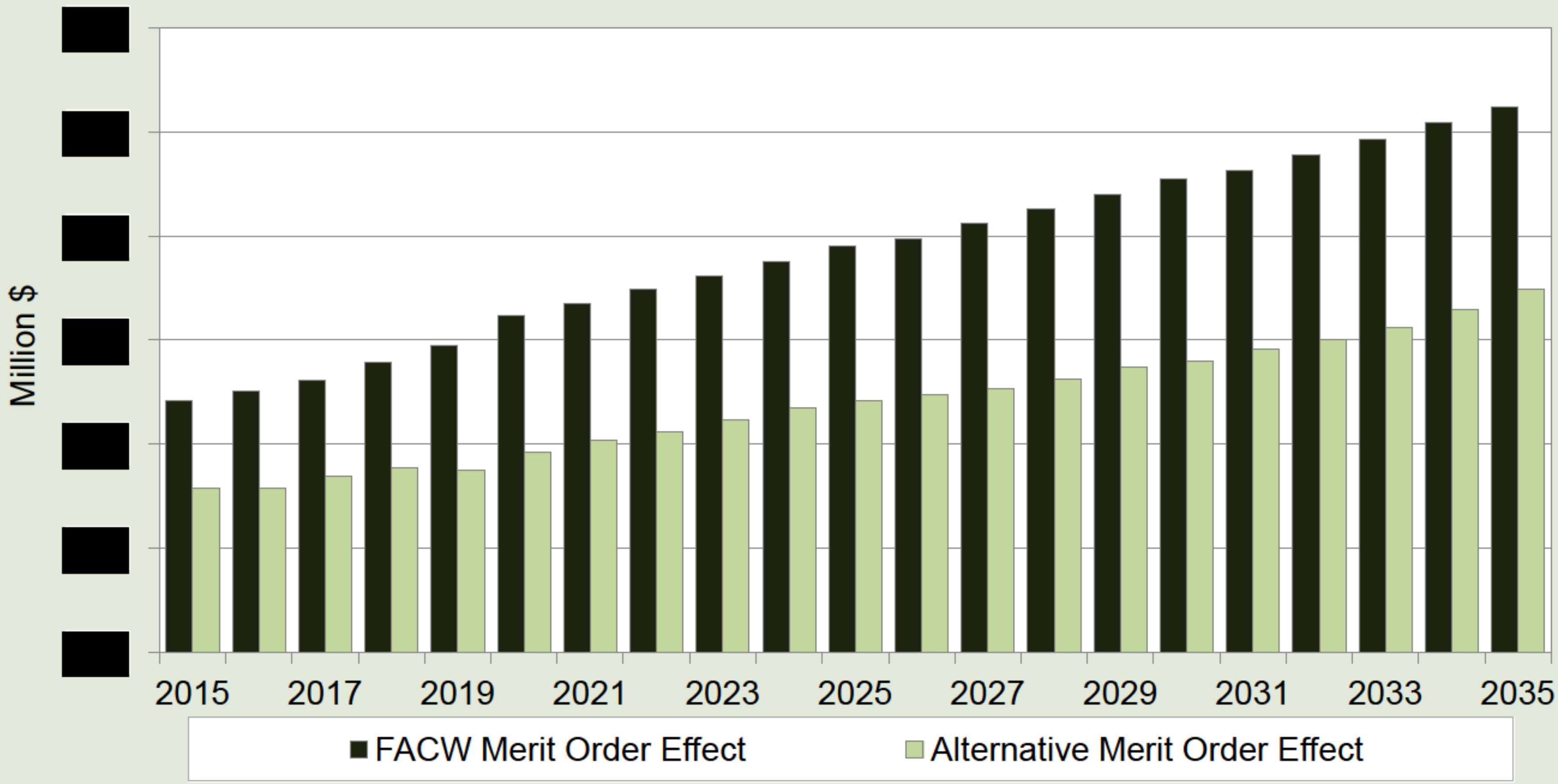
FACW's rate impact model includes a "merit order effect". This credit assumes that the additional electricity generation from renewable energy displaces high-cost fossil-fuel generation and lowers the overall cost of electricity to ratepayers.

Model Correction for Revised Rate Impact Analysis:

No changes were made to the methods used for calculating the merit order effect. However, the adjustment to the capacity factor, and the change in wholesale price will both have an impact on this benefit.

FACW Rate Impact Model: Alternative Merit Order Effect

FACW's anticipated merit order effect totals $[redacted] million (or $[redacted] million NPV). The corrected merit order effect due to changes in capacity factor and wholesale energy price totals $25.2 million (or $8.9 million NPV), a reduction of [redacted] percent.



Source:
Amended Application, Appendix D, Optimized Project C-B Analysis.xlsx.

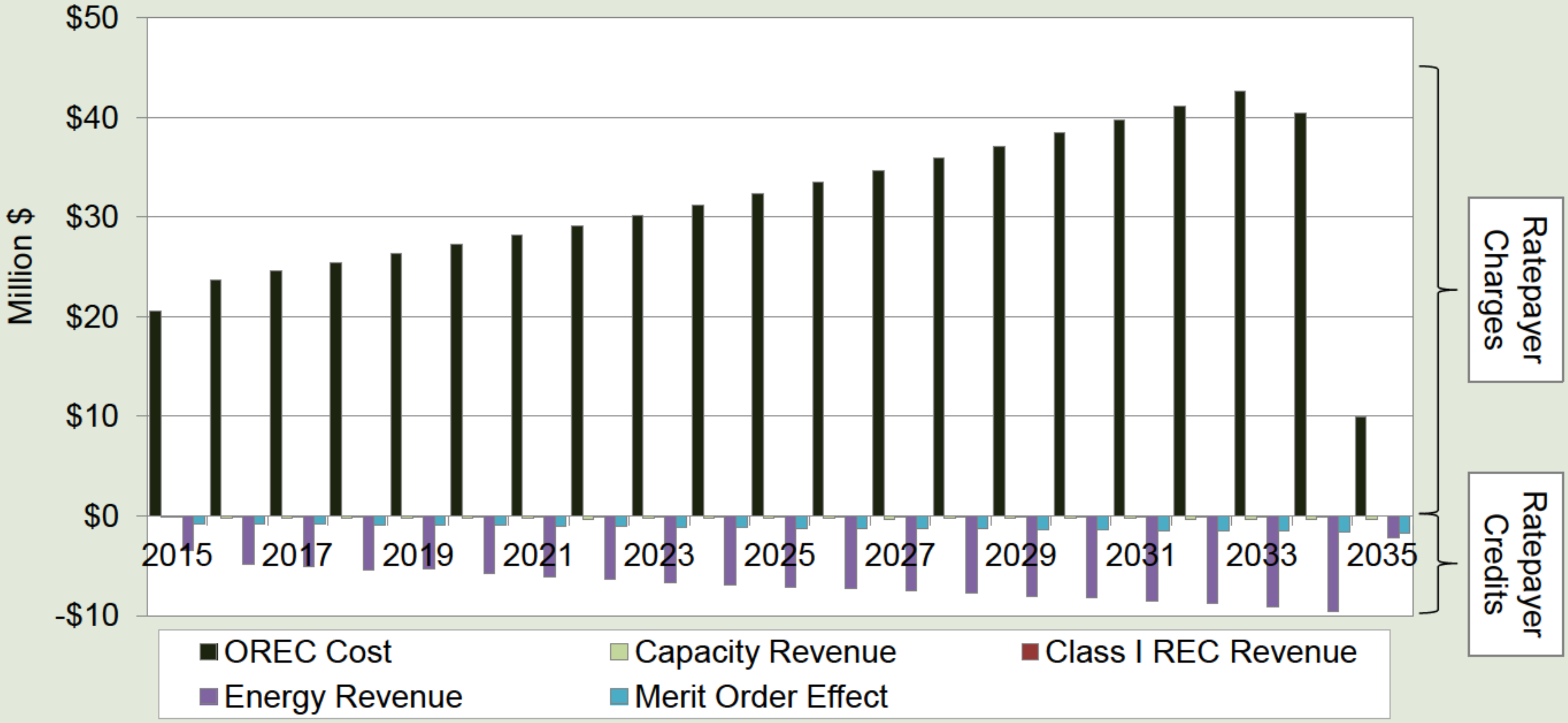
Revised Rate Impact Model and Results

The revised rate impact analysis shows that the FACW project will require a total of $282.2 million (NPV) in ratepayer support. This is offset by $74.2 million in capacity revenue, Class I REC savings, energy revenue and a merit order effect, leading to a total net rate increase of $208 million (NPV). On average, ratepayers will provide annual financial support to the FACW project of $16 to $31 million.

	OREC Costs	Capacity Revenue	Class I REC Savings	Energy Revenue	Merit Order Effect	Total Cost	Cost by Rate Class: Residential	Commercial	Industrial	Total
	(million $)									
2015	$ 20.6	$ 0.2	$ 0.1	$ 3.5	$ 0.8	$ 16.0	$ 6.3	$ 8.1	$ 1.6	$ 16.0
2016	23.7	0.2	0.2	4.8	0.8	17.8	7.0	9.0	1.8	$ 17.8
2017	24.6	0.3	0.2	5.1	0.8	18.2	7.2	9.2	1.8	$ 18.2
2018	25.4	0.2	0.2	5.4	0.9	18.8	7.5	9.5	1.8	$ 18.8
2019	26.3	0.3	0.2	5.3	0.9	19.7	7.9	10.0	1.9	$ 19.7
2020	27.2	0.3	0.2	5.8	1.0	20.1	8.0	10.1	1.9	$ 20.1
2021	28.2	0.3	0.2	6.1	1.0	20.6	8.3	10.4	2.0	$ 20.6
2022	29.2	0.3	0.2	6.4	1.1	21.3	8.6	10.7	2.0	$ 21.3
2023	30.2	0.3	0.2	6.7	1.1	22.0	8.9	11.0	2.0	$ 22.0
2024	31.3	0.2	0.2	7.0	1.2	22.7	9.2	11.4	2.1	$ 22.7
2025	32.4	0.3	0.2	7.2	1.2	23.6	9.6	11.8	2.1	$ 23.6
2026	33.5	0.3	0.2	7.3	1.2	24.5	10.0	12.3	2.2	$ 24.5
2027	34.7	0.3	0.2	7.5	1.3	25.4	10.5	12.7	2.3	$ 25.4
2028	35.9	0.3	0.2	7.7	1.3	26.4	10.9	13.2	2.3	$ 26.4
2029	37.1	0.2	0.2	8.1	1.4	27.3	11.3	13.6	2.4	$ 27.3
2030	38.4	0.3	0.2	8.2	1.4	28.4	11.8	14.2	2.4	$ 28.4
2031	39.8	0.3	0.2	8.5	1.5	29.3	12.2	14.6	2.5	$ 29.3
2032	41.2	0.3	0.2	8.8	1.5	30.4	12.7	15.1	2.6	$ 30.4
2033	42.6	0.3	0.2	9.1	1.6	31.4	13.2	15.6	2.6	$ 31.4
2034	40.4	0.3	0.2	9.6	1.6	28.6	12.1	14.2	2.4	$ 28.6
2035	10.0	0.3	0.0	2.2	1.7	5.6	2.4	2.8	0.5	$ 5.6
Total	**$ 652.7**	**$ 5.7**	**$ 3.2**	**$ 140.3**	**$ 25.2**	**$ 478.2**	**$ 195.6**	**$ 239.5**	**$ 43.1**	**$ 478.2**
NPV	**$ 282.2**	**$ 2.5**	**$ 1.5**	**$ 59.7**	**$ 10.5**	**$ 208.0**	**$ 84.2**	**$ 104.5**	**$ 19.3**	**$ 208.0**

Revised Rate Impacts

The revised rate impact analysis shows that the proposed FACW project will likely have a considerable net increase in rates across the entire time period in which it is in operation. Approval of the FACW project, based upon its current costs, configuration, and proposed OREC plan, will likely cost ratepayers some $208 million (NPV).



Rate Impact Comparison: Original FACW Analysis to Revised Rate Impact Results

The FACW rate impact model results in annual ratepayer costs of between $[redacted] million and $[redacted] million. The revised rate impact analysis shows that the actual impacts are likely between [redacted] percent and [redacted] percent higher than FACW's estimated rate impact.

	FACW Net Rate Impacts				Revised Net Rate Impacts			
	Residential	Commercial	Industrial	Total	Residential	Commercial	Industrial	Total
	($/customer)							
2015	[redacted]				$ 1.76	$ 16.12	$ 125.08	$ 3.93
2016					1.96	17.72	137.46	4.34
2017					2.00	17.92	139.02	4.40
2018					2.06	18.29	141.95	4.52
2019					2.16	19.02	147.59	4.72
2020					2.19	19.13	148.43	4.77
2021					2.24	19.45	150.90	4.87
2022					2.32	19.88	154.26	5.00
2023					2.38	20.28	157.33	5.12
2024					2.45	20.70	160.60	5.25
2025					2.54	21.26	164.98	5.42
2026					2.64	21.85	169.52	5.60
2027					2.73	22.45	174.23	5.78
2028					2.83	23.03	178.69	5.95
2029					2.92	23.56	182.81	6.12
2030					3.03	24.23	187.99	6.32
2031					3.12	24.75	192.07	6.49
2032					3.23	25.38	196.93	6.68
2033					3.33	25.95	201.39	6.87
2034					3.03	23.38	181.42	6.22
2035					$ 0.59	$ 4.55	$ 35.30	$ 1.22

Rate Impact Comparison: Extrapolation of FACW Proposal to the Entire OSW RPS

The proposed FACW project, while expensive on a per unit basis, is very small compared to other OSW projects, and thus, the rate impacts appear moderate, particularly on a per customer basis. The magnitude of the project's rate impact becomes more apparent if the unit costs are applied to the entire OSW RPS goal of 1,100 MW. If the entire 1,100 MW OSW goal were met with project costs and rate impacts comparable to FACW's proposal, New Jersey ratepayers would fund an annual amount of up to $1.3 billion, in addition to their normal utility payments.

	OREC Costs	Capacity Revenue	Class I REC Savings	Energy Revenue	Merit Order Effect	Total Cost	Cost by Rate Class: Residential	Commercial	Industrial	Total	Net Rate Impacts: Residential	Commercial	Industrial	Total
	(million $)										($/customer)			
2015	$ 906.2	$ 4.0	$ 10.5	$ 153.3	$ 53.2	$ 685.2	$ 268.7	$ 347.1	$ 69.4	$ 685.2	$ 75.5	$ 689.8	$ 5,352.6	$ 168.1
2016	1,044.7	4.0	35.8	218.5	55.2	731.1	287.9	370.0	73.2	731.1	80.4	728.1	5,649.6	178.2
2017	1,081.2	25.3	53.7	227.5	57.6	717.2	283.5	362.6	71.0	717.2	78.7	706.5	5,481.9	173.7
2018	1,119.1	23.6	51.1	241.0	61.3	742.1	294.6	374.9	72.7	742.1	81.3	723.2	5,611.2	178.6
2019	1,158.2	25.9	48.5	254.8	65.0	764.0	304.4	385.5	74.0	764.0	83.5	736.4	5,713.7	182.7
2020	1,198.8	27.8	46.1	278.2	71.1	775.6	310.3	391.0	74.4	775.6	84.6	739.4	5,737.1	184.2
2021	1,240.7	29.0	43.8	288.3	73.8	805.8	323.6	405.8	76.4	805.8	87.7	759.8	5,895.6	190.2
2022	1,284.2	29.8	41.6	298.6	76.6	837.6	337.7	421.3	78.5	837.6	91.0	781.1	6,060.8	196.4
2023	1,329.1	27.0	39.5	309.1	79.6	874.0	353.7	439.2	81.1	874.0	94.7	806.2	6,255.1	203.6
2024	1,375.7	23.7	37.5	319.7	82.6	912.1	370.6	457.8	83.7	912.1	98.6	832.0	6,455.8	211.1
2025	1,423.8	25.9	35.7	330.5	85.8	945.9	385.8	474.3	85.8	945.9	102.1	853.4	6,621.8	217.6
2026	1,473.6	27.9	33.9	336.5	87.5	987.8	404.4	494.7	88.6	987.8	106.4	881.4	6,839.2	225.7
2027	1,525.2	29.9	32.2	347.6	90.6	1,024.9	421.2	512.7	91.0	1,024.9	110.1	904.5	7,017.8	232.7
2028	1,578.6	28.1	30.6	358.8	93.7	1,067.4	440.3	533.4	93.7	1,067.4	114.4	931.5	7,227.9	240.8
2029	1,633.8	24.2	29.1	370.3	96.8	1,113.5	461.1	555.7	96.6	1,113.5	119.1	961.0	7,456.4	249.5
2030	1,691.0	26.1	27.6	381.9	100.0	1,155.3	480.2	576.0	99.2	1,155.3	123.3	986.1	7,651.2	257.3
2031	1,750.2	28.2	26.2	388.2	101.8	1,205.7	503.0	600.3	102.3	1,205.7	128.4	1,017.7	7,896.2	266.7
2032	1,811.5	30.6	24.9	400.1	105.1	1,250.7	523.7	622.0	105.0	1,250.7	132.9	1,043.9	8,099.8	274.9
2033	1,874.9	32.5	23.6	412.2	108.5	1,298.0	545.6	644.7	107.7	1,298.0	137.6	1,071.3	8,312.6	283.5
2034	1,778.0	34.7	22.5	424.4	111.9	1,184.5	499.7	587.6	97.2	1,184.5	125.3	966.8	7,501.2	257.0
2035	439.6	34.7	4.7	95.6	115.4	189.3	80.1	93.8	15.4	189.3	20.0	152.8	1,185.3	40.8
Total	$ 28,718.1	$ 543.0	$ 699.0	$ 6,435.1	$ 1,773.2	$ 19,267.7	$ 7,880.4	$ 9,650.4	$ 1,736.9	$ 19,267.7	$ 2,075.7	$ 17,272.9	$ 134,023.1	$ 4,413.4
NPV	$ 12,416.4	$ 224.8	$ 351.4	$ 2,742.8	$ 736.8	$ 8,360.7	$ 3,384.3	$ 4,199.9	$ 776.4	$ 8,360.7	$ 905.9	$ 7,721.0	$ 59,908.8	$ 1,948.7

Conclusions: Rate Impacts

The revised rate impact analysis shows that the FACW project will require a total of $282.2 million (NPV) in support. This is offset by $74.2 million (NPV) from a combination of capacity revenues, Class I REC savings, energy revenues, and a merit order effects, leading to a total net rate increase of $208 million (NPV).

On average, ratepayers will provide annual financial support to the FACW project of $16 to $31 million. The revised rate impact analysis shows that actual impacts are likely between [redacted] percent and [redacted] percent higher than FACW's estimated rate impact.

The proposed FACW project, while expensive on a per unit basis, is very small compared to other OSW projects, and thus, the rate impacts appear moderate particularly on a per customer basis. The magnitude of the project's rate impacts becomes more apparent if the unit costs are applied to the entire OSW RPS goal of 1,100 MW. If the entire 1,100 MW OSW goal were met with project costs and rate impacts comparable to FACW's proposal, New Jersey ratepayers would be funding up to $1.3 billion each year, in addition to their normal utility payments.

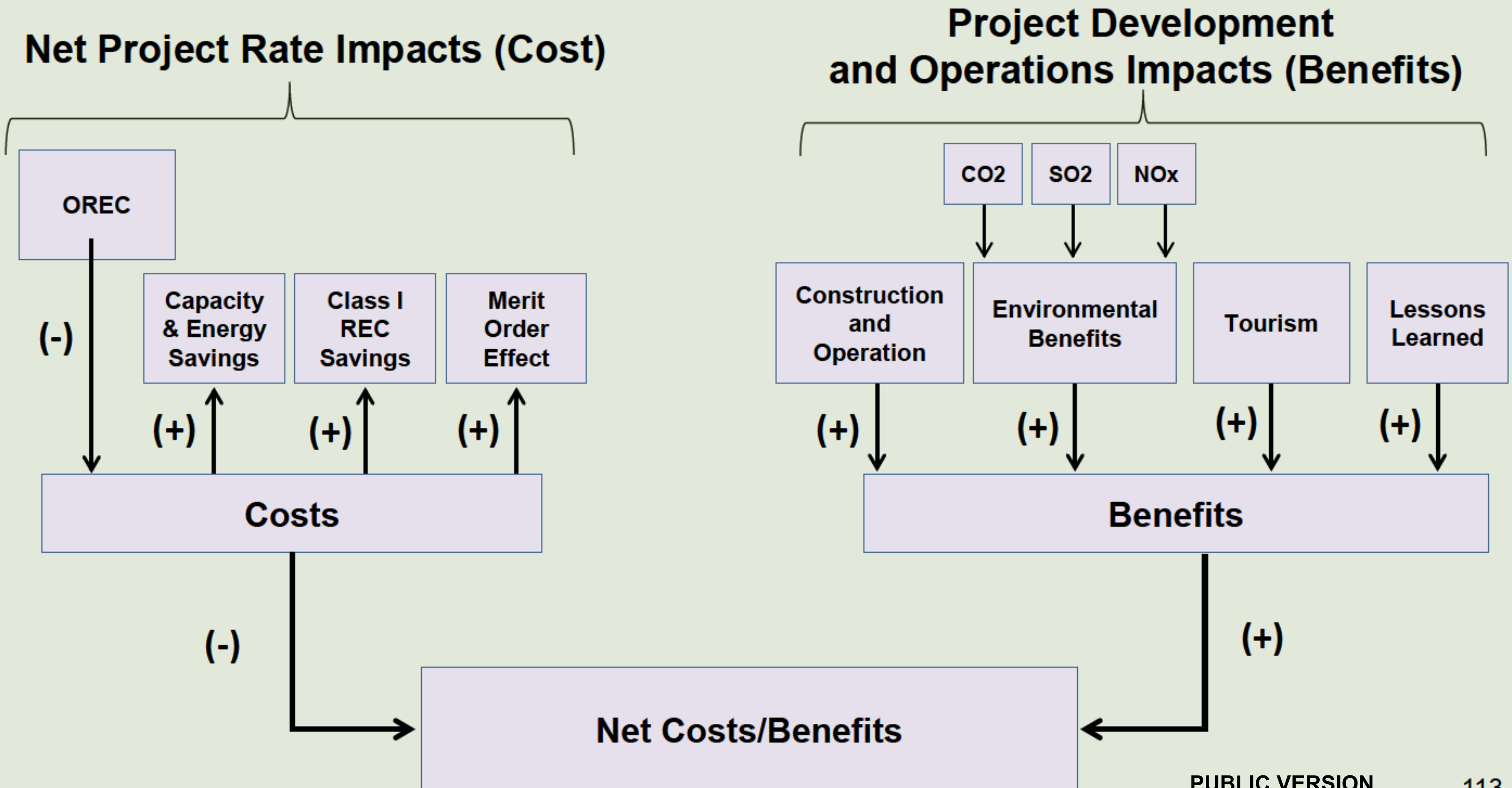
6. Project Net Economic Benefits

6. Project Net Economic Benefits

a. Overview and Comparison

FACW Cost Benefit Model: Overview of Approach

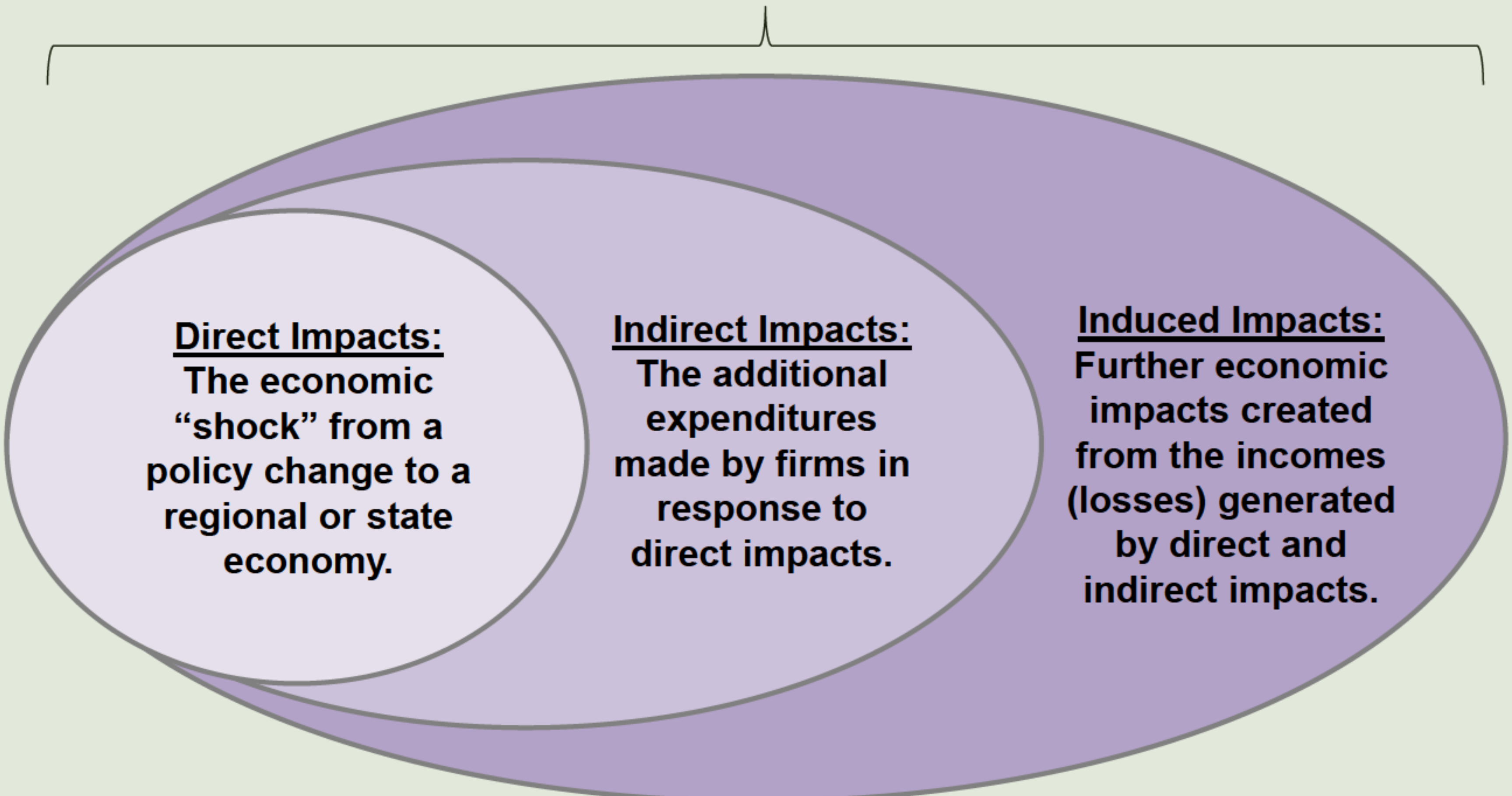
Net economic impacts are estimated by comparing the negative impacts associated with OREC-related rate increases and the various benefits created by the development and operation of the proposed FACW project. Benefits below are represented as positives (+) and costs as negatives (-).



Overview of Economic Impact Modeling

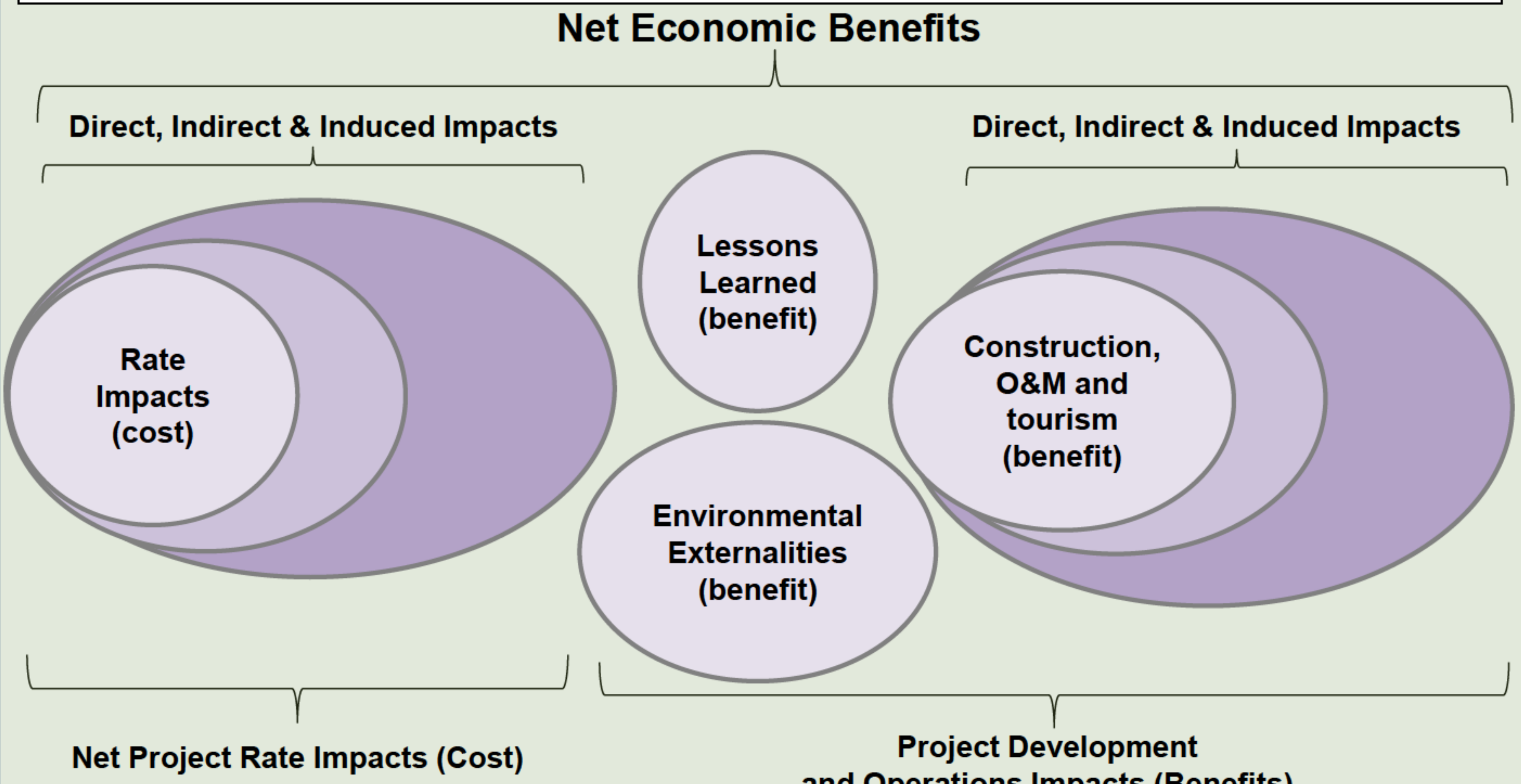
Economic impacts are estimated to be the sum of the direct, indirect and induced effects that an investment or policy change has on a regional or state economy.

Total Economic Impact



Net Benefits Analysis

Net benefits calculation must include the direct, indirect and induced impacts from both the rate impacts and project development and operation. FACW corrected this deficiency but includes a number of questionable additional benefits such as lessons learned, externalities, and tourism.



Fallacies in the FACW Economic Impact Analysis: OREC, Construction, and Operation

FACW's economic impact estimates of its OREC-induced rate increases (negative impacts) and its construction and development benefits (positive impacts) are:

(1) Dramatically different and entirely inconsistent with its prior application before the Board.

(2) Implausibly large and entirely at odds with a host of other comparable economic impact estimates including those conducted by the Rutgers' Center for Energy, Economics and Environmental Policy ("CEEEP").

Issue 1: Inconsistency of FACW's Estimates with its Prior Application

- In its original application, FACW estimated that [redacted] **percent** of project expenditures for construction and [redacted] percent of expenditures for O&M would be spent in-state.
- In its current Amended Application, FACW has increased these estimates to [redacted] **percent** of expenditures for construction and [redacted] percent of expenditures for O&M to be spent in-state.
- Although total project capital expenditures have decreased from $[redacted] million to $[redacted] million, the dollars spent in state for construction has increased from **$[redacted] million to $[redacted] million: over double its original application**.

Comparison of FACW's Current Amended Application and Original Application

The in-state expenditure assumptions used by FACW in calculating economic benefits from construction and operations has changed substantially between its original application and the current Amended Application.

FACW has not provided any justification for these significant changes.

[redacted]

Source:
Amended Application, Appendix D, Exhibit A-2, pp. 3-4; and Response to BPU-1-Econ-10.

Issue 2: Implausibility of FACW's Estimates

FACW's original application used the JEDI Model to estimate project economic impacts, while its current Amended Application uses the R/ECON model. This model has been developed, and maintained by Rutgers University.

The R/Econ model is a regional economic impact model estimating a baseline case for the New Jersey economy. "Shocks" can be incorporated into the model to develop a change case, which in turn can be compared to the baseline estimate of the New Jersey economy in order to calculate economic impacts.

FACW gave Rutgers information about its project which presumably was entered into the R/Econ model. To date, FACW has still not provided any information or explanation on how FACW instructed Rutgers to run this model or the recommended economic sectors that should be "shocked" as a result of project development and operation as well as OREC impacts.[1]

The impact results provided by FACW are orders of magnitude larger than the same results FACW provided to the Board in its last application using the JEDI model. FACW made no attempt to reconcile the large discrepancies in the economic impacts it calculated in its original application and its current application raising significant questions about the veracity of its current estimates.

Source: [1]RCR-PF2-46.

Impact Comparisons between FACW's Various Board Applications

Generally, an economic impact "multiplier" can be interpreted as the ratio of the total economic impact associated with a particular project to its direct economic impact. A multiplier of 2, for instance, suggests that the total economic impact is two times greater than the direct impact.

In the last FACW filing, the Company estimated a multiplier of around 1.46 using the JEDI model while Rate Counsel's economic impact multipliers were comparable around 1.47 using the Implan model.

In the current filing, FACW provided an implausibly large economic output multiplier of 2.62. The Company's implied multiplier is even more dubious considering that it is a "composite" number that nets the positive benefits of OSW development against the negative OREC rate impacts.

Implied Multiplier (Impact) Differences

FACW's current economic impact estimates lead to an output multiplier that is an order of magnitude greater than its earlier application.

	NPV Direct Impact	Multiplier	NPV Output
FACW Current Amended Application (R/Econ)	[redacted]	2.6269	[redacted]
FACW Original Application (JEDI)		1.4685	
ACG (IMPLAN)		1.4734	

- **The impact per dollar (aggregate multiplier) for Implan and JEDI are comparable.**
- **The impact per dollar for R/ECON is almost two times higher than Implan or JEDI.**
- **The higher implied impact per dollar in the R/ECON model leads to economic impacts that are substantially higher than either Implan or JEDI.**

Impact Comparisons between FACW's Various Board Applications

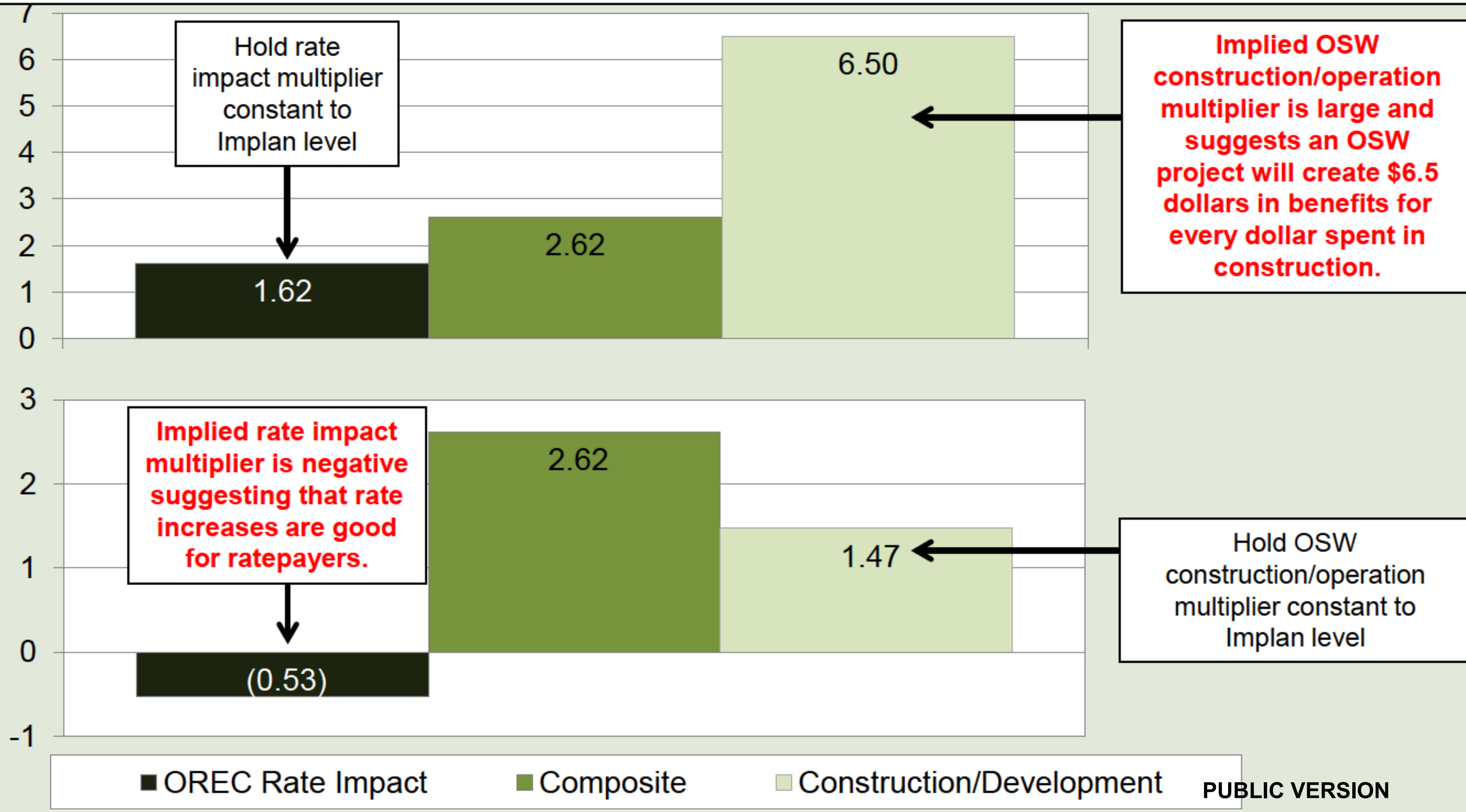
The Company's implied multiplier of 2.62 is highly suspect since it is a "composite" number that nets the positive benefits of OSW development against the negative OREC rate impacts. This means that the construction benefits associated with the project have to be exceptionally and almost unbelievably large to offset OREC rate impacts OR the economic impacts associated with a rate increase (created by the OREC charges) are very, very small if not negative (indicating that ratepayers benefit from increases in their rates).

FACW did not provide separate economic impact output data in order to assess the relative differences between its estimated (a) negative rate impacts and (b) its positive construction and operation impacts.

A decomposition of this "composite" multiplier can be estimated for both impacts (i.e., rates, construction/operation) if one of the impacts is held constant and the composite number is used, algebraically, to solve for the unknown number. Estimating this separately for each impact provides a range of the potential individual impacts for comparison.

Illustrative Multiplier Comparison

Implicit in FACW's economic impact analysis is that its construction benefits are 6.5 times every dollar spent in the New Jersey economy, or that rate increases yield benefits to New Jersey ratepayers. Neither result is plausible.



CEEEP- Estimated OSW Economic Impacts and Multipliers

Table A.5: Economic and Tax Impacts on New Jersey of Installing 60 MW Off-shore Wind Park, Assuming All Production Takes Place in the State (Year 2000 Dollars)

	Economic Component			
	Output (000$)	Employment (jobs)	Income (000$)	Gross State Product (000$)
I. TOTAL EFFECTS (Direct and Indirect/Induced)*				
1. Agriculture	60.2	0	6.2	11.5
2. Agri. Serv., Forestry, & Fish	46.7	1	24.1	39.2
3. Mining	108.3	1	37.3	71.1
4. Construction	6,601.3	40	3,066.3	4,340.5
5. Manufacturing	56,821.3	240	16,624.7	21,836.4
6. Transport. & Public Utilities	7,360.5	21	1,457.5	2,812.5
7. Wholesale	2,999.4	17	1,219.7	1,288.3
8. Retail Trade	3,704.1	60	1,382.6	2,150.1
9. Finance, Ins., & Real Estate	4,240.8	22	1,420.2	2,854.4
10. Services	6,510.1	62	2,838.8	3,233.3
Private Subtotal	88,452.7	463	28,077.5	38,637.1
Public				
11. Government	218.5	1	66.6	105.3
Total Effects (Private and Public)	88,671.2	464	28,144.0	38,742.4
II. DISTRIBUTION OF EFFECTS/MULTIPLIER				
1. Direct Effects	60,878.0	262	18,727.9	25,558.5
2. Indirect and Induced Effects	27,793.2	203	9,416.1	13,183.9
3. Total Effects	88,671.2	464	28,144.0	38,742.4
4. Multipliers (3/1)	1.457	1.775	1.503	1.516
III. COMPOSITION OF GROSS STATE PRODUCT				
1. Wages--Net of Taxes				25,637.1
2. Taxes				5,524.4
a. Local				1,033.9
b. State				841.2
c. Federal				3,649.3
General				631.8
Social Security				3,017.5
3. Profits, dividends, rents, and other				[illegible]
4. Total Gross State Product (1+2+3)				[illegible]

IV. TAX ACCOUNTS

	Business	Household
1. Income --Net of Taxes	25,637.1	[illegible]
2. Taxes	5,524.4	5,[illegible]
a. Local	1,033.9	[illegible]
b. State	841.2	[illegible]
c. Federal	3,649.3	4,[illegible]
General	631.8	4,[illegible]
Social Security	3,017.5	[illegible]

EFFECTS PER MILLION DOLLARS OF INITIAL EXPENDITURE

Employment (Jobs)	7.6
Income	462,302.2
State Taxes	24,344.8
Local Taxes	29,007.5
Gross State Product	636,394.0
INITIAL EXPENDITURE IN DOLLARS	60,878,000

Note: Detail may not sum to totals due to rounding.

*Terms:

Direct Effects --the proportion of direct spending on goods and services produced in the specified region.

Indirect Effects--the value of goods and services needed to support the provision of these direct economic effects.

Induced Effects--the value of goods and services needed by households that provide the direct and indirect labor.

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A 2004 study completed by Rutger's Center for Energy, Economic and Environmental Policy ("CEEEP"), using the same R/Econ model used by FACW, estimated OSW economic impact multipliers considerably lower than those included in the FACW application.

This study was relied upon by the Board in setting its 20 percent RPS. The CEEEP OSW multipliers are consistent with the Implan and JEDI multipliers, all of which are considerably lower than those utilized by FACW.

II. DISTRIBUTION OF EFFECTS/MULTIPLIER				
1. Direct Effects	60,878.0	262	18,727.9	25,558.5
2. Indirect and Induced Effects	27,793.2	203	9,416.1	13,183.9
3. Total Effects	88,671.2	464	28,144.0	38,742.4
4. Multipliers (3/1)	1.457	1.775	1.503	1.516

Source: Center for Energy, Economic & Environmental Policy. Economic Impact Analysis of New Jersey's Proposed 20% Renewable Portfolio Standard. 8 December 2004. Page 83 (Appendix A).

Multiplier Comparisons: R/ECON, JEDI and Implan

The implied multipliers in FACW's current application are orders of magnitude larger than CEEEP's OSW multiplier; FACW's own estimates in its prior application (JEDI model); other JEDI multipliers for renewable energy; and Implan multipliers for electric power, and various heavy manufacturing and construction industries.

	Multiplier
Implied Construction and O&M (R/ECON)	6.5036
CEEEP (R/ECON)	1.4570
FACW Original Application (JEDI)	1.4683
JEDI Default Inputs	
Wind	1.6875
Solar PV	1.1642
Hydro	1.4972
Geothermal	2.2024
Implan	
OSW Construction	1.5697
Sector 31: Electric Power Generation, Transmission, and Distribution	1.2141
Sector 35: Manufacturing and Industrial Construction	1.4735
Sector 115: Petroleum Refineries[1]	1.2393
Sector 120: Petrochemical Manufacturing[1]	1.9738

Note:
[1]Sectors 115 and 120 are not available for Atlantic County, therefore statewide multipliers are presented.

Conclusions: FACW's Economic Impact Estimates (Construction and Rate Impacts)

In conclusion, FACW's economic impact estimates are implausible and entirely inconsistent with its prior Board filing. FACW's impact estimates are also inconsistent with the prior OSW economic impact numbers used by the Board in its 20 percent RPS goal proceedings. The numbers provided by FACW are also inconsistent with the economic impact estimates associated with other renewable energy technologies and even heavy construction and industry activities commonly known to generate large economic impacts.

Further, consider that FACW's OREC proposal will result in a cost to New Jersey ratepayers of some $[redacted] million based on its own estimates. FACW also estimates that the direct capital expenditures (benefits) associated with construction and operation of its OSW project are $[redacted] million. So – even based on FACW's own estimates, the <u>direct</u> costs of the OSW project are two times higher than the project's benefits. It is simply implausible to believe that "multiplier impacts" will turn this basic negative outcome around and lead to an alternative outcome where not only are the <u>total</u> benefits positive, but they are (on net) two times larger than any other estimate provided to date before the Board on OSW benefits. The Board should reject such a suggestion.

6. Project Net Economic Benefits

b. Societal Environmental Benefits

FACW Cost Benefit Model: Environmental Benefit Assumptions

FACW Assumed Environmental Benefits:

In its original application, FACW included a carbon price adder. In its current Amended Application, FACW acknowledged that the inclusion of a carbon adder was inappropriate since it is already bundled in the forecasted cost of energy. Thus, FACW removed the adder from its current rate impact.[1]

Yet, despite this admission, FACW has attempted to do the same thing, via a different approach, by injecting a new, non-market based value for environmental externalities into its model by (1) determining the estimated reduction in CO_2, SO_2, and NOx; (2) listing a set of non-publicly posted "social" cost per ton of SO2, NOx, Hg and PM2.5 air pollutants; and (3) applying these social cost values ($/ton) to the total emission reductions (tons/year) to get a total non-market credit value.[2]

Model Correction for Revised Cost Benefit Analysis:

Environmental costs should be based on known and measurable costs like credit prices posted in regional clean air markets. These costs, however, are already embedded as a cost of doing business in regional energy markets. FACW's analysis double counts these costs. The use of any other value such as those associated with environmental externalities should be removed since they are highly variable, often subjective, and are not based upon information that is known and reasonable with any degree of certainty.

Source:
[1]Amended Application, Testimony Exhibit 15, p. 10-11.
[2]Amended Application, Appendix D, Cost-Benefit Analysis, p. 16-17.

Environmental Externalities and Public Policy

The use of non-market based approaches, such as "societal costs," to value air emissions is based upon the premise that current clean air markets and EPA regulations do not value or control for air emissions appropriately. While market based approaches to valuing emissions costs are appropriate, the use of non-market based values are problematic since these values are estimates, not based on reported data or valuations, and cannot be tested or verified to the true societal cost (valuation) of the emission in question.

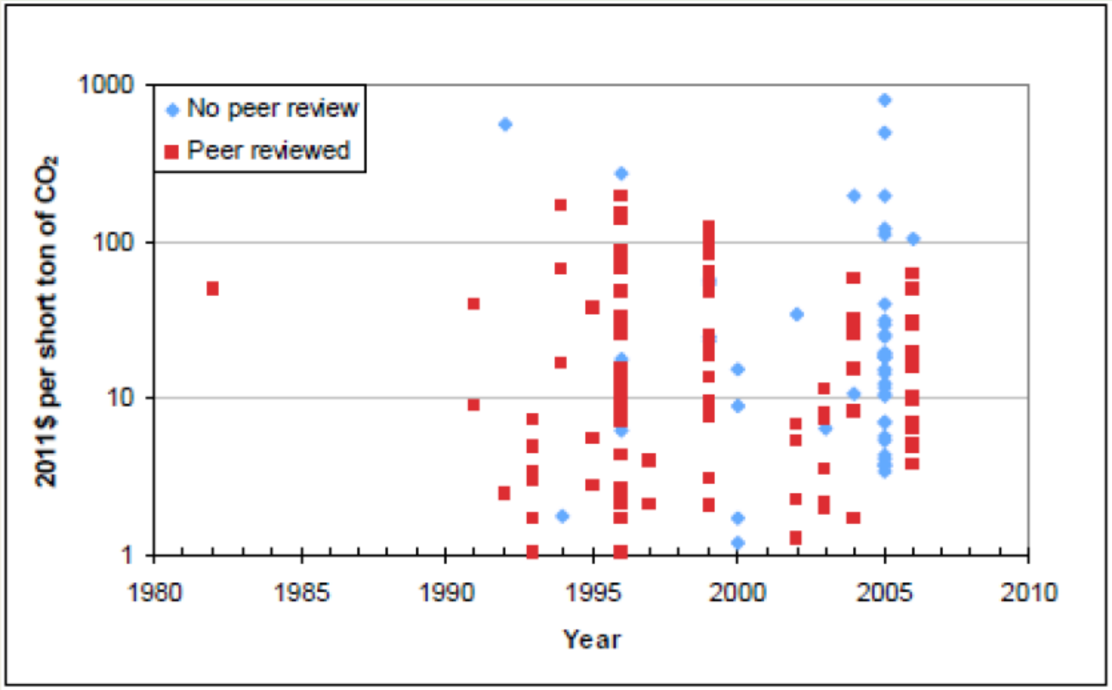
Market-based approaches, such as cap-and-trade programs, have increasingly become the preferred approach for valuing societal costs and have the benefit of creating objective rather than subjective standards for valuing potential environmental externalities. Valuation is based upon the interplay of market forces and willing buyers and sellers.

Note: In 2008, some ten states in the Northeast and Mid-Atlantic regions of the U.S. launched the Regional Greenhouse Gas Initiative, or what has come to be called simply "RGGI." These states collectively formed the first of its kind regional GHG reduction accord complete with a fully-functioning cap-and-trade market, also a first for the region and the U.S. overall. The program has been considered by many as a success in using a market-based mechanism (i.e., a cap and trade market) to reduce GHG emissions over a multi-state region.

Scatter Plot of Estimates of the Societal Cost of Carbon

The scatter plot to the right shows the wide range of "societal" environmental cost estimates (externalities) for carbon emissions alone. The plot is taken from a study by Richard Tol examining 47 different studies yielding 211 estimates of the "social cost of carbon."[1]

The variation in these estimates are a function of a wide range of differences including methodologies, discount rates, damage functions, physical impacts of climate change and equity weightings.



[1]These studies were performed between 1982 and 2006.

Source: Included in Avoided Energy Supply Costs in New England: 2011 Report. Synapse Energy Economics. August 11, 2011; Originally in: Tol, Richard S.J. The Social cost of Carbon: Trends, Outliers and Catastrophes. Economics E-Journal. Vol 2, 2008-25. August 12, 2008.

Conclusions: Environmental Externalities

The Board should reject FACW's proposed environmental externality values. The use of non-market based information of this nature is inconsistent with traditional regulatory and ratemaking practices that are traditionally based upon known and reasonably measurable information. FACW's approach would inject a high degree of speculation into the valuation of the project's benefits, which, in turn, could lead to the approval of a project based upon OREC rates that are not fair, just and reasonable and consistent with the public interest.

6. Project Net Economic Benefits

c. Tourism

FACW Cost Benefit Model: Tourism Assumptions

FACW Assumed Tourism Benefits:

FACW's tourism estimates are based on two methodologies:

1. The first methodology is referred to as the "**Expected Case**". This methodology is drawn from a report by the William J. Hughes Center for Public Policy which is based on a 2009 Stockton/Zogby international study where people were surveyed and asked it they were more likely to visit Atlantic City in the future if a windfarm was present.
2. The second methodology used by FACW to estimate tourism is termed the "**Low Case**". For this 'method' FACW simply acquired tourism data from the Scroby Sands Windfarm Information Center, and assumes the same number of tourists would visit the FACW project.

Model Correction for Revised Tourism Analysis:

There is no evidence that the FACW project will lead to any impact in tourism; therefore the net economic benefit of tourism is zero.

Tourism Assumptions

FACW's net benefits rely heavily on tourism impacts. FACW assumes that a large number of tourists will visit the FACW windfarm. These tourists are anticipated to create a significant positive economic impact that offsets the negative economic impacts from the OREC-price induced rate increase.

FACW tourism estimates range from 35,000 (Low Case) to 4.48 million (Expected Case).[1]

FACW's Expected Case anticipates having more visitors each year than the Baseball Hall of Fame in Cooperstown, the Washington Monument in Washington D.C., or the Museum of Modern Art in New York.

Site	Location	Annual Visitors
FACW Current Amended Application - Low Case	**Offshore, Atlantic City, NJ**	**35,000**
Scroby Sands Offshore Wind Farm	Offshore Great Yarmouth, UK	35,000
Thomas Edison National Historical Park	West Orange, NJ	63,009
George Washington Birthplace National Monument	Westmoreland County, VA	128,158
Flight 93 National Memorial	Stoystown, PA	137,837
Harper's Ferry	Harpers Ferry, WV	268,822
Washington Crossing Historic Park	Washington Crossing, PA	300,000
Baseball Hall of Fame	Cooperstown, NY	300,000
U.S.S. Constitution	Boston, MA	303,360
Antietam National Battleground	Sharpsburg, MD	393,957
Children's Museum of Manhattan	New York, NY	400,000
Governors Island National Monument	New York, NY	409,207
Wright Brothers National Memorial	Kill Devil Hills, NC	476,200
Washington Monument	Washington D.C.	628,665
FACW Original Application - Tourism Estimate	**Offshore, Atlantic City, NJ**	**705,090**
Giants Games (9 home games)	East Rutherford, NJ	742,500
Mystic Aquarium	Mystic, CT	800,000
Museum of Fine Arts	Boston, MA	911,216
Gettysburg National Military Park	Gettysburg, PA	1,031,554
Smithsonian American Art Museum	Washington, D.C.	1,100,000
Getty Center/Getty Museum	Los Angeles, CA	1,205,685
Museum of Modern Art, New York	New York, NY	3,131,238
Yankees Games (81 home games)	New York, NY	3,653,680
Statute of Liberty	New York, NY	3,833,288
Yosemite National Park	Sierra Nevada, California	3,901,408
Grand Canyon National Park	Northwest Arizona	4,388,386
FACW Current Amended Application - Expected Case	**Offshore, Atlantic City, NJ**	**4,480,000**
Louvre	Paris, France	8,500,000

Note: [1]FACW's Expected Case tourism estimate is based on the assumption that 16 percent of Atlantic City's 28 million annual visitors will spend extra time in town to visit the wind farm.

Tourism Benefits, FACW Expected Case

FACW's Expected Case methodology is based on "stated preferences," i.e. what survey respondents said that they *would* do. However, it is well cited in the economics of tourism literature that this approach is problematic.

> *"Four practical methods for estimating the non-market value of an environmental amenity have been developed and applied in tourism related contexts: contingent valuation and contingent choice methods which are both associated with* ***state[d] preferences****, and hedonic pricing and travel cost methods, which are both based on* ***revealed preference*** *techniques. The state[d] preference[s] methods are more straightforward since the willingness-to-pay amounts can be easily obtained . . . Through a survey process . . .* ***However, the limitations of these methods associated with hypothetical bias (i.e. the respondents stated willingness to pay and the actual behavior) have been well recognized."[1]***

For this reason, econometric approaches should be based on revealed preferences (i.e. empirically observed/quantifiable changes in tourism) rather than stated preferences (i.e. what people say they will do if a windfarm is built).

Source:
[1] Tourism Economics Research: A Review and Assessment. Song, Dwyer, and Zheng Cao. *Annals of Tourism Research.* Vol 39 N0. 3 pp. 1653-1682, 2012.

Tourism Benefits, FACW Low Case

FACW's Low Case methodology is based on the assumption that the visitors to the windfarm would not have visited that area if the windfarm was not present.

Discovery Question RCR-PF2-138 asks [redacted]

An empirical examination of tourism data and offshore wind development in Europe suggests there is no statistically significant change in local tourism as a result of OSW development.

Tourism Benefits, Revised Methodology

If OSWs lead to an increase in tourism, then the number of visitors (tourism) should increase in locations where OSWs are built relative to similar areas where no OSW was built. The outcome can be tested by examining data on the following empirical specification:

$$Tourism_{it} = \alpha + \beta_1 Windfarm_{it} + \beta_2 P_{it} + \beta_3 PS_{it} + \beta_4 Inc_{it} + \gamma_t + c_i + \varepsilon_{it}$$

Where:

Tourism is the number of visitors in NUTS II region *i* in year *t*.[1]

Windfarm is an indicator variable indicating whether an offshore windfarm was present and β_1 is the coefficient of interest.

P_{it} is the price of tourism activities.

PS_{it} is the price of tourism in substitute destinations.

Inc_{it} is the real disposable income of people in origin regions.

Note: [1] Nomenclature of Territorial Units for Statistics ("NUTS") are statistical regions that are commonly used in Europe. There are three regions: NUTS I, II, and III, where NUTS I are the largest and NUTS III are the smallest. NUTS II regions are used for this analysis because tourism data is available at this level.

Tourism, Empirical Analysis Regression Results, Full Sample

No statistically significant impact of offshore wind on tourism is found using European data. The indicator variable for OSW is statistically insignificant, indicating the areas with OSWs did not see a relative increase in tourism once OSWs were built relative to similar regions where no OSW was constructed.

Dependent Variable:	Number of Non-Resident Arrivals to Hotels
Number of Observations:	1,720
Number of Groups:	215
Observations per Group:	8

Variable	Coefficient	Std. Error	t-Statistic	P-value
Windfarm	0.02218	0.06576	0.34	0.736
Income (Household)	1.30329	0.07699	16.93	0.000
Purchasing Power Parity - Recreational and Culture Difference	(0.00247)	0.00091	(2.72)	0.007
Purchasing Power Parity - Restaurants and Hotel Difference	0.00175	0.00155	1.13	0.262
Real Exchange Rate	(0.00086)	0.00102	(0.85)	0.399
Time Trend	(0.00485)	0.00294	(1.65)	0.100
Constant	0.51399	0.73194	0.70	0.483

F-statistic	59.0500
Probability (F-statistic)	0.0000
R-squared (within)	0.2586

statistically insignificant

Notes:
1. NUTS is "Nomenclature of Territorial Units for Statistics".
2. All standard errors are clustered by region.
3. Ln(Income) = ln(Average Household Income in other NUTS II regions) Weighted by Population.
4. PPP Recreation and Culture Difference = PPP in own NUTS II – Average PPP in other regions weighted by Nonresident arrivals in hotels.
5. PPP Restaurants and Hotel Difference = PPP in own Nuts II – Average PPP in other regions weighted by Non-resident arrivals in hotels.
6. Real Exchange Rate = Real Effective Exchange Rate (deflator: consumer price indices – 16 trading partners – Euro Area).

Tourism, Empirical Analysis Regression Results, Coastal Regions

When only coastal regions are considered in the analysis, the results are robust, as there again is no evidence that the construction of an OSW lead to an increase in tourism.

Dependent Variable:	Number of Non-Resident Arrivals to Hotels
Number of Observations:	464
Number of Groups:	58
Observations per Group:	8

Variable	Coefficient	Std. Error	t-Statistic	P-value
Windfarm	(0.01211)	0.09443	(0.13)	0.898
Income (Household)	1.51626	0.16421	9.23	0.000
Purchasing Power Parity - Recreational and Culture Difference	(0.25886)	0.07187	(0.36)	0.720
Purchasing Power Parity - Restaurants and Hotel Difference	0.07762	0.04782	1.62	0.110
Real Exchange Rate	0.00064	0.00162	0.39	0.697
Time Trend	(0.00739)	0.00574	(1.29)	0.203
Constant	(1.76550)	1.50824	(1.17)	0.247
F-statistic	22.5100			
Probability (F-statistic)	0.0000			
R-squared (within)	0.3243			

statistically insignificant

Notes:
1. NUTS is “Nomenclature of Territorial Units for Statistics”.
2. All standard errors are clustered by region.
3. Ln(Income) = ln(Average Household Income in other NUTS II regions) Weighted by Population.
4. PPP Recreation and Culture Difference = PPP in own NUTS II – Average PPP in other regions weighted by Nonresident arrivals in hotels.
5. PPP Restaurants and Hotel Difference = PPP in own Nuts II – Average PPP in other regions weighted by Non-resident arrivals in hotels.
6. Real Exchange Rate = Real Effective Exchange Rate (deflator: consumer price indices – 16 trading partners – Euro Area).

Conclusions: Tourism

- Empirical evidence associated with European tourism does not support the hypothesis that the presence of an offshore windfarm will lead to a meaningful change in tourism activity (visits). This result is robust when all regions in Europe are included in the analysis, as well as when the analysis is limited to coastal regions.

- FACW's approach, even if true, fails to recognize the potential opportunity cost of avoided tourism. If a tourist in Atlantic City allocates vacation time to a visit to the FACW location, that tourist is not making expenditures in other potential destinations including remaining at a local Atlantic City casino. An appropriate analysis would net the potential increase in FACW-related tourism against the dollars avoided in other Atlantic City-related tourism opportunities.

- There is no evidence that the FACW project will have any meaningful nor measurable impact on tourism, and even if it did, those potential positive impacts need to be offset by other lost tourism activities. For purposes of this analysis, tourism, on net, was assumed to be unaffected by the development of the FACW project.

6. Project Net Economic Benefits

d. Lessons Learned

FACW Cost Benefit Model: Lessons Learned Assumptions

FACW Assumed Lessons Learned Assumptions:

FACW has also included a new benefit associated with "lessons learned". The "lessons learned" benefit is based upon the assumption that the FACW project will "allow uncertainties surrounding an offshore wind development to be understood and/or resolved on a smaller scale prior to developing larger projects."[1]

FACW quantified the added benefit of gaining knowledge from the project, as well as the added benefit of proven financeability of the OREC system. An example of the gained knowledge component, FACW notes "[redacted]" environmental curtailment regulations that will result in permitting constraints, loss of revenue, and higher rate impacts.[2] Presumably, the knowledge and experience gained from this project will lead to lower costs to future projects. Similarly, FACW expects that once the OREC system is proven viable, it will reduce the cost to finance future projects.

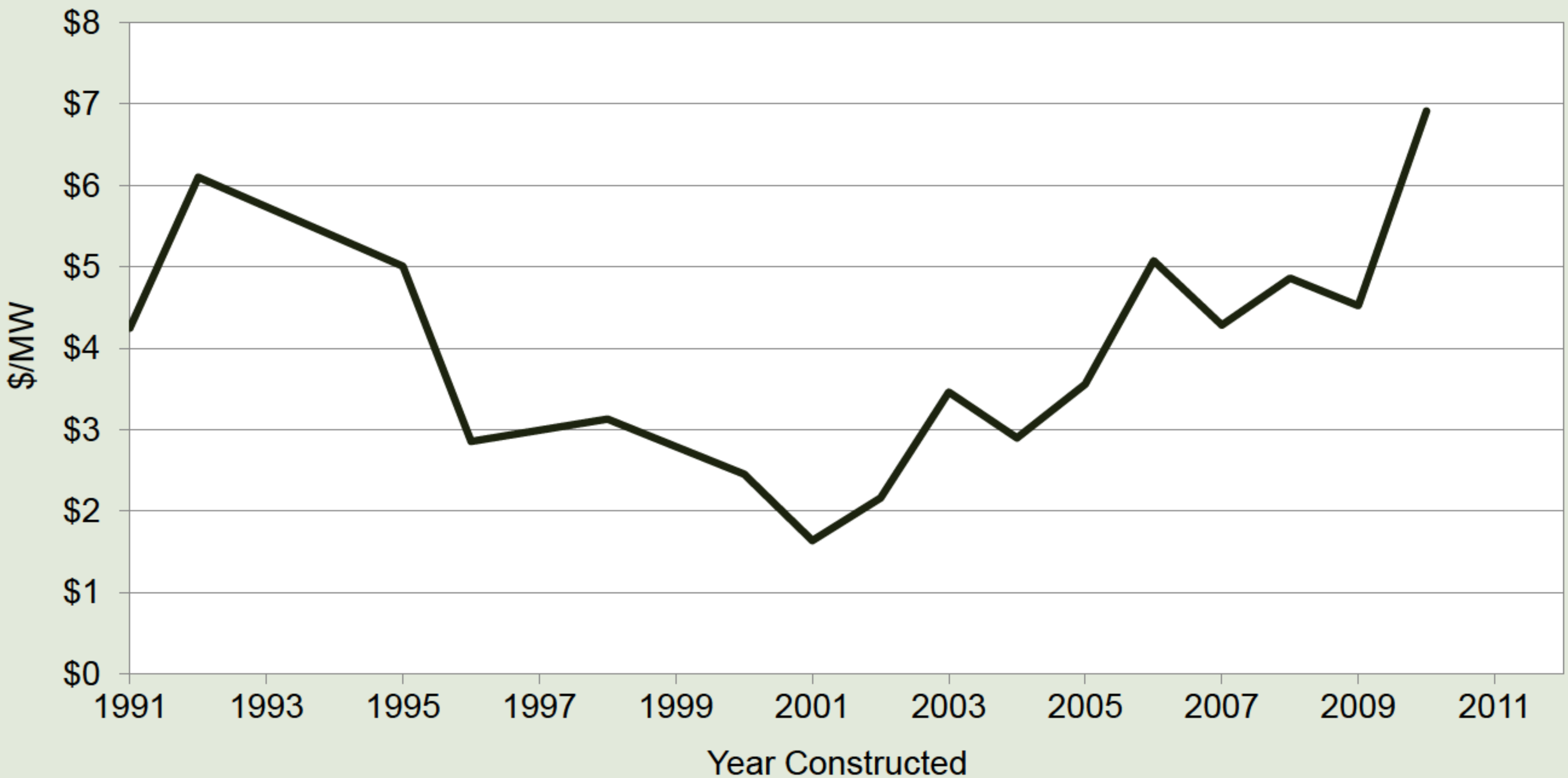
Model Correction for Revised Cost Benefit Analysis:

A statistical model was used to test for learning effects on completed OSW projects. No evidence of "learning effects" are found either worldwide or within countries and therefore no benefits from learning effects are used in calculating the economic benefits.

Source:
[1]Testimony Exhibit 15, p. 13
[2]Testimony Exhibit 15, p. 14.

Average Cost (per Capacity): Completed European OSW Projects (1991 to Current)

Offshore wind projects have not shown a downward trend in average cost per capacity as the number of projects or cumulative developed capacity increases. A simple comparison of these costs trends, however, can be admittedly limited since it does not hold other factors constant.



Lessons Learned: Empirical Specification

- Data from completed European OSW projects can be used to estimate learning effects for the industry overall and within specific countries using the following empirical specification:

$$Ln(Overnight\ Cost_i) = \alpha + \beta_1 Cumuative\ Capacity_i + \beta_2 Capacity_i + \gamma X_i' + \varepsilon_i$$

- The overnight costs are in 2012 USD. Cumulative capacity is the sum of all OSW developed capacity before construction of observation in question. Capacity is total capacity in MW and γ_i is country fixed effects that control for country specific time invariant heterogeneity.

- If learning effects are present, β_1 should be significantly negative since learning effects will cause wind project costs to decline holding other variables constant.

Note: Tourism, price and exchange rate are from Eurostat Data Navigation Tree, <http://epp.eurostat.ec.europa.eu>.
Source: Windfarm capacity and construction dates are from 4 C Offshore, http://www.4coffshore.com/.

Lessons Learned: Industry Learning Effects Empirical Results

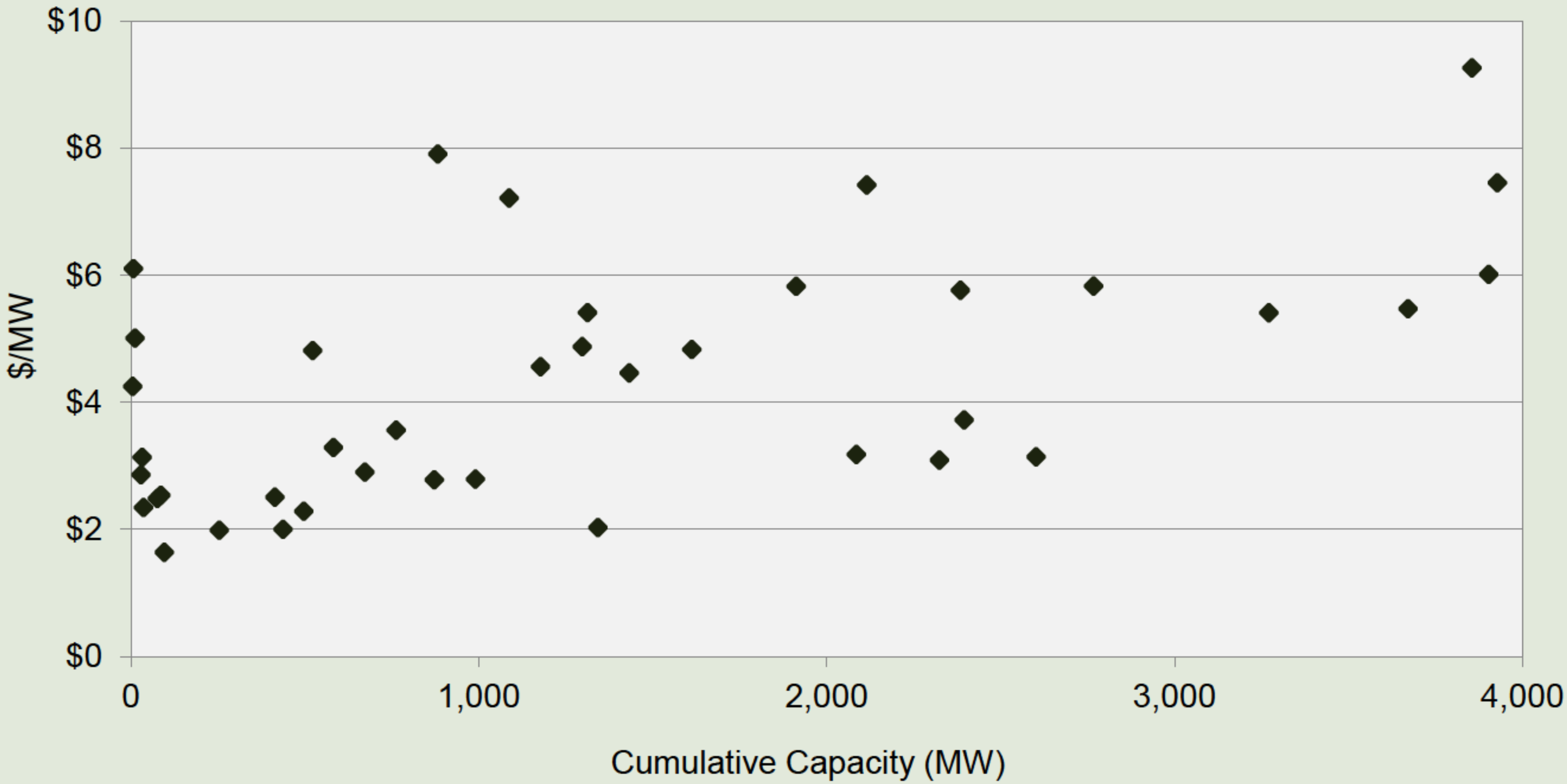
The regression results show that learning effects, as measured by cumulative capacity, are actually positive, yet statistically insignificant.

Dependent Variable:	Overnight Cost in 2012 US$			
Number of Observations:	39			
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**P-value**
Ln(Cumulative Capacity)	0.0604775	0.0602811	1.00	0.324
Ln(Capacity MW)	0.9134430	0.0721957	12.65	0.000
Constant	15.5954400	0.4009164	38.90	0.000
F-statistic	72.9700			
Probability (F-statistic)	0.0000			
R-squared	0.9577			

Note: Cumulative capacity is the total capacity (MW) of all windfarms worldwide when the construction of each windfarm began. Distance to shore is measured in kilometers and the natural log of all variables is used. Country fixed effects are not included in the model presented, but these results are robust when they are included. Time country fixed effect coefficients are not reported.

Industry Learning Effects Analysis: Unit Cost and Cumulative Capacity Comparisons

A comparison of unit costs and cumulative capacity from the industry-wide model does not support a finding of any statistically significant learning effects.



Lessons Learned: Country-Specific Empirical Results

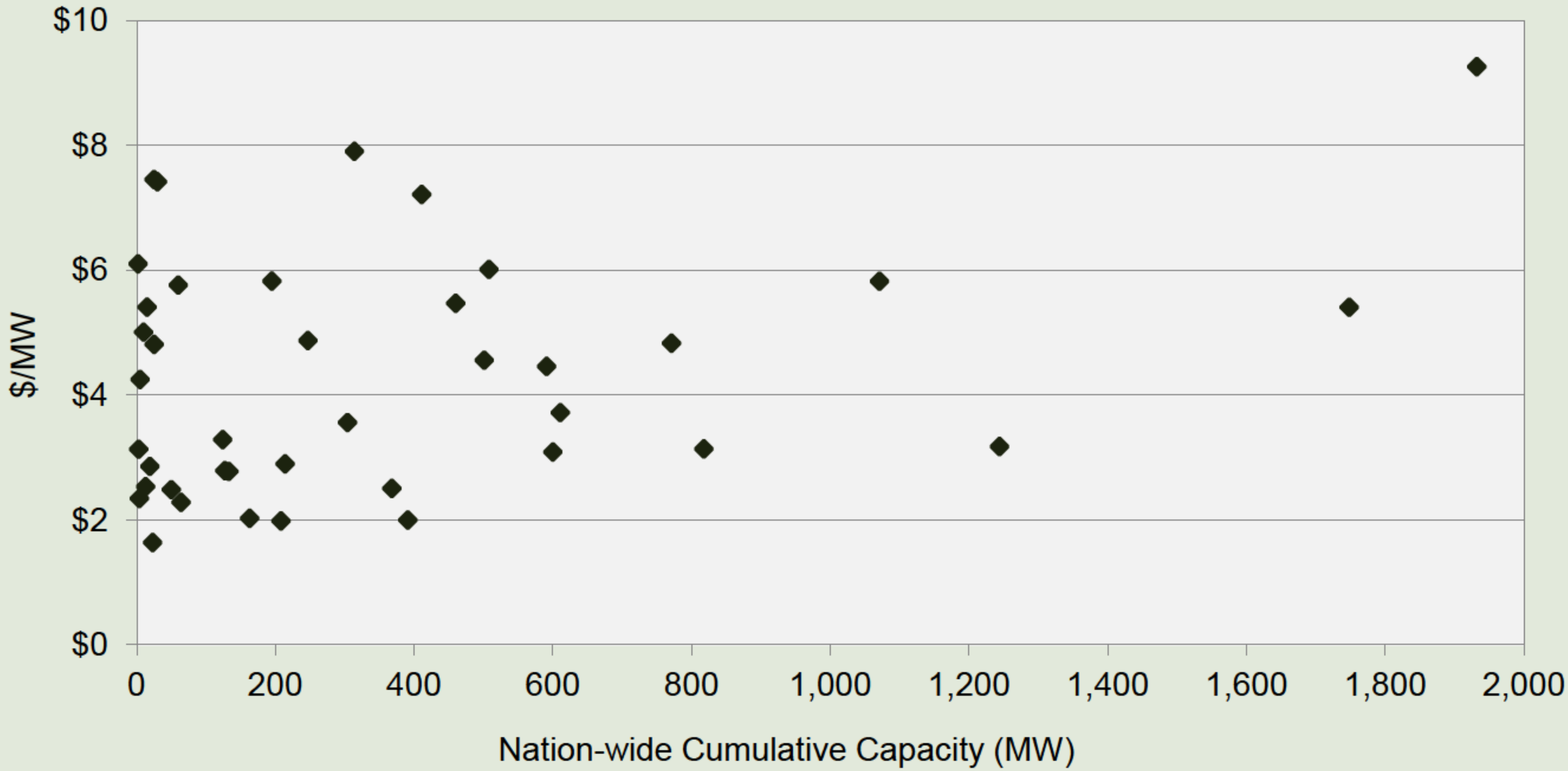
Country-specific learning effects are also not corroborated on a country-specific basis.

Dependent Variable:	Overnight Cost in 2012 US$			
Number of Observations:	39			
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**P-value**
Ln(Nation Wide Cumulative Capacity MW)	0.1129492	0.0644419	1.75	0.090
Capacity	0.8574217	0.0778285	11.02	0.000
Constant	15.8150500	0.3151850	50.18	0.000
F-statistic	78.2100			
Probability (F-statistic)	0.0000			
R-squared	0.9604			

Note:
Cumulative capacity is the total capacity (MW) of all windfarms worldwide when the construction of each windfarm began.
Distance to shore is measured in kilometers and the natural log of all variables is used. Country fixed effects are not included in the model presented, but these results are robust when they are included.

Country-Specific Learning Effects: Unit Cost and Cumulative Capacity Comparisons

A simple plot of the country-specific learning effects results also shows there is no statistically significant evidence of country specific learning effects.



Conclusions: Lessons Learned Assumption

- FACW has failed to provide any empirical evidence that corroborates the inclusion of lessons learned into the net positive economic benefit. In fact, a simple empirical analysis of trends in OSW development fail to support FACW's learning effects hypothesis.

- More importantly, and regardless of the statistics, FACW's inclusion of benefits from learning effects (or "lessons learned") is misplaced and conceptually incorrect.

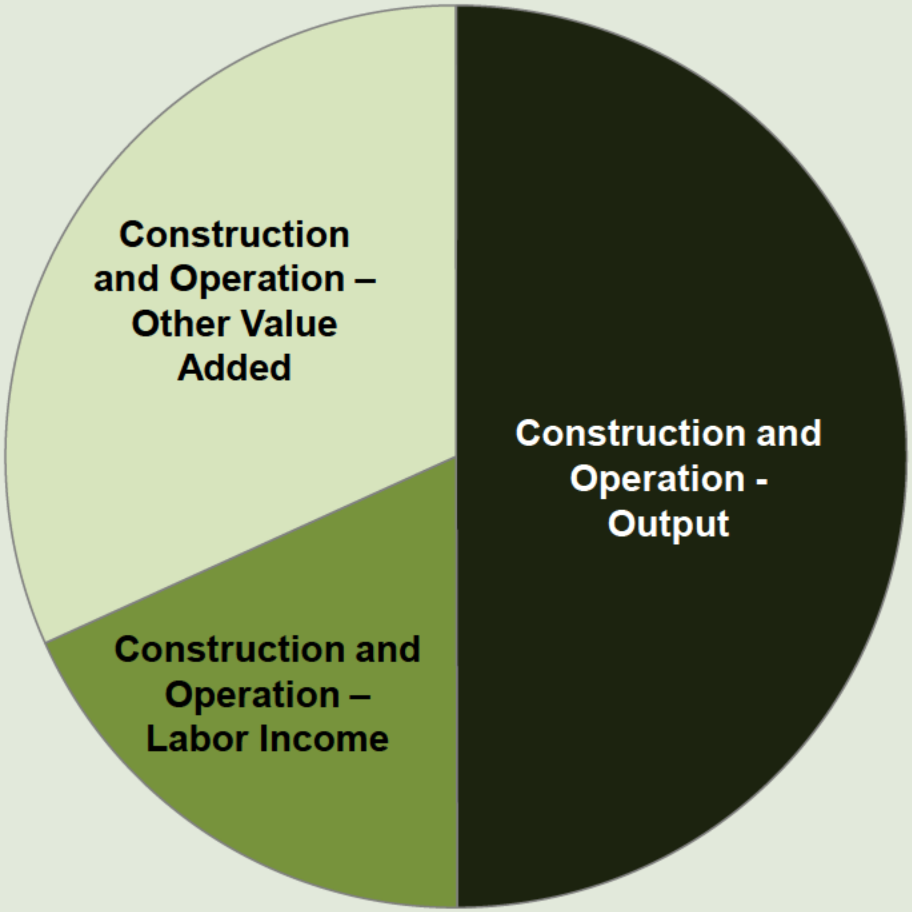
- Even if FACW were correct in its hypothesis regarding the presence of learning effects, the use of these future potential impacts in the FACW application simply expropriates future cost reduction benefits away from future OSW applications. Allowing FACW to account for these benefits in its current application will require the Board to reduce the net benefits from future OSW applications in order to avoid a double counting of societal benefits from OSW development. Such a position is unreasonable and untenable.

- Given the problems enumerated above, learning effects should not be included in any net benefits analysis.

6. Project Net Economic Benefits

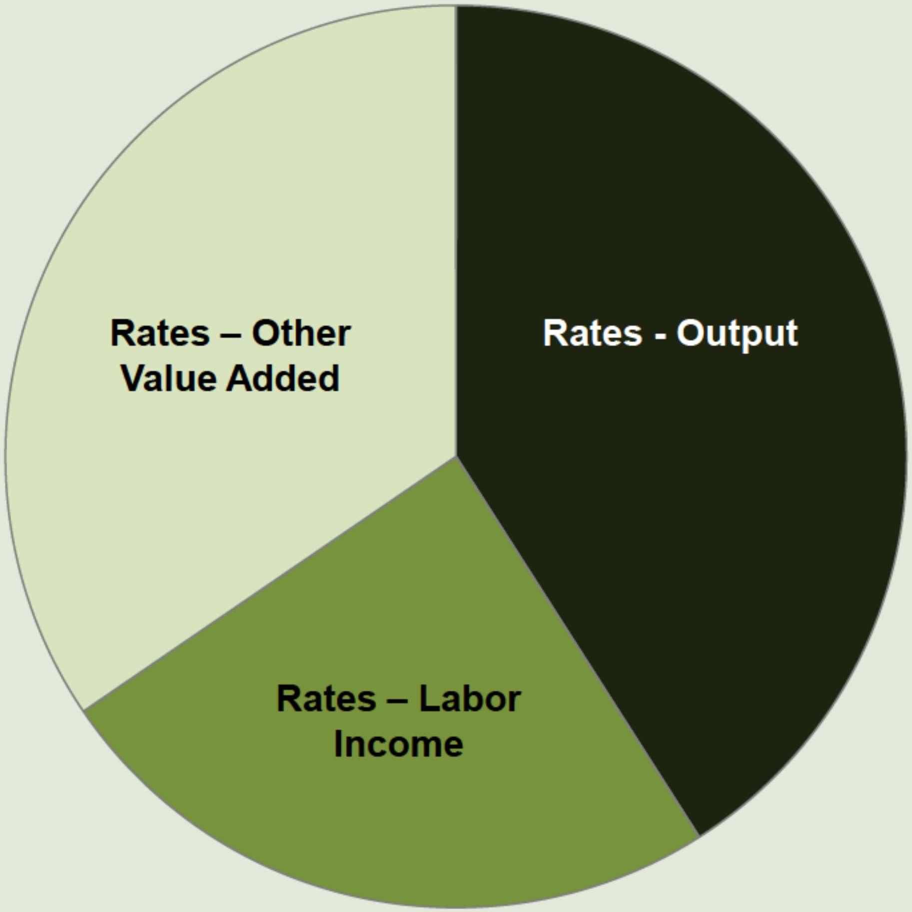
d. Net Economic Impacts

Revised Net Economic Benefits: Positive Impacts



		Impact (million $)	Percent of Total (%)
Construction and O&M			
Output	$	221.40	49.9%
Labor Income	$	81.01	18.3%
Other Value Added	$	140.84	31.8%
Total Construction and O&M	**$**	**443.25**	**100.0%**

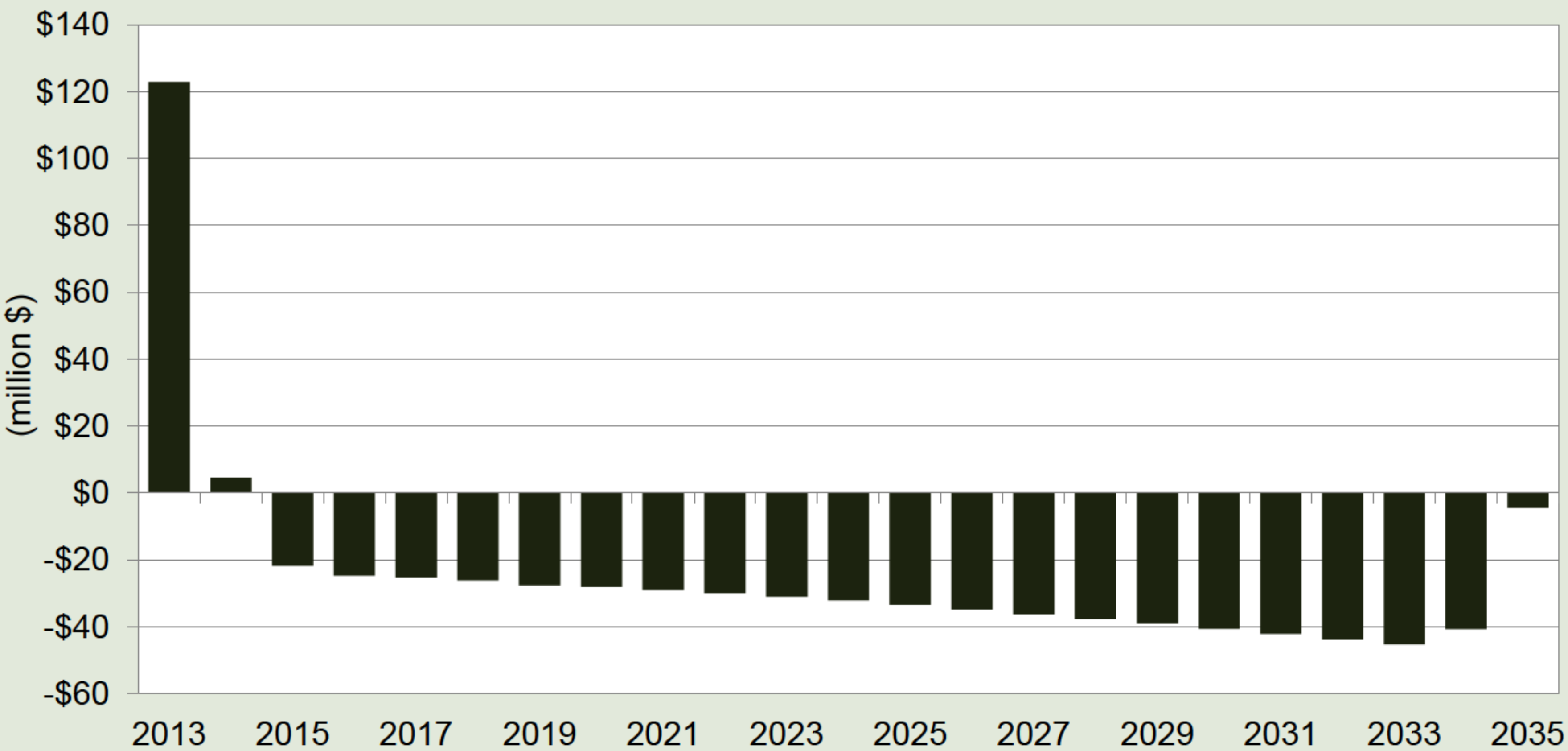
Revised Net Economic Benefits: Negative Impacts



	Impact (million $)	Percent of Total (%)
Rates		
Output	$ (768.05)	40.9%
Labor Income	$ (460.07)	24.5%
Other Value Added	$ (647.65)	34.5%
Total Rate Impact	**$ (1,875.77)**	**100.0%**

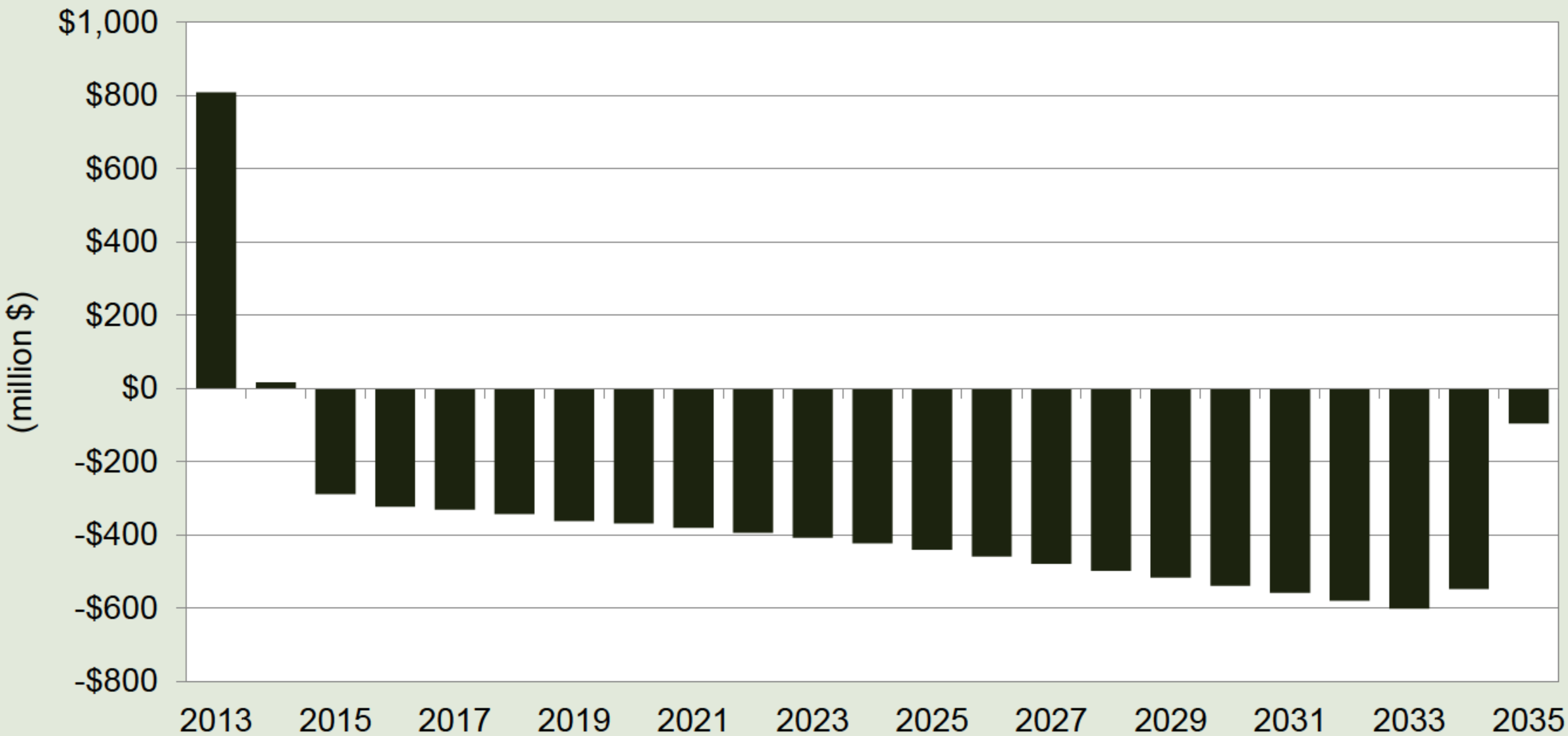
Revised Net Economic Benefits: Total Net Impacts (Output)

Negative rate impacts, plus positive impacts from construction and operation, result in a net reduction of New Jersey output of $547 million, or $132 million (NPV). The FACW project is estimated to have a negative net economic benefit from an economic output perspective.



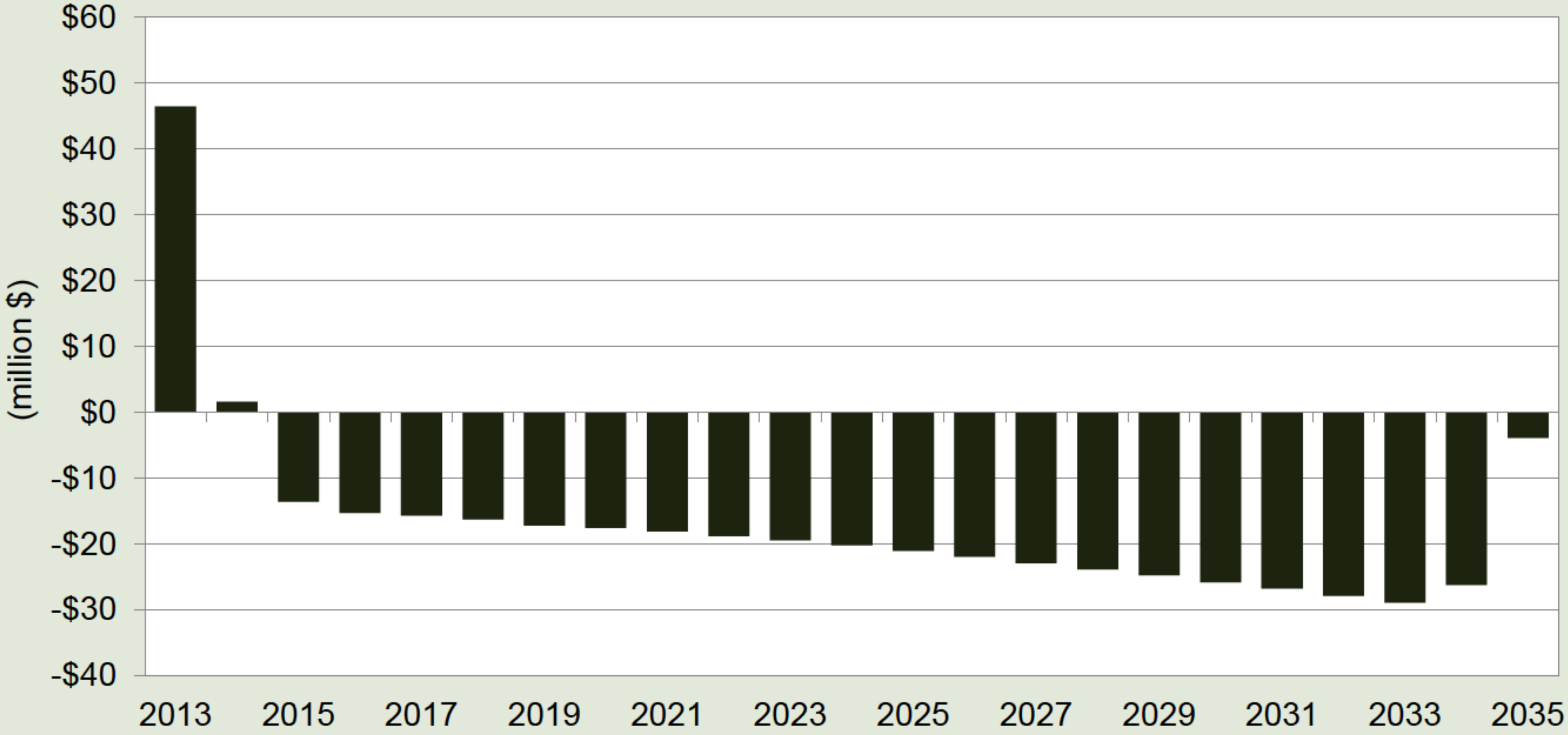
Revised Net Economic Benefits: Total Net Impacts (Employment)

Negative rate impacts, plus positive impacts from construction, operation, and tourism, result in a net reduction in total employment of some 8,109 jobs. The FACW project is estimated to have a negative net economic benefit from an employment perspective.



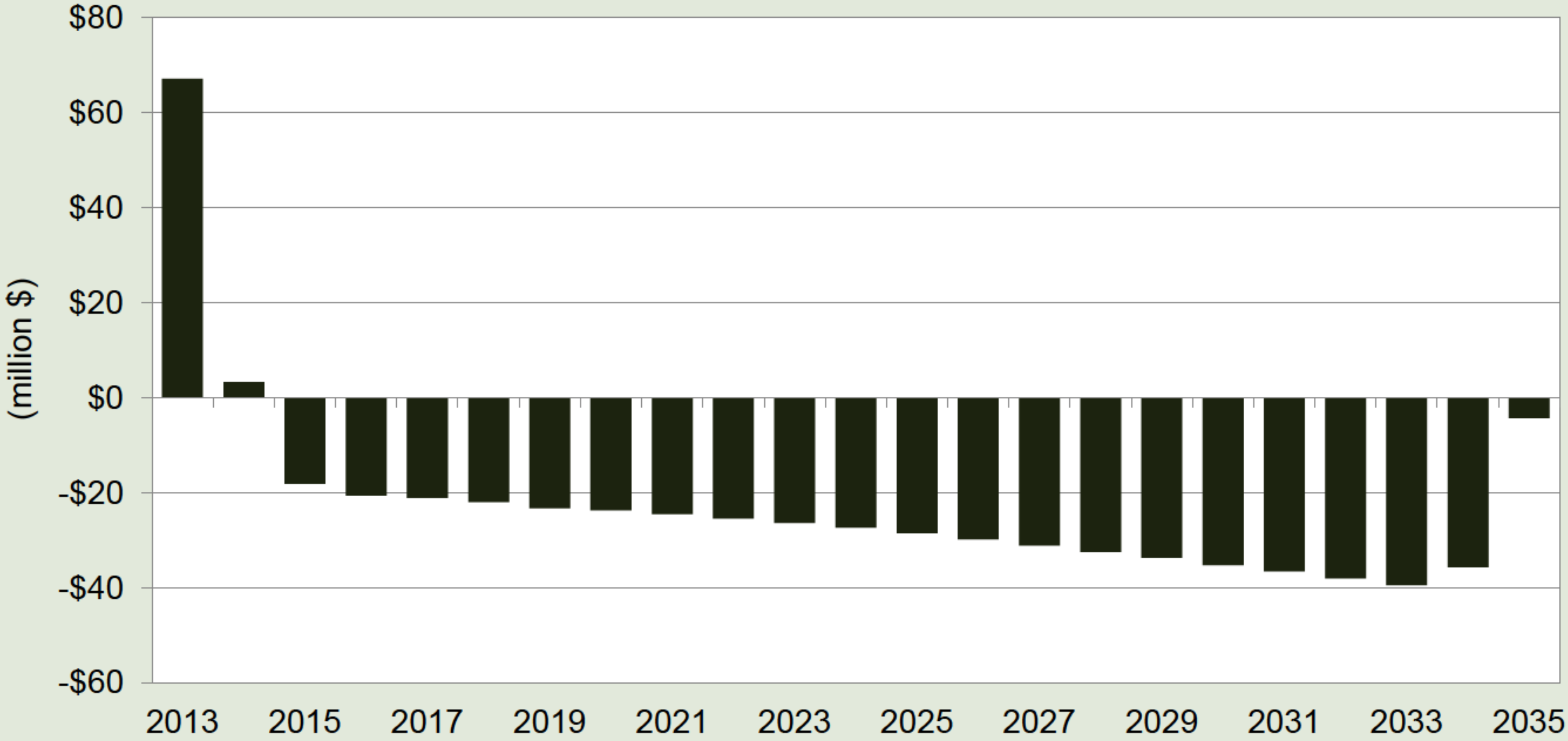
Revised Net Economic Benefits: Total Net Impacts (Labor Income)

Negative rate impacts, plus positive impacts from construction, operation, and tourism, result in a reduction of total labor income of $379 million, or $113 million (NPV). The FACW project is estimated to have a negative net economic benefit from a wage and salary perspective.



Revised Net Economic Benefits: Total Net Impacts (Other Value Added)

Negative rate impacts, plus positive impacts from construction, operation, and tourism, result in a reduction of total other value added of $507 million, or $147 million (NPV). The FACW project is estimated to have a negative net economic benefit from an other value added perspective.



7. Recommendations

Summary of Primary Recommendation

The FACW project should not be approved and its proposed OREC plan should be rejected because **neither are in the public interest** and do not meet the statutory requirements of the OSWEDA (N.J.S.A. 48:3-87 et seq.) since the project, and its proposed OREC prices, **do not result in a net economic benefit** to New Jersey ratepayers and will likely lead to a **negative net economic impact of over $132 million in NPV terms**.

Summary of Additional Recommendations & Conclusions

The FACW project also leaves open a number of unanswered questions including:

1) FACW is proposing to use a relatively new turbine vendor and technology for this project:

   a. FACW has not provided any evidence that the direct drive technology will result in lower overall project costs and OREC prices, relative to a gearbox technology.

   b. There appears to be no price discount by the vendor to compensate or serve as an offset for its relatively new technology or lack of experience in Western renewable energy markets.

   c. Share prices for XEMC, the Company's vendor and financial partner, have shown a number dramatic and consistently downward movements over the past 18 months comparable to other Chinese wind manufacturing companies.

   d. U.S.-Chinese trade relationships for renewable energy manufacturing have become increasingly constrained. The USDOC has opened a number of investigations on this matter leading to negative final or preliminary findings. To date, XEMC has not been specifically identified by the USDOC as a company engaging in questionable anticompetitive trade practices.

Summary of Additional Recommendations and Conclusions (Continued)

2) At $[redacted]/kW, FACW's proposed project is more expensive, on a per kW basis, than most completed wind projects in Europe. FACW's proposal is also between $[redacted]/kW to $[redacted]/kW more expensive than four proposed U.S. wind projects. If approved, FACW will be the fourth most expensive OSW project in the world.

3) FACW's OREC proposal is too high and not competitive with other proposed U.S OSW projects.

4) FACW has not been able to provide specific details on how its project will be financed. Based upon the information currently available, it appears the FACW project will be heavily debt-financed.

5) To date, FACW has not provided a complete set of translated financial statements.

6) If approved, the FACW project will impose unreasonable rate impacts on ratepayers. The rate impact analysis included in FACW's application overstates various offsets to its proposed OREC costs and understates the negative impact this proposal could have on ratepayers.

7) FACW's net economic benefit results are flawed and unreasonable and based upon: (a) over-estimated in-state expenditures; (b) over-estimated impacts per dollar investment and/or under-estimates of the negative consequences of project rate impacts; and (c) the inclusion of several questionable benefits that are not known and measurable with any degree of certainty.

Appendix 1: Cost Modeling Detail

PUBLIC VERSION

Cost Modeling Detail

Windfarm	Country	Overnight Cost (2012 US$)	Capacity (MW)	Cost per Capacity ($/MW)	Year	Water Depth (meters)	Turbine Size (MW)	Number of Turbines	Distance to Shore (km)	PPI	Exchange Rate
Yttre Stengrund	Sweden	$ 16,363,179	10	$ 1,636,318	2001	7.0	2.0	5	2	142.9	0.896
Nysted	Denmark	$ 313,474,400	158	$ 1,984,015	2002	7.5	2.3	72	10	129.4	1.011
Samsø	Denmark	$ 45,929,816	23	$ 1,996,949	2002	11.5	2.3	10	3.5	134.8	1.029
Vindpark Vanern	Sweden	$ 60,786,852	30	$ 2,026,228	2007	26.3	3.0	10	10.1	173.9	0.098
North Hoyle	UK	$ 136,948,064	60	$ 2,282,468	2003	8.5	2.0	30	7	138.2	1.176
Blyth	UK	$ 9,368,903	4	$ 2,342,226	2000	5.0	2.0	2	1	130.0	1.516
Middelgrunden	Denmark	$ 99,355,848	40	$ 2,483,896	2000	4.5	2.0	20	2	137.3	1.450
Horns Rev	Denmark	$ 400,587,488	160	$ 2,503,672	2002	8.5	2.0	80	14	130.5	0.959
Utgrunden	Sweden	$ 25,336,138	10	$ 2,533,614	2000	10.5	1.4	7	4.2	137.3	1.443
Lillgrund	Sweden	$ 305,453,408	110	$ 2,776,849	2006	8.5	2.3	48	10	168.3	1.300
Egmond aan Zee	Netherlands	$ 301,100,864	108	$ 2,787,971	2006	16.5	3.0	36	10	168.3	1.259
Irene Vorrink	Netherlands	$ 48,569,540	17	$ 2,857,032	1996	2.5	0.6	28	0	126.4	1.562
Kentish Flats	UK	$ 260,831,792	90	$ 2,898,131	2004	4.0	3.0	30	10	149.3	1.846
Horns Rev 2	Denmark	$ 645,154,880	209	$ 3,086,866	2008	13.0	2.3	91	31.7	204.0	1.394
Bockstigen	Sweden	$ 9,393,771	3	$ 3,131,257	1998	5.5	0.6	5	4	125.9	1.470
Rødsand 2	Denmark	$ 649,565,056	207	$ 3,137,996	2009	23.0	2.3	90	9	170.3	1.374
Gunfleet Sands	UK	$ 549,426,944	173	$ 3,175,878	2008	6.5	3.6	48	7	184.6	1.694
Scroby Sands	UK	$ 197,180,816	60	$ 3,286,347	2003	4.0	2.0	30	2.5	139.2	1.807
Barrow	UK	$ 320,307,040	90	$ 3,558,967	2005	14.0	3.0	30	7.5	156.3	1.787
Avedøre Holme	Denmark	$ 40,159,680	11	$ 3,718,489	2009	3.3	3.6	3	0.4	170.8	1.372
Vindeby	Denmark	$ 21,240,064	5	$ 4,248,013	1991	3.0	0.5	11	1.8	119.3	1.767
Rhyl Flats	UK	$ 401,351,584	90	$ 4,459,462	2007	7.5	3.6	25	10.7	176.4	1.780
Burbo Bank	UK	$ 410,102,912	90	$ 4,556,699	2006	3.0	3.6	25	6.5	170.6	1.926
Arklow Bank Phase 1	Ireland	$ 121,217,088	25	$ 4,810,202	2003	49.0	3.6	7	11.7	139.1	1.767
Robin Rigg	UK	$ 869,210,816	180	$ 4,828,949	2007	6.0	3.0	60	9	175.6	1.920
Prinses Amaliawindpark	Netherlands	$ 584,793,856	120	$ 4,873,282	2006	21.5	2.0	60	23	169.2	1.407
Tunø Knob	Denmark	$ 25,032,316	5	$ 5,006,463	1995	5.5	0.5	10	5.5	123.7	1.588
Greater Gabbard	UK	$ 2,724,340,224	504	$ 5,405,437	2009	20.5	3.6	140	36	176.9	1.583
Kemi Ajos Phase I	Finland	$ 81,125,408	15	$ 5,408,361	2006	9.9	3.0	5	5	165.4	1.338
BARD Offshore	Germany	$ 2,187,481,600	400	$ 5,468,704	2010	131.2	5.0	80	111.9	185.6	1.344
Alpha Ventus	Germany	$ 345,611,360	60	$ 5,760,190	2008	128.0	5.0	12	56	204.0	1.401
Thanet	UK	$ 1,746,984,576	300	$ 5,823,282	2007	18.5	3.0	100	12	176.9	1.706
Belwind Phase 1	Belgium	$ 961,105,856	165	$ 5,824,884	2009	22.5	3.0	55	46	177.7	1.367
EnBW Baltic I	Germany	$ 288,531,968	48	$ 6,011,083	2010	17.5	2.3	21	16	187.2	1.340
Lely	Netherlands	$ 12,200,075	2	$ 6,100,038	1992	3.5	0.5	4	0.8	115.7	1.606
Lynn/Inner Downsing	UK	$ 699,582,592	97	$ 7,212,192	2006	9.0	3.6	27	5	166.3	1.932
Thornton Bank	Belgium	$ 222,503,840	30	$ 7,416,795	2008	52.0	5.1	6	28	193.8	1.410
FACW	USA	$ [redacted]	25	$ [redacted]	2012	31.3	4.0	6	4.5	202.0	1.000
Beatrice Demonstration	UK	$ 79,039,440	10	$ 7,903,944	2006	45.0	5.0	2	22	168.3	1.893
Walney Phase 1	UK	$ 1,703,630,080	184	$ 9,258,859	2010	21.0	3.6	51	14	185.6	1.570

Appendix 2: FACW Pro Forma Detail

PUBLIC VERSION

REDACTED:
Identified by FACW as Privileged and Confidential

Appendix 3: FACW Revised Rate Impact Detail

PUBLIC VERSION

REDACTED:
Identified by FACW as Privileged and Confidential

Appendix 4: FACW Revised Net Economic Benefit Detail

PUBLIC VERSION

Impacts and Multipliers

Impact Type	Employment	Labor Income	Value Added	Output	Multiplier Employment	Multiplier Labor Income	Multiplier Value Added	Multiplier Output
OREC - Individual								
Direct Effect	24.9	$ 976,103	$ 976,103	$ 1,000,000	0.0000249	0.9761030	0.9761030	1.0000000
Indirect Effect	-	$ -	$ -	$ -	-	-	-	-
Induced Effect	6.3	$ 386,414	$ 651,955	$ 1,024,781	0.0000063	0.3864140	0.6519550	1.0247810
Total Effect	31.3	$ 1,362,517	$ 1,628,058	$ 2,024,781	0.0000313	1.3625170	1.6280580	2.0247810
OREC - Commercial								
Direct Effect	6.6	$ 394,550	$ 660,129	$ 1,000,000	0.0000066	0.3945500	0.6601290	1.0000000
Indirect Effect	2.0	$ 124,066	$ 210,135	$ 332,085	0.0000020	0.1240660	0.2101350	0.3320850
Induced Effect	3.4	$ 206,923	$ 349,074	$ 548,547	0.0000034	0.2069230	0.3490740	0.5485470
Total Effect	12.0	$ 725,539	$ 1,219,338	$ 1,880,632	0.0000120	0.7255390	1.2193380	1.8806320
OREC - Industrial								
Direct Effect	1.6	$ 174,279	$ 372,582	$ 1,000,000	0.0000016	0.1742790	0.3725820	1.0000000
Indirect Effect	2.4	$ 154,618	$ 268,913	$ 462,316	0.0000024	0.1546180	0.2689130	0.4623160
Induced Effect	2.1	$ 131,024	$ 221,042	$ 347,380	0.0000021	0.1310240	0.2210420	0.3473800
Total Effect	6.2	$ 459,921	$ 862,537	$ 1,809,696	0.0000062	0.4599210	0.8625370	1.8096960
Construction								
Direct Effect	465.8	$ 30,534,200	$ 39,100,395	$ 78,259,321	0.0000060	0.3901669	0.4996260	1.0000000
Indirect Effect	133.4	$ 6,748,458	$ 11,020,426	$ 18,614,821	0.0000017	0.0862320	0.1408193	0.2378608
Induced Effect	209.4	$ 9,152,974	$ 17,044,418	$ 25,971,394	0.0000027	0.1169570	0.2177941	0.3318633
Total Effect	808.7	$ 46,435,632	$ 67,165,238	$ 122,845,536	0.0000103	0.5933559	0.8582395	1.5697240
O&M								
Direct Effect	6.4	$ 1,150,067	$ 2,575,617	$ 3,274,876	0.0000020	0.3511788	0.7864777	1.0000000
Indirect Effect	2.1	$ 107,784	$ 189,170	$ 315,138	0.0000006	0.0329124	0.0577640	0.0962290
Induced Effect	7.2	$ 313,497	$ 584,245	$ 889,920	0.0000022	0.0957279	0.1784022	0.2717416
Total Effect	15.7	$ 1,571,348	$ 3,349,032	$ 4,479,934	0.0000048	0.4798191	1.0226439	1.3679706

Economic Impacts of Rates

Economic Impacts (Rates) - Output (million $)																
	Residential				Commercial				Industrial				Total			
Year	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
2013	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2015	(6.28)	-	(6.43)	(12.71)	(8.11)	(2.69)	(4.45)	(15.25)	(1.62)	(0.75)	(0.56)	(2.93)	(16.01)	(9.88)	(17.73)	(26.30)
2016	(7.00)	-	(7.18)	(14.18)	(9.00)	(2.99)	(4.94)	(16.93)	(1.78)	(0.82)	(0.62)	(3.22)	(17.79)	(10.99)	(19.74)	(29.15)
2017	(7.19)	-	(7.37)	(14.56)	(9.20)	(3.05)	(5.04)	(17.29)	(1.80)	(0.83)	(0.63)	(3.26)	(18.19)	(11.25)	(20.23)	(29.75)
2018	(7.45)	-	(7.64)	(15.09)	(9.48)	(3.15)	(5.20)	(17.83)	(1.84)	(0.85)	(0.64)	(3.33)	(18.77)	(11.64)	(20.93)	(30.65)
2019	(7.86)	-	(8.06)	(15.92)	(9.96)	(3.31)	(5.46)	(18.73)	(1.91)	(0.88)	(0.66)	(3.46)	(19.73)	(12.25)	(22.05)	(32.15)
2020	(8.03)	-	(8.23)	(16.25)	(10.11)	(3.36)	(5.55)	(19.02)	(1.92)	(0.89)	(0.67)	(3.48)	(20.07)	(12.47)	(22.47)	(32.62)
2021	(8.28)	-	(8.49)	(16.77)	(10.39)	(3.45)	(5.70)	(19.53)	(1.96)	(0.90)	(0.68)	(3.54)	(20.63)	(12.84)	(23.15)	(33.46)
2022	(8.59)	-	(8.81)	(17.40)	(10.72)	(3.56)	(5.88)	(20.17)	(2.00)	(0.92)	(0.69)	(3.62)	(21.32)	(13.29)	(23.98)	(34.51)
2023	(8.90)	-	(9.12)	(18.02)	(11.05)	(3.67)	(6.06)	(20.77)	(2.04)	(0.94)	(0.71)	(3.69)	(21.98)	(13.73)	(24.78)	(35.51)
2024	(9.22)	-	(9.45)	(18.67)	(11.39)	(3.78)	(6.25)	(21.42)	(2.08)	(0.96)	(0.72)	(3.77)	(22.69)	(14.19)	(25.64)	(36.57)
2025	(9.61)	-	(9.85)	(19.46)	(11.82)	(3.92)	(6.48)	(22.22)	(2.14)	(0.99)	(0.74)	(3.87)	(23.57)	(14.76)	(26.69)	(37.91)
2026	(10.02)	-	(10.27)	(20.30)	(12.26)	(4.07)	(6.73)	(23.06)	(2.20)	(1.02)	(0.76)	(3.98)	(24.49)	(15.36)	(27.79)	(39.30)
2027	(10.46)	-	(10.72)	(21.17)	(12.73)	(4.23)	(6.98)	(23.94)	(2.26)	(1.04)	(0.78)	(4.09)	(25.45)	(15.99)	(28.94)	(40.76)
2028	(10.89)	-	(11.16)	(22.04)	(13.19)	(4.38)	(7.23)	(24.80)	(2.32)	(1.07)	(0.80)	(4.19)	(26.39)	(16.61)	(30.08)	(42.18)
2029	(11.30)	-	(11.58)	(22.89)	(13.63)	(4.52)	(7.47)	(25.62)	(2.37)	(1.10)	(0.82)	(4.29)	(27.30)	(17.21)	(31.19)	(43.54)
2030	(11.80)	-	(12.09)	(23.89)	(14.15)	(4.70)	(7.76)	(26.61)	(2.44)	(1.13)	(0.85)	(4.41)	(28.39)	(17.92)	(32.50)	(45.17)
2031	(12.24)	-	(12.54)	(24.78)	(14.60)	(4.85)	(8.01)	(27.46)	(2.49)	(1.15)	(0.86)	(4.50)	(29.33)	(18.54)	(33.65)	(46.57)
2032	(12.73)	-	(13.05)	(25.78)	(15.12)	(5.02)	(8.30)	(28.44)	(2.55)	(1.18)	(0.89)	(4.62)	(30.41)	(19.25)	(34.97)	(48.18)
2033	(13.22)	-	(13.54)	(26.76)	(15.62)	(5.19)	(8.57)	(29.37)	(2.61)	(1.21)	(0.91)	(4.72)	(31.45)	(19.94)	(36.24)	(49.72)
2034	(12.09)	-	(12.39)	(24.47)	(14.21)	(4.72)	(7.80)	(26.73)	(2.35)	(1.09)	(0.82)	(4.26)	(28.65)	(18.19)	(33.08)	(45.19)
2035	(2.39)	-	(2.45)	(4.83)	(2.79)	(0.93)	(1.53)	(5.25)	(0.46)	(0.21)	(0.16)	(0.83)	(5.64)	(3.59)	(6.52)	(8.87)
TOTAL	**$ (195.56)**	**$ -**	**$ (200.40)**	**$ (395.96)**	**$ (239.53)**	**$ (79.54)**	**$ (131.39)**	**$ (450.47)**	**$ (43.13)**	**$ (19.94)**	**$ (14.98)**	**$ (78.05)**	**$ (478.22)**	**$ (299.89)**	**$ (542.33)**	**$ (768.05)**
NPV	**$ (71.70)**	**$ -**	**$ (73.48)**	**$ (145.18)**	**$ (88.99)**	**$ (29.55)**	**$ (48.81)**	**$ (167.35)**	**$ (16.45)**	**$ (7.61)**	**$ (5.72)**	**$ (29.77)**	**$ (177.14)**	**$ (110.63)**	**$ (199.71)**	**$ (286.11)**

Economic Impacts (Rates) - Employment (number of jobs)																
	Residential				Commercial				Industrial				Total			
Year	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2015	(156)	-	(40)	(197)	(54)	(16)	(28)	(97)	(3)	(4)	(3)	(10)	(212)	(20)	(71)	(304)
2016	(174)	-	(44)	(219)	(59)	(18)	(31)	(108)	(3)	(4)	(4)	(11)	(237)	(22)	(78)	(338)
2017	(179)	-	(45)	(225)	(61)	(18)	(31)	(110)	(3)	(4)	(4)	(11)	(243)	(23)	(80)	(347)
2018	(186)	-	(47)	(233)	(63)	(19)	(32)	(114)	(3)	(4)	(4)	(11)	(251)	(23)	(83)	(358)
2019	(196)	-	(50)	(246)	(66)	(20)	(34)	(119)	(3)	(5)	(4)	(12)	(265)	(25)	(87)	(377)
2020	(200)	-	(51)	(251)	(67)	(20)	(34)	(121)	(3)	(5)	(4)	(12)	(270)	(25)	(89)	(385)
2021	(206)	-	(52)	(259)	(69)	(21)	(35)	(125)	(3)	(5)	(4)	(12)	(278)	(25)	(92)	(396)
2022	(214)	-	(54)	(269)	(71)	(21)	(36)	(129)	(3)	(5)	(4)	(12)	(288)	(26)	(95)	(410)
2023	(222)	-	(56)	(278)	(73)	(22)	(38)	(133)	(3)	(5)	(4)	(13)	(298)	(27)	(98)	(424)
2024	(230)	-	(58)	(289)	(75)	(23)	(39)	(137)	(3)	(5)	(4)	(13)	(308)	(28)	(101)	(438)
2025	(239)	-	(61)	(301)	(78)	(24)	(40)	(142)	(3)	(5)	(4)	(13)	(321)	(29)	(105)	(456)
2026	(250)	-	(63)	(314)	(81)	(25)	(42)	(147)	(4)	(5)	(5)	(14)	(334)	(30)	(109)	(475)
2027	(260)	-	(66)	(327)	(84)	(25)	(43)	(153)	(4)	(5)	(5)	(14)	(348)	(31)	(114)	(494)
2028	(271)	-	(69)	(341)	(87)	(26)	(45)	(158)	(4)	(6)	(5)	(14)	(362)	(32)	(118)	(513)
2029	(281)	-	(71)	(354)	(90)	(27)	(46)	(164)	(4)	(6)	(5)	(15)	(375)	(33)	(123)	(532)
2030	(294)	-	(74)	(369)	(93)	(28)	(48)	(170)	(4)	(6)	(5)	(15)	(391)	(34)	(128)	(554)
2031	(305)	-	(77)	(383)	(96)	(29)	(50)	(175)	(4)	(6)	(5)	(15)	(405)	(35)	(132)	(574)
2032	(317)	-	(80)	(399)	(100)	(30)	(51)	(181)	(4)	(6)	(5)	(16)	(421)	(36)	(137)	(596)
2033	(329)	-	(83)	(414)	(103)	(31)	(53)	(187)	(4)	(6)	(5)	(16)	(436)	(38)	(142)	(617)
2034	(301)	-	(76)	(378)	(94)	(28)	(48)	(171)	(4)	(6)	(5)	(15)	(398)	(34)	(129)	(563)
2035	(59)	-	(15)	(75)	(18)	(6)	(9)	(34)	(1)	(1)	(1)	(3)	(79)	(7)	(25)	(111)
TOTAL	**(4,869)**	**-**	**(1,232)**	**(6,121)**	**(1,581)**	**(479)**	**(814)**	**(2,874)**	**(69)**	**(104)**	**(91)**	**(267)**	**(6,519)**	**(583)**	**(2,137)**	**(9,263)**

Economic Impacts of Rates

Economic Impacts (Rates) - Labor Income (million $)

	Residential				Commercial				Industrial				Total			
Year	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
2013	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2015	(6.13)	-	(2.43)	(8.56)	(3.20)	(1.01)	(1.68)	(5.88)	(0.28)	(0.25)	(0.21)	(0.75)	(9.61)	(1.26)	(4.32)	(15.18)
2016	(6.84)	-	(2.71)	(9.54)	(3.55)	(1.12)	(1.86)	(6.53)	(0.31)	(0.28)	(0.23)	(0.82)	(10.70)	(1.39)	(4.80)	(16.89)
2017	(7.02)	-	(2.78)	(9.80)	(3.63)	(1.14)	(1.90)	(6.67)	(0.31)	(0.28)	(0.24)	(0.83)	(10.96)	(1.42)	(4.92)	(17.30)
2018	(7.27)	-	(2.88)	(10.15)	(3.74)	(1.18)	(1.96)	(6.88)	(0.32)	(0.28)	(0.24)	(0.85)	(11.34)	(1.46)	(5.08)	(17.88)
2019	(7.68)	-	(3.04)	(10.71)	(3.93)	(1.24)	(2.06)	(7.23)	(0.33)	(0.30)	(0.25)	(0.88)	(11.94)	(1.53)	(5.35)	(18.82)
2020	(7.84)	-	(3.10)	(10.94)	(3.99)	(1.25)	(2.09)	(7.34)	(0.34)	(0.30)	(0.25)	(0.88)	(12.16)	(1.55)	(5.45)	(19.16)
2021	(8.09)	-	(3.20)	(11.29)	(4.10)	(1.29)	(2.15)	(7.54)	(0.34)	(0.30)	(0.26)	(0.90)	(12.52)	(1.59)	(5.61)	(19.72)
2022	(8.39)	-	(3.32)	(11.71)	(4.23)	(1.33)	(2.22)	(7.78)	(0.35)	(0.31)	(0.26)	(0.92)	(12.97)	(1.64)	(5.80)	(20.41)
2023	(8.69)	-	(3.44)	(12.12)	(4.36)	(1.37)	(2.29)	(8.01)	(0.36)	(0.32)	(0.27)	(0.94)	(13.40)	(1.69)	(5.99)	(21.08)
2024	(9.00)	-	(3.56)	(12.56)	(4.49)	(1.41)	(2.36)	(8.26)	(0.36)	(0.32)	(0.27)	(0.96)	(13.85)	(1.73)	(6.19)	(21.78)
2025	(9.38)	-	(3.71)	(13.10)	(4.66)	(1.47)	(2.45)	(8.57)	(0.37)	(0.33)	(0.28)	(0.98)	(14.42)	(1.80)	(6.44)	(22.65)
2026	(9.79)	-	(3.87)	(13.66)	(4.84)	(1.52)	(2.54)	(8.90)	(0.38)	(0.34)	(0.29)	(1.01)	(15.01)	(1.86)	(6.70)	(23.57)
2027	(10.21)	-	(4.04)	(14.25)	(5.02)	(1.58)	(2.63)	(9.24)	(0.39)	(0.35)	(0.30)	(1.04)	(15.62)	(1.93)	(6.97)	(24.52)
2028	(10.63)	-	(4.21)	(14.83)	(5.20)	(1.64)	(2.73)	(9.57)	(0.40)	(0.36)	(0.30)	(1.07)	(16.23)	(1.99)	(7.24)	(25.47)
2029	(11.03)	-	(4.37)	(15.40)	(5.38)	(1.69)	(2.82)	(9.89)	(0.41)	(0.37)	(0.31)	(1.09)	(16.82)	(2.06)	(7.50)	(26.38)
2030	(11.52)	-	(4.56)	(16.08)	(5.58)	(1.76)	(2.93)	(10.27)	(0.42)	(0.38)	(0.32)	(1.12)	(17.53)	(2.13)	(7.81)	(27.46)
2031	(11.94)	-	(4.73)	(16.67)	(5.76)	(1.81)	(3.02)	(10.60)	(0.43)	(0.38)	(0.33)	(1.14)	(18.14)	(2.20)	(8.08)	(28.41)
2032	(12.43)	-	(4.92)	(17.35)	(5.97)	(1.88)	(3.13)	(10.97)	(0.44)	(0.39)	(0.33)	(1.17)	(18.84)	(2.27)	(8.38)	(29.50)
2033	(12.90)	-	(5.11)	(18.01)	(6.16)	(1.94)	(3.23)	(11.33)	(0.45)	(0.40)	(0.34)	(1.20)	(19.52)	(2.34)	(8.68)	(30.54)
2034	(11.80)	-	(4.67)	(16.47)	(5.61)	(1.76)	(2.94)	(10.31)	(0.41)	(0.36)	(0.31)	(1.08)	(17.81)	(2.13)	(7.92)	(27.86)
2035	(2.33)	-	(0.92)	(3.25)	(1.10)	(0.35)	(0.58)	(2.03)	(0.08)	(0.07)	(0.06)	(0.21)	(3.51)	(0.42)	(1.56)	(5.49)
TOTAL	**$ (190.88)**	**$ -**	**$ (75.57)**	**$ (266.45)**	**$ (94.51)**	**$ (29.72)**	**$ (49.56)**	**$ (173.79)**	**$ (7.52)**	**$ (6.67)**	**$ (5.65)**	**$ (19.84)**	**$ (292.91)**	**$ (36.39)**	**$ (130.78)**	**$ (460.07)**
NPV	**$ (69.99)**	**$ -**	**$ (27.71)**	**$ (97.69)**	**$ (35.11)**	**$ (11.04)**	**$ (18.41)**	**$ (64.56)**	**$ (2.87)**	**$ (2.54)**	**$ (2.16)**	**$ (7.57)**	**$ (107.96)**	**$ (13.58)**	**$ (48.28)**	**$ (169.82)**

Economic Impacts (Rates) - Value Added (million $)

	Residential				Commercial				Industrial				Total			
Year	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
2013	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2015	(6.13)	-	(4.09)	(10.22)	(5.35)	(1.70)	(2.83)	(9.89)	(0.60)	(0.44)	(0.36)	(1.40)	(12.09)	(2.14)	(7.28)	(21.51)
2016	(6.84)	-	(4.57)	(11.40)	(5.94)	(1.89)	(3.14)	(10.98)	(0.66)	(0.48)	(0.39)	(1.54)	(13.44)	(2.37)	(8.10)	(23.92)
2017	(7.02)	-	(4.69)	(11.71)	(6.07)	(1.93)	(3.21)	(11.21)	(0.67)	(0.48)	(0.40)	(1.55)	(13.76)	(2.42)	(8.30)	(24.47)
2018	(7.27)	-	(4.86)	(12.13)	(6.26)	(1.99)	(3.31)	(11.56)	(0.69)	(0.49)	(0.41)	(1.59)	(14.22)	(2.49)	(8.58)	(25.28)
2019	(7.68)	-	(5.13)	(12.80)	(6.57)	(2.09)	(3.48)	(12.14)	(0.71)	(0.51)	(0.42)	(1.65)	(14.96)	(2.61)	(9.03)	(26.60)
2020	(7.84)	-	(5.23)	(13.07)	(6.68)	(2.13)	(3.53)	(12.33)	(0.72)	(0.52)	(0.43)	(1.66)	(15.23)	(2.64)	(9.19)	(27.06)
2021	(8.09)	-	(5.40)	(13.49)	(6.86)	(2.18)	(3.63)	(12.66)	(0.73)	(0.53)	(0.43)	(1.69)	(15.67)	(2.71)	(9.46)	(27.84)
2022	(8.39)	-	(5.60)	(13.99)	(7.08)	(2.25)	(3.74)	(13.08)	(0.74)	(0.54)	(0.44)	(1.72)	(16.21)	(2.79)	(9.79)	(28.79)
2023	(8.69)	-	(5.80)	(14.49)	(7.29)	(2.32)	(3.86)	(13.47)	(0.76)	(0.55)	(0.45)	(1.76)	(16.74)	(2.87)	(10.11)	(29.71)
2024	(9.00)	-	(6.01)	(15.01)	(7.52)	(2.39)	(3.98)	(13.89)	(0.78)	(0.56)	(0.46)	(1.80)	(17.29)	(2.95)	(10.45)	(30.69)
2025	(9.38)	-	(6.27)	(15.65)	(7.80)	(2.48)	(4.12)	(14.41)	(0.80)	(0.57)	(0.47)	(1.84)	(17.98)	(3.06)	(10.86)	(31.90)
2026	(9.79)	-	(6.54)	(16.32)	(8.10)	(2.58)	(4.28)	(14.95)	(0.82)	(0.59)	(0.49)	(1.90)	(18.70)	(3.17)	(11.30)	(33.17)
2027	(10.21)	-	(6.82)	(17.03)	(8.40)	(2.67)	(4.44)	(15.52)	(0.84)	(0.61)	(0.50)	(1.95)	(19.45)	(3.28)	(11.76)	(34.49)
2028	(10.63)	-	(7.10)	(17.72)	(8.70)	(2.77)	(4.60)	(16.08)	(0.86)	(0.62)	(0.51)	(2.00)	(20.19)	(3.39)	(12.21)	(35.80)
2029	(11.03)	-	(7.37)	(18.40)	(8.99)	(2.86)	(4.76)	(16.61)	(0.88)	(0.64)	(0.52)	(2.04)	(20.91)	(3.50)	(12.65)	(37.06)
2030	(11.52)	-	(7.69)	(19.21)	(9.34)	(2.97)	(4.94)	(17.26)	(0.91)	(0.66)	(0.54)	(2.10)	(21.77)	(3.63)	(13.17)	(38.57)
2031	(11.94)	-	(7.98)	(19.92)	(9.64)	(3.07)	(5.10)	(17.81)	(0.93)	(0.67)	(0.55)	(2.15)	(22.51)	(3.74)	(13.63)	(39.87)
2032	(12.43)	-	(8.30)	(20.73)	(9.98)	(3.18)	(5.28)	(18.44)	(0.95)	(0.69)	(0.56)	(2.20)	(23.36)	(3.86)	(14.14)	(41.37)
2033	(12.90)	-	(8.62)	(21.52)	(10.31)	(3.28)	(5.45)	(19.05)	(0.97)	(0.70)	(0.58)	(2.25)	(24.18)	(3.98)	(14.65)	(42.82)
2034	(11.80)	-	(7.88)	(19.68)	(9.38)	(2.99)	(4.96)	(17.33)	(0.88)	(0.63)	(0.52)	(2.03)	(22.05)	(3.62)	(13.36)	(39.03)
2035	(2.33)	-	(1.56)	(3.89)	(1.84)	(0.59)	(0.97)	(3.41)	(0.17)	(0.12)	(0.10)	(0.39)	(4.34)	(0.71)	(2.63)	(7.69)
TOTAL	**$ (190.88)**	**$ -**	**$ (127.49)**	**$ (318.38)**	**$ (158.12)**	**$ (50.33)**	**$ (83.61)**	**$ (292.07)**	**$ (16.07)**	**$ (11.60)**	**$ (9.53)**	**$ (37.20)**	**$ (365.07)**	**$ (61.93)**	**$ (220.64)**	**$ (647.65)**
NPV	**$ (69.99)**	**$ -**	**$ (46.75)**	**$ (116.73)**	**$ (58.74)**	**$ (18.70)**	**$ (31.06)**	**$ (108.51)**	**$ (6.13)**	**$ (4.42)**	**$ (3.64)**	**$ (14.19)**	**$ (134.86)**	**$ (23.12)**	**$ (81.45)**	**$ (239.43)**

Economic Impacts of Construction and O&M

Economic Impact (Construction and O&M) - Output (million $)												
	Construction				Operations				Construction + Operations			
Year	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
2013	$ 78	$ 19	$ 26	$ 123					$ 78.26	$ 18.61	$ 25.97	$ 122.85
2014				-	$ 3.27	$ 0.32	$ 0.89	$ 4.48	3.27	0.32	0.89	4.48
2015				-	3.27	0.32	0.89	4.48	3.27	0.32	0.89	4.48
2016				-	3.27	0.32	0.89	4.48	3.27	0.32	0.89	4.48
2017				-	3.27	0.32	0.89	4.48	3.27	0.32	0.89	4.48
2018				-	3.27	0.32	0.89	4.48	3.27	0.32	0.89	4.48
2019				-	3.27	0.32	0.89	4.48	3.27	0.32	0.89	4.48
2020				-	3.27	0.32	0.89	4.48	3.27	0.32	0.89	4.48
2021				-	3.27	0.32	0.89	4.48	3.27	0.32	0.89	4.48
2022				-	3.27	0.32	0.89	4.48	3.27	0.32	0.89	4.48
2023				-	3.27	0.32	0.89	4.48	3.27	0.32	0.89	4.48
2024				-	3.27	0.32	0.89	4.48	3.27	0.32	0.89	4.48
2025				-	3.27	0.32	0.89	4.48	3.27	0.32	0.89	4.48
2026				-	3.27	0.32	0.89	4.48	3.27	0.32	0.89	4.48
2027				-	3.27	0.32	0.89	4.48	3.27	0.32	0.89	4.48
2028				-	3.27	0.32	0.89	4.48	3.27	0.32	0.89	4.48
2029				-	3.27	0.32	0.89	4.48	3.27	0.32	0.89	4.48
2030				-	3.27	0.32	0.89	4.48	3.27	0.32	0.89	4.48
2031				-	3.27	0.32	0.89	4.48	3.27	0.32	0.89	4.48
2032				-	3.27	0.32	0.89	4.48	3.27	0.32	0.89	4.48
2033				-	3.27	0.32	0.89	4.48	3.27	0.32	0.89	4.48
2034				-	3.27	0.32	0.89	4.48	3.27	0.32	0.89	4.48
2035				-	3.27	0.32	0.89	4.48	3.27	0.32	0.89	4.48
NPV	**$ 72.21**	**$ 17.18**	**$ 23.97**	**$ 113.36**	**$ 32.45**	**$ 3.12**	**$ 8.82**	**$ 40.96**	**$ 102.16**	**$ 20.06**	**$ 32.10**	**$ 154.32**

Economic Impact (Construction and O&M) - Employment (number of jobs)												
	Construction				Operations				Construction + Operations			
Year	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
2013	466	133	209	809					466	133	209	809
2014				-	6	2	7	16	6	2	7	16
2015				-	6	2	7	16	6	2	7	16
2016				-	6	2	7	16	6	2	7	16
2017				-	6	2	7	16	6	2	7	16
2018				-	6	2	7	16	6	2	7	16
2019				-	6	2	7	16	6	2	7	16
2020				-	6	2	7	16	6	2	7	16
2021				-	6	2	7	16	6	2	7	16
2022				-	6	2	7	16	6	2	7	16
2023				-	6	2	7	16	6	2	7	16
2024				-	6	2	7	16	6	2	7	16
2025				-	6	2	7	16	6	2	7	16
2026				-	6	2	7	16	6	2	7	16
2027				-	6	2	7	16	6	2	7	16
2028				-	6	2	7	16	6	2	7	16
2029				-	6	2	7	16	6	2	7	16
2030				-	6	2	7	16	6	2	7	16
2031				-	6	2	7	16	6	2	7	16
2032				-	6	2	7	16	6	2	7	16
2033				-	6	2	7	16	6	2	7	16
2034				-	6	2	7	16	6	2	7	16
2035				-	6	2	7	16	6	2	7	16
Total	**466**	**133**	**209**	**809**	**141**	**46**	**158**	**345**	**607**	**180**	**368**	**1,154**

Economic Impacts of Construction and O&M

Economic Impact (Construction and O&M) - Labor Income (million $)												
	Construction				Operations				Construction + Operations			
Year	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
2013	$ 30.53	$ 6.75	$ 9.15	$ 46.44					$ 30.53	$ 6.75	$ 9.15	$ 46.44
2014				-	$ 1.15	$ 0.11	$ 0.31	$ 1.57	1.15	0.11	0.31	1.57
2015				-	1.15	0.11	0.31	1.57	1.15	0.11	0.31	1.57
2016				-	1.15	0.11	0.31	1.57	1.15	0.11	0.31	1.57
2017				-	1.15	0.11	0.31	1.57	1.15	0.11	0.31	1.57
2018				-	1.15	0.11	0.31	1.57	1.15	0.11	0.31	1.57
2019				-	1.15	0.11	0.31	1.57	1.15	0.11	0.31	1.57
2020				-	1.15	0.11	0.31	1.57	1.15	0.11	0.31	1.57
2021				-	1.15	0.11	0.31	1.57	1.15	0.11	0.31	1.57
2022				-	1.15	0.11	0.31	1.57	1.15	0.11	0.31	1.57
2023				-	1.15	0.11	0.31	1.57	1.15	0.11	0.31	1.57
2024				-	1.15	0.11	0.31	1.57	1.15	0.11	0.31	1.57
2025				-	1.15	0.11	0.31	1.57	1.15	0.11	0.31	1.57
2026				-	1.15	0.11	0.31	1.57	1.15	0.11	0.31	1.57
2027				-	1.15	0.11	0.31	1.57	1.15	0.11	0.31	1.57
2028				-	1.15	0.11	0.31	1.57	1.15	0.11	0.31	1.57
2029				-	1.15	0.11	0.31	1.57	1.15	0.11	0.31	1.57
2030				-	1.15	0.11	0.31	1.57	1.15	0.11	0.31	1.57
2031				-	1.15	0.11	0.31	1.57	1.15	0.11	0.31	1.57
2032				-	1.15	0.11	0.31	1.57	1.15	0.11	0.31	1.57
2033				-	1.15	0.11	0.31	1.57	1.15	0.11	0.31	1.57
2034				-	1.15	0.11	0.31	1.57	1.15	0.11	0.31	1.57
2035				-	1.15	0.11	0.31	1.57	1.15	0.11	0.31	1.57
NPV	**$ 28.18**	**$ 6.23**	**$ 8.45**	**$ 42.85**	**$ 11.40**	**$ 1.07**	**$ 3.11**	**$ 14.37**	**$ 38.69**	**$ 7.21**	**$ 11.31**	**$ 57.22**

Economic Impact (Construction and O&M) - Value Added (million $)												
	Construction				Operations				Construction + Operations			
Year	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
2013	$ 39.10	$ 11.02	$ 17.04	$ 67.17					$ 39.10	$ 11.02	$ 17.04	$ 67.17
2014				-	$ 2.58	$ 0.19	$ 0.58	$ 3.35	2.58	0.19	0.58	3.35
2015				-	2.58	0.19	0.58	3.35	2.58	0.19	0.58	3.35
2016				-	2.58	0.19	0.58	3.35	2.58	0.19	0.58	3.35
2017				-	2.58	0.19	0.58	3.35	2.58	0.19	0.58	3.35
2018				-	2.58	0.19	0.58	3.35	2.58	0.19	0.58	3.35
2019				-	2.58	0.19	0.58	3.35	2.58	0.19	0.58	3.35
2020				-	2.58	0.19	0.58	3.35	2.58	0.19	0.58	3.35
2021				-	2.58	0.19	0.58	3.35	2.58	0.19	0.58	3.35
2022				-	2.58	0.19	0.58	3.35	2.58	0.19	0.58	3.35
2023				-	2.58	0.19	0.58	3.35	2.58	0.19	0.58	3.35
2024				-	2.58	0.19	0.58	3.35	2.58	0.19	0.58	3.35
2025				-	2.58	0.19	0.58	3.35	2.58	0.19	0.58	3.35
2026				-	2.58	0.19	0.58	3.35	2.58	0.19	0.58	3.35
2027				-	2.58	0.19	0.58	3.35	2.58	0.19	0.58	3.35
2028				-	2.58	0.19	0.58	3.35	2.58	0.19	0.58	3.35
2029				-	2.58	0.19	0.58	3.35	2.58	0.19	0.58	3.35
2030				-	2.58	0.19	0.58	3.35	2.58	0.19	0.58	3.35
2031				-	2.58	0.19	0.58	3.35	2.58	0.19	0.58	3.35
2032				-	2.58	0.19	0.58	3.35	2.58	0.19	0.58	3.35
2033				-	2.58	0.19	0.58	3.35	2.58	0.19	0.58	3.35
2034				-	2.58	0.19	0.58	3.35	2.58	0.19	0.58	3.35
2035				-	2.58	0.19	0.58	3.35	2.58	0.19	0.58	3.35
NPV	**$ 36.08**	**$ 10.17**	**$ 15.73**	**$ 61.98**	**$ 25.52**	**$ 1.87**	**$ 5.79**	**$ 30.62**	**$ 59.63**	**$ 11.90**	**$ 21.07**	**$ 92.60**

Economic Impacts of Construction and O&M less OREC

Economic Impact (Construction and O&M less OREC) - Output (million $)

Year	Construction Direct	Construction Indirect	Construction Induced	Construction Total	Operations Direct	Operations Indirect	Operations Induced	Operations Total	OREC Direct	OREC Indirect	OREC Induced	OREC Total	Construction + Operations-OREC Direct	Construction + Operations-OREC Indirect	Construction + Operations-OREC Induced	Construction + Operations-OREC Total
2013	$ 78.26	$ 18.61	$ 25.97	$ 122.85					$ -	$ -	$ -	$ -	$ 78	$ 19	$ 26	$ 123
2014				-	$ 3.27	$ 0.32	$ 0.89	$ 4.48	-	-	-	-	3.27	0.32	0.89	4.48
2015				-	3.27	0.32	0.89	4.48	(16.01)	(9.88)	(17.73)	(26.30)	(12.74)	(9.56)	(16.84)	(21.82)
2016				-	3.27	0.32	0.89	4.48	(17.79)	(10.99)	(19.74)	(29.15)	(14.51)	(10.68)	(18.85)	(24.67)
2017				-	3.27	0.32	0.89	4.48	(18.19)	(11.25)	(20.23)	(29.75)	(14.91)	(10.94)	(19.34)	(25.27)
2018				-	3.27	0.32	0.89	4.48	(18.77)	(11.64)	(20.93)	(30.65)	(15.50)	(11.32)	(20.04)	(26.17)
2019				-	3.27	0.32	0.89	4.48	(19.73)	(12.25)	(22.05)	(32.15)	(16.46)	(11.93)	(21.16)	(27.67)
2020				-	3.27	0.32	0.89	4.48	(20.07)	(12.47)	(22.47)	(32.62)	(16.79)	(12.16)	(21.58)	(28.14)
2021				-	3.27	0.32	0.89	4.48	(20.63)	(12.84)	(23.15)	(33.46)	(17.35)	(12.53)	(22.26)	(28.98)
2022				-	3.27	0.32	0.89	4.48	(21.32)	(13.29)	(23.98)	(34.51)	(18.04)	(12.98)	(23.09)	(30.03)
2023				-	3.27	0.32	0.89	4.48	(21.98)	(13.73)	(24.78)	(35.51)	(18.71)	(13.41)	(23.89)	(31.03)
2024				-	3.27	0.32	0.89	4.48	(22.69)	(14.19)	(25.64)	(36.57)	(19.41)	(13.88)	(24.75)	(32.09)
2025				-	3.27	0.32	0.89	4.48	(23.57)	(14.76)	(26.69)	(37.91)	(20.29)	(14.45)	(25.80)	(33.43)
2026				-	3.27	0.32	0.89	4.48	(24.49)	(15.36)	(27.79)	(39.30)	(21.21)	(15.05)	(26.90)	(34.82)
2027				-	3.27	0.32	0.89	4.48	(25.45)	(15.99)	(28.94)	(40.76)	(22.17)	(15.67)	(28.05)	(36.28)
2028				-	3.27	0.32	0.89	4.48	(26.39)	(16.61)	(30.08)	(42.18)	(23.11)	(16.29)	(29.19)	(37.70)
2029				-	3.27	0.32	0.89	4.48	(27.30)	(17.21)	(31.19)	(43.54)	(24.02)	(16.89)	(30.30)	(39.06)
2030				-	3.27	0.32	0.89	4.48	(28.39)	(17.92)	(32.50)	(45.17)	(25.11)	(17.60)	(31.61)	(40.69)
2031				-	3.27	0.32	0.89	4.48	(29.33)	(18.54)	(33.65)	(46.57)	(26.05)	(18.22)	(32.76)	(42.09)
2032				-	3.27	0.32	0.89	4.48	(30.41)	(19.25)	(34.97)	(48.18)	(27.13)	(18.94)	(34.08)	(43.70)
2033				-	3.27	0.32	0.89	4.48	(31.45)	(19.94)	(36.24)	(49.72)	(28.17)	(19.62)	(35.35)	(45.24)
2034				-	3.27	0.32	0.89	4.48	(28.65)	(18.19)	(33.08)	(45.19)	(25.37)	(17.88)	(32.19)	(40.71)
2035				-	3.27	0.32	0.89	4.48	(5.64)	(3.59)	(6.52)	(8.87)	(2.36)	(3.27)	(5.63)	(4.39)
NPV	**$ 72.21**	**$ 17.18**	**$ 23.97**	**$ 113.36**	**$ 32.45**	**$ 3.12**	**$ 8.82**	**$ 44.39**	**$ (177.14)**	**$ (110.63)**	**$ (199.71)**	**$ (286.11)**	**$ (74.98)**	**$ (90.58)**	**$ (167.60)**	**$ (131.79)**

Economic Impact (Construction and O&M less OREC) - Employment (number of jobs)

Year	Construction Direct	Construction Indirect	Construction Induced	Construction Total	Operations Direct	Operations Indirect	Operations Induced	Operations Total	OREC Direct	OREC Indirect	OREC Induced	OREC Total	Construction + Operations-OREC Direct	Construction + Operations-OREC Indirect	Construction + Operations-OREC Induced	Construction + Operations-OREC Total
2013	466	133	209	809					-	-	-	-	466	133	209	809
2014				-	6	2	7	16	-	-	-	-	6	2	7	16
2015				-	6	2	7	16	(212)	(20)	(71)	(304)	(206)	(18)	(63)	(288)
2016				-	6	2	7	16	(237)	(22)	(78)	(338)	(230)	(20)	(71)	(323)
2017				-	6	2	7	16	(243)	(23)	(80)	(347)	(236)	(21)	(73)	(331)
2018				-	6	2	7	16	(251)	(23)	(83)	(358)	(245)	(21)	(76)	(343)
2019				-	6	2	7	16	(265)	(25)	(87)	(377)	(258)	(22)	(80)	(362)
2020				-	6	2	7	16	(270)	(25)	(89)	(385)	(263)	(23)	(82)	(369)
2021				-	6	2	7	16	(278)	(25)	(92)	(396)	(272)	(23)	(84)	(380)
2022				-	6	2	7	16	(288)	(26)	(95)	(410)	(282)	(24)	(88)	(394)
2023				-	6	2	7	16	(298)	(27)	(98)	(424)	(291)	(25)	(91)	(408)
2024				-	6	2	7	16	(308)	(28)	(101)	(438)	(302)	(26)	(94)	(422)
2025				-	6	2	7	16	(321)	(29)	(105)	(456)	(314)	(27)	(98)	(440)
2026				-	6	2	7	16	(334)	(30)	(109)	(475)	(328)	(28)	(102)	(459)
2027				-	6	2	7	16	(348)	(31)	(114)	(494)	(342)	(29)	(107)	(478)
2028				-	6	2	7	16	(362)	(32)	(118)	(513)	(355)	(30)	(111)	(498)
2029				-	6	2	7	16	(375)	(33)	(123)	(532)	(369)	(31)	(115)	(516)
2030				-	6	2	7	16	(391)	(34)	(128)	(554)	(385)	(32)	(120)	(539)
2031				-	6	2	7	16	(405)	(35)	(132)	(574)	(399)	(33)	(125)	(558)
2032				-	6	2	7	16	(421)	(36)	(137)	(596)	(415)	(34)	(130)	(580)
2033				-	6	2	7	16	(436)	(38)	(142)	(617)	(430)	(35)	(135)	(602)
2034				-	6	2	7	16	(398)	(34)	(129)	(563)	(392)	(32)	(122)	(548)
2035				-	6	2	7	16	(79)	(7)	(25)	(111)	(72)	(5)	(18)	(95)
Total	**466**	**133**	**209**	**809**	**141**	**46**	**158**	**345**	**(6,519)**	**(583)**	**(2,137)**	**(9,263)**	**(5,913)**	**(403)**	**(1,769)**	**(8,109)**

Economic Impacts of Construction and O&M less OREC

Economic Impact (Construction and O&M less OREC) - Labor Income (million $)																
	Construction				Operations				OREC				Construction + Operations-OREC			
Year	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
2013	$ 30.53	$ 6.75	$ 9.15	$ 46.44					$ -	$ -	$ -	$ -	$ 31	$ 7	$ 9	$ 46
2014				-	$ 1.15	$ 0.11	$ 0.31	$ 1.57	-	-	-	-	1.15	0.11	0.31	1.57
2015				-	1.15	0.11	0.31	1.57	(9.61)	(1.26)	(4.32)	(15.18)	(8.46)	(1.15)	(4.00)	(13.61)
2016				-	1.15	0.11	0.31	1.57	(10.70)	(1.39)	(4.80)	(16.89)	(9.55)	(1.28)	(4.49)	(15.32)
2017				-	1.15	0.11	0.31	1.57	(10.96)	(1.42)	(4.92)	(17.30)	(9.81)	(1.31)	(4.60)	(15.73)
2018				-	1.15	0.11	0.31	1.57	(11.34)	(1.46)	(5.08)	(17.88)	(10.19)	(1.35)	(4.77)	(16.31)
2019				-	1.15	0.11	0.31	1.57	(11.94)	(1.53)	(5.35)	(18.82)	(10.79)	(1.42)	(5.04)	(17.25)
2020				-	1.15	0.11	0.31	1.57	(12.16)	(1.55)	(5.45)	(19.16)	(11.01)	(1.44)	(5.13)	(17.59)
2021				-	1.15	0.11	0.31	1.57	(12.52)	(1.59)	(5.61)	(19.72)	(11.37)	(1.48)	(5.29)	(18.15)
2022				-	1.15	0.11	0.31	1.57	(12.97)	(1.64)	(5.80)	(20.41)	(11.82)	(1.53)	(5.49)	(18.84)
2023				-	1.15	0.11	0.31	1.57	(13.40)	(1.69)	(5.99)	(21.08)	(12.25)	(1.58)	(5.68)	(19.50)
2024				-	1.15	0.11	0.31	1.57	(13.85)	(1.73)	(6.19)	(21.78)	(12.70)	(1.63)	(5.88)	(20.21)
2025				-	1.15	0.11	0.31	1.57	(14.42)	(1.80)	(6.44)	(22.65)	(13.27)	(1.69)	(6.13)	(21.08)
2026				-	1.15	0.11	0.31	1.57	(15.01)	(1.86)	(6.70)	(23.57)	(13.86)	(1.75)	(6.39)	(22.00)
2027				-	1.15	0.11	0.31	1.57	(15.62)	(1.93)	(6.97)	(24.52)	(14.47)	(1.82)	(6.66)	(22.95)
2028				-	1.15	0.11	0.31	1.57	(16.23)	(1.99)	(7.24)	(25.47)	(15.08)	(1.89)	(6.93)	(23.89)
2029				-	1.15	0.11	0.31	1.57	(16.82)	(2.06)	(7.50)	(26.38)	(15.67)	(1.95)	(7.18)	(24.81)
2030				-	1.15	0.11	0.31	1.57	(17.53)	(2.13)	(7.81)	(27.46)	(16.38)	(2.02)	(7.49)	(25.89)
2031				-	1.15	0.11	0.31	1.57	(18.14)	(2.20)	(8.08)	(28.41)	(16.99)	(2.09)	(7.76)	(26.84)
2032				-	1.15	0.11	0.31	1.57	(18.84)	(2.27)	(8.38)	(29.50)	(17.69)	(2.16)	(8.07)	(27.92)
2033				-	1.15	0.11	0.31	1.57	(19.52)	(2.34)	(8.68)	(30.54)	(18.37)	(2.23)	(8.37)	(28.97)
2034				-	1.15	0.11	0.31	1.57	(17.81)	(2.13)	(7.92)	(27.86)	(16.66)	(2.02)	(7.61)	(26.29)
2035				-	1.15	0.11	0.31	1.57	(3.51)	(0.42)	(1.56)	(5.49)	(2.36)	(0.31)	(1.25)	(3.92)
NPV	**$ 28.18**	**$ 6.23**	**$ 8.45**	**$ 42.85**	**$ 11.40**	**$ 1.07**	**$ 3.11**	**$ 14.37**	**$ (107.96)**	**$ (13.58)**	**$ (48.28)**	**$ (169.82)**	**$ (69.27)**	**$ (6.37)**	**$ (36.96)**	**$ (112.61)**

Economic Impact (Construction and O&M less OREC) - Value Added (million $)																
	Construction				Operations				OREC				Construction + Operations-OREC			
Year	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
2013	$ 39.10	$ 11.02	$ 17.04	$ 67.17					$ -	$ -	$ -	$ -	$ 39	$ 11	$ 17	$ 67
2014				-	$ 2.58	$ 0.19	$ 0.58	$ 3.35	-	-	-	-	2.58	0.19	0.58	3.35
2015				-	2.58	0.19	0.58	3.35	(12.09)	(2.14)	(7.28)	(21.51)	(9.51)	(1.95)	(6.70)	(18.16)
2016				-	2.58	0.19	0.58	3.35	(13.44)	(2.37)	(8.10)	(23.92)	(10.87)	(2.18)	(7.52)	(20.57)
2017				-	2.58	0.19	0.58	3.35	(13.76)	(2.42)	(8.30)	(24.47)	(11.18)	(2.23)	(7.71)	(21.12)
2018				-	2.58	0.19	0.58	3.35	(14.22)	(2.49)	(8.58)	(25.28)	(11.64)	(2.30)	(7.99)	(21.93)
2019				-	2.58	0.19	0.58	3.35	(14.96)	(2.61)	(9.03)	(26.60)	(12.39)	(2.42)	(8.44)	(23.25)
2020				-	2.58	0.19	0.58	3.35	(15.23)	(2.64)	(9.19)	(27.06)	(12.65)	(2.45)	(8.61)	(23.71)
2021				-	2.58	0.19	0.58	3.35	(15.67)	(2.71)	(9.46)	(27.84)	(13.09)	(2.52)	(8.87)	(24.49)
2022				-	2.58	0.19	0.58	3.35	(16.21)	(2.79)	(9.79)	(28.79)	(13.64)	(2.60)	(9.20)	(25.44)
2023				-	2.58	0.19	0.58	3.35	(16.74)	(2.87)	(10.11)	(29.71)	(14.16)	(2.68)	(9.52)	(26.37)
2024				-	2.58	0.19	0.58	3.35	(17.29)	(2.95)	(10.45)	(30.69)	(14.72)	(2.76)	(9.86)	(27.34)
2025				-	2.58	0.19	0.58	3.35	(17.98)	(3.06)	(10.86)	(31.90)	(15.40)	(2.87)	(10.28)	(28.55)
2026				-	2.58	0.19	0.58	3.35	(18.70)	(3.17)	(11.30)	(33.17)	(16.12)	(2.98)	(10.72)	(29.82)
2027				-	2.58	0.19	0.58	3.35	(19.45)	(3.28)	(11.76)	(34.49)	(16.88)	(3.09)	(11.18)	(31.15)
2028				-	2.58	0.19	0.58	3.35	(20.19)	(3.39)	(12.21)	(35.80)	(17.62)	(3.20)	(11.63)	(32.45)
2029				-	2.58	0.19	0.58	3.35	(20.91)	(3.50)	(12.65)	(37.06)	(18.34)	(3.31)	(12.07)	(33.71)
2030				-	2.58	0.19	0.58	3.35	(21.77)	(3.63)	(13.17)	(38.57)	(19.19)	(3.44)	(12.59)	(35.22)
2031				-	2.58	0.19	0.58	3.35	(22.51)	(3.74)	(13.63)	(39.87)	(19.94)	(3.55)	(13.04)	(36.52)
2032				-	2.58	0.19	0.58	3.35	(23.36)	(3.86)	(14.14)	(41.37)	(20.79)	(3.67)	(13.56)	(38.02)
2033				-	2.58	0.19	0.58	3.35	(24.18)	(3.98)	(14.65)	(42.82)	(21.61)	(3.79)	(14.06)	(39.47)
2034				-	2.58	0.19	0.58	3.35	(22.05)	(3.62)	(13.36)	(39.03)	(19.48)	(3.43)	(12.78)	(35.68)
2035				-	2.58	0.19	0.58	3.35	(4.34)	(0.71)	(2.63)	(7.69)	(1.77)	(0.52)	(2.05)	(4.34)
NPV	**$ 36.08**	**$ 10.17**	**$ 15.73**	**$ 61.98**	**$ 25.52**	**$ 1.87**	**$ 5.79**	**$ 33.19**	**$ (134.86)**	**$ (23.12)**	**$ (81.45)**	**$ (239.43)**	**$ (75.23)**	**$ (11.22)**	**$ (60.38)**	**$ (146.83)**

Appendix 5: Sources Consulted

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Appendix 5. Sources Consulted

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