

Exhibit D

Project Costs and Financing



Exhibit D

Statement of Costs and Financing

Prepared for:

EDF Renewable Development, Inc.

FERC Project No. P-13318

October 2015

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October 2015

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TABLE OF CONTENTS

Acronyms and Abbreviations.....	vii
1. Project Costs.....	1
2. Existing Structure and Facility	7
3. Residual Value after License Expiration.....	9
4. Average Annual Cost	11
5. Estimated Annual Value of Project Power	13
6. Other energy Alternatives	15
7. Consequences of denial of license.....	17
8. Project Financing.....	19
9. Project Licensing Cost	21
10. Market Price Estimate.....	23

TABLES

- D.1: Expected Capital Costs for the Swan Lake North Pumped Storage
Hydroelectric Project
- D.2: Proposed Mitigation and Environmental Measures and Their Costs
- D.3: Average Annual Cost from Completion of Project Construction to Expiration
of Original License

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ACRONYMS AND ABBREVIATIONS

BPA	Bonneville Power Administration
CAISO	California Independent System Operator
COB.....	California Oregon Border
DAM.....	day-ahead market
EIM	Energy Imbalance Market
LMP	Locational Marginal Prices
MRTU	Market Redesign and Technology Upgrade
Project.....	Swan Lake North Pumped Storage Project
RPS.....	Renewable Portfolio Standards
WISO	Western Independent System Operator

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1. PROJECT COSTS

Table D.1 includes a breakdown of the project development costs in 2015\$, and shown as overnight costs. The table includes a total cost for each major item, interest during construction, and other general expenses. The table includes pooled contingencies on a p80 basis.

The capital costs of environmental measures are included Table D.1 and broken out in detail in Table D.2. The capital costs of environmental measures in Table D.2 are the costs in 2015\$ expected at the time the measures will be implemented, with sufficient contingency added for the measures to be completed. Capital costs for environmental measures include the following contingencies: a 10-percent contingency on each major item, a 10-percent contingency on the summation of all the major items, and a contingency to cover an assumed 2.5-percent annual inflation rate. The Applicant does not believe these measures will cost more than has been specified, however, the project as a whole also has an overall contingency applied to account for variation of costs.

TABLE D.1: EXPECTED CAPITAL COSTS FOR THE SWAN LAKE NORTH PUMPED STORAGE HYDROELECTRIC PROJECT

Item	Cost (\$)		
	Subtotal	Subtotal	Subtotal
Civil Works total:			298,700,000
Tests & Surveys		2,500,000	
Preliminary works		2,100,000	
Detailed Civil Works studies		6,500,000	
Temporary site facilities		27,900,000	
Upper reservoir		57,700,000	
Earthworks	44,800,000		
Waterproofing	7,900,000		
Water intake	5,000,000		
High pressure circuit		113,200,000	
Earthworks & support	23,800,000		
Penstock	89,400,000		
Powerhouse		23,100,000	
Low pressure circuit		17,700,000	
Earthworks & support	10,300,000		
Penstock	7,400,000		
Lower reservoir		46,800,000	
Earthworks	32,500,000		
Waterproofing	7,800,000		
Water intake	6,500,000		
Substation platform		100,000	

Item	Cost (\$)		
	Subtotal	Subtotal	Subtotal
Roads & tracks (within project site perimeter)		1,100,000	
Electromechanical Equipment total:			161,200,000
Hydromechanical equipment		2,300,000	
Generating units		71,300,000	
Electrotechnical equipment		60,300,000	
Lifting equipment		2,100,000	
Mechanical auxiliaries		6,200,000	
Electrical auxiliaries		10,600,000	
Control system		4,700,000	
Energy evacuation		3,700,000	
Spare parts		Included	
Engineering & Project Management total:			55,200,000
Engineering & project management		36,800,000	
Owners engineer & All Risks insurance		18,400,000	
Other costs total:			136,420,000
Interconnection		34,960,000	
Transmission line		33,530,000	
Land acquisitions & water rights		47,430,000	
Access roads		10,100,000	
Licensing costs & supporting studies		10,400,000	
Overall Contingencies			57,400,000
Interest During Construction			35,490,225
Total Project Costs			744,410,225

TABLE D.2: PROPOSED MITIGATION AND ENVIRONMENTAL MEASURES AND THEIR COSTS

Resource Area	PM&E Category	Task Description	Initial Cost	Incremental Cost	Frequency (years)	Total Cost
Water Resources	Hazardous Substances Spill Prevention and Cleanup Plan	Develop and implement Plan	\$30,000			\$30,000
	Operational Adaptive Water Quality Monitoring and Management Program	Develop and implement Plan	\$30,000	\$2,000	45	\$120,000
Wildlife Resources	Ungulate Protection Program	Ongoing consultation during construction	\$5,000			\$5,000
		Dust Pallatives	\$20,000			\$20,000
		Weed Control	see RNWMP			
		Decommissioning/Revegetating access roads	see RNWMP			
	Avian and Bat Protection Program	Ongoing consultation/timing during construction	\$50,000			\$50,000
		Preconstruction surveys for raptors for 2 breeding seasons (and additional birds of conservation concern in year 2)	\$40,000			\$40,000
		Additional consultation regarding birds of conservation concern if found	\$4,500			\$4,500
		Bird flight diverter installation at three locations	\$15,000			\$15,000
		Minimize lighting/motion or heat activated system	\$20,000			\$20,000
		Reservoir fencing	\$250,000			\$250,000
		Penstock wildlife crossings	Consultation/Engineering Costs	\$20,000		\$20,000

Resource Area	PM&E Category	Task Description	Initial Cost	Incremental Cost	Frequency (years)	Total Cost
	Wildlife habitat restoration and enhancement plan	Habitat mitigation as determined by the Mitigation Planning Team	To be determined by selection of mitigation projects by the Mitigation Planning Team			
		Mitigation Planning Team		\$10,000	10	\$100,000
Recreation	Interpretive Facility	Small interpretive facility. The facility would include signage with educational and historical information, and a staging area for periodic guided tours of the hydroelectric facility. Site designs and drawings would be designed in consultation with stakeholders.	\$7,000	\$3,000	10	\$37,000
Land Use	Comprehensive Traffic Safety Plan	Develop and implement Plan	\$20,000			\$20,000
Cultural	Historic Properties Management Plan	Implement Plan	To be determined			
Geology & Soils	Comprehensive Soil Erosion Control Plan	Develop and implement plan	\$95,000			\$95,000
Botanical	Revegetation and Noxious Weed Management Plan (RNWMP)	Pre-construction Noxious Weed Surveys	\$100,000			\$100,000
		Weed control during construction	\$10,000			\$10,000

Resource Area	PM&E Category	Task Description	Initial Cost	Incremental Cost	Frequency (years)	Total Cost
		Reseeding and Plantings ¹	\$750,000			\$750,000
		Finalizing Revegetation Management Plan	\$30,000			\$30,000
		Monitoring		40,000	5	\$200,000
Health and Safety	Comprehensive Public Safety Plan	Develop and implement Plan	\$20,000			\$20,000
Total without Wildlife Habitat Mitigation						\$1,936,500

¹Costs and duration contingent upon success of initial reseeding and weed control efforts.

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2. EXISTING STRUCTURE AND FACILITY

There are no existing structures or facilities at this site.

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3. RESIDUAL VALUE AFTER LICENSE EXPIRATION

Many components of the project will have a useful life beyond the expiration of the License, and this is particularly true of the major civil works. It is estimated that the minimum fair value at \$1,030,000,000 in 2073\$ for the project is primarily a function of the residual major civil works and their replacement cost. The replacement cost is illustrated as the 2015\$ overnight major civil works costs described in Table D-1 escalated for inflation. The net investment is estimated at \$0 for the project as the project will have generated enough depreciation and revenue in its life to eliminate any residual investment value. It is possible that some late stage equipment failure may require new investment in the later years of the License that may not be fully depreciated. The severance damages of not being allowed to continue operation of the project (relicensing for a second 50 year term) would be equal to the minimum fair value described above. The project is considered unique and is interconnecting at a critical infrastructure location in the west, and thus it is presumed that market valuation of the project will be higher than the minimum fair valuation.

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4. AVERAGE ANNUAL COST

Table D.3 contains the average annual costs of the project. The costs of O&M for environmental measures are specified in Table D.2 and included in total costs in Table D.3. The project is assumed to be completely balance sheet financed by EDF and will not rely on long-term debt financing. Therefore there is no annual financing cost. The equity return assumed at this time is 7.8%, but is subject to market forces between now and completion of project construction that may raise or lower this value. All costs shown in the table are a 45-year average annual cost proxy, including cost escalation, based on the EDF financial 30-year template model used for all EDF projects.

Environmental measures not included in the O&M costs listed in Table D.3 are measures that will be enacted during construction (and therefore are a one-time cost) and for a specified short period after construction, not for the life of the project. An example of this are activities such as revegetation of areas disturbed during construction are not included below. The O&M costs shown in Table D.3 are for the first year of operation; after the first year an escalation rate of 2.5 percent was assumed for all annual costs.

TABLE D.3: AVERAGE ANNUAL COST FROM COMPLETION OF PROJECT CONSTRUCTION TO EXPIRATION OF ORIGINAL LICENSE

Annual Cost Items	45 Year Average Annual Cost* (\$)
Depreciation	20,988,000
Average annual taxes (income and property)	38,540,000
Average operation and maintenance	10,454,000
Operation and maintenance mitigation and environmental measures	14,000
Energy pumping charge	22,936,000
Total average cost	92,932,000

* A proxy for the 45 year useful life cycle average costs is the EDF 30 year financial template used for all projects.

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5. ESTIMATED ANNUAL VALUE OF PROJECT POWER

Assuming the project runs in pumping mode using off-peak electricity for up to 14 hours per day and then produces on-peak electricity for up to 10 hours per day, the most pertinent electricity market for this project is the Northern California wholesale electricity market administered by the California Independent System Operator (CAISO). Recent actions by PacifiCorp, the interconnecting utility, are leading toward a potential merger of their Energy Imbalance Market (EIM) with the CAISO. Such a merger would create and expanded-CAISO or Western Independent System Operator (WISO). A WISO creation would allow the project to better serve the needs of a greater pool of utilities and their customers and thus further enhance the value of the project. Economic dispatch modeling for the project was done by Energy Exemplar, LLC using their PLEXOS production cost modeling software. The PLEXOS software is commonly used by CAISO and the utility member of CAISO in their modeling and planning activities. The full Phase 3 report of the most recent modeling is located in Appendix D-1. As a conservative, yet likely, assumption in the economic dispatch modeling done for the project, the future revenues and costs associated with operating the Project have been based on a future WISO happening. A market price is thus determined by Locational Marginal Prices (LMP) at the California Oregon Border (COB) wholesale electricity trading hub established and currently administered by Bonneville Power Administration (BPA) for the day-ahead market (DAM). It is expected that current policy developments will lead CAISO to expand into the northwest by absorption of the growing EIM and turn the COB market hub into a new LMP in the WISO. LMP use was implemented under their Market Redesign and Technology Upgrade (MRTU) on April 1, 2009. Based on a full service operation year of 2023, it is anticipated that annual revenues from the sale of energy produced by the Project will exceed \$47.5 million (2023\$) with an additional sale of ancillary services exceeding \$7 million (2023\$), and the energy costs associated with obtaining pumping energy will approach \$15.9 million (2023\$) annually. As the Project is expected to operate as a marginal economic facility due to its procurement of energy for pumping, and then reselling to the market as energy and capacity, its revenues can be used as a proxy from a similar marginal resource that may be of an alternative technology. The cost of similar energy and capacity is estimated at \$38.58/MWh (2023\$), based on \$54.5 million (2023\$) in total annual revenues and a 41% generation capacity factor of all available hours.

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6. OTHER ENERGY ALTERNATIVES

Other energy alternatives are available; however, EDF does not participate in development of gas, oil, coal or nuclear-fueled power plants in the USA. EDF does develop renewable energy projects in the wind and solar technologies. These renewable technologies are not a good comparison to the Project for several reasons. First, these renewable projects are non-dispatchable and are unable to provide capacity and ancillary services to the market. Second, the influence of Renewable Portfolio Standards (RPS) which are mandated for renewable technologies, distorts the supply/ demand balance and therefore the cost of these generators. Third, the influence of federal and state tax incentives in the form of tax credits, either production-based or investment-based, distort the true costs of these generators.

Due to the above limitations of direct experience with other energy alternatives, EDF relies here on the PacifiCorp Integrated Resource Plan Volume 1 published March 31, 2015 (PAC IRP). It can be found in its entirety in Appendix D-2. This extensive system and regional assessment is relevant for the Project because PacifiCorp is the interconnecting utility that the Project is currently interfacing with and proceeding through their interconnection process (currently in the Feasibility Study stage). Additionally, PacifiCorp has used the Project and many of its characteristics in their assessment of a typical pumped storage hydropower project being added to their system as identified in the following highlighted sections of the PAC IRP:

- Discussion of the potential need for bulk storage and in particular pumped storage hydropower projects as a viable Resource Option, Ch. 6, page 87.
- Representation of the prior Project design of 600MW in Table 6.7 and reference in footnote 45 to the further change in the EDF Project design to a smaller ~400MW resource, Ch. 6, page 116.
- Analysis in the Modeling and Portfolio Selection discussion where the sensitivity used for the default pumped storage hydropower generator was the EDF Project in the ~400MW configuration, Ch. 8, page 205.

Finally, PacifiCorp is a likely customer for the Project's generation capability due to the direct interconnection of the Project with their system, and the expressed interest in the PAC IRP of adding this technology to their resource portfolio.

The PAC IRP highlights several key areas for comparing potential energy alternatives which include the following:

- Many energy alternatives were identified and assessed by PacifiCorp with the cumulative results provided in Table 6.1: Supply Side Resources, Ch. 6, page 91, and Table 6.2: Total Resource Cost for Supply Side Resource Options, Ch. 6, page 92+. Pumped storage hydropower is clearly represented in direct comparison to these energy alternatives, and is shown primarily with emphasis on Total Resource Cost.
- Complementing the possible Supply Side Resources, is a discussion of the utility's Resource Need and Forecast, Ch. 5, page 61. Note that due to expected carbon impacts of 111D, as described extensively in the PAC IRP, various energy

alternatives may have a strong preference or avoidance based on carbon emitting characteristics while still meeting the Resource Needs identified.

- A general discussion of realistic Supply Side Resources is contained at the beginning of Ch. 6, page 87. Note this chapter looks at a wide range of energy alternatives including natural gas generation, nuclear, batteries, renewable resources, carbon capture coal generation, and pumped storage hydropower.-

7. CONSEQUENCES OF DENIAL OF LICENSE

The value of the Project would be a great loss to society if the License was denied. Production cost modeling of the operations of the project, conducted by Energy Exemplar, LLC and shown in their report in Appendix D.1, have shown that the value of the project to the grid is substantial at over \$20/kW-mo or \$94.4 million (2023\$) in the first year of operations alone. This value creation takes many forms including:

1. creation of low cost energy during peak use periods
2. provision of ancillary services to respond to immediate needs of ramping and load following
3. provision of regulation to manage grid stability, in particular with relation to renewable generation
4. ability to absorb surplus renewable energy or other forms of energy, such as traditional hydropower, when there is surplus generation allowing the resource to not be curtailed or for hydro to not spill water
5. creation of new load that allows existing fossil fuel generators to supply energy and run at more efficient output levels which decrease their operation heat rate (they consume less fuel and consume it more efficiently)
6. a marked reduction in CO₂ from fossil fuel generators
7. reduced operations and maintenance cost for fossil fuel generators due to less cycling of their operation

If the project were not issued a License and the pumped storage hydropower project not built, it is expected that the site would revert to its current use as pivot farm agriculture, cattle ranching, and timber production.

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8. PROJECT FINANCING

The Project is assumed to be completely balance sheet financed by EDF and will not rely on long-term debt financing. The annual revenue for the project is discussed in Section 5.0 of this exhibit.

SWAN LAKE NORTH HYDRO, LLC

APPLICATION HE-617

2019 UPDATE FOR EXHIBIT D

Exhibit D of the Federal Energy Regulatory Commission Final License Application was originally prepared for EDF Renewable Development, Inc. in October of 2015. On February 23, 2017, Rye Development and National Grid Ventures (through Swan Lake North Hydro, LLC, a Delaware limited liability company registered to do business in the State of Oregon), purchased the Swan Lake Pumped Storage Project from EDF. Swan Lake North Hydro, LLC ("Swan Lake") will thus have financial responsibility for the project moving forward.

Swan Lake accepts the cost model referred to in Section 4 of this report and the cost projections reflected in Tables D-1 and D-2 (as adjusted for inflation). The original report stated in Section 8 that EDF intended to "balance-sheet fund" the project and not to take on any long-term debt financing. The new project owners could also balance-sheet fund the project, but long-term debt could also be viable given the clear demand for purchase of electricity from the project, as discussed in Section 6 of the report.

As a condition of the FERC License, Swan Lake is required to submit a full project finance plan to FERC 90 days prior to project construction. Detailed and updated financial information will be included in that plan.

9. PROJECT LICENSING COST

The Applicant estimates total licensing costs to be approximately \$10,400,000.

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10.MARKET PRICE ESTIMATE

The future value of revenues and costs associated with operating the Project have been based on LMP at the future Expanded CAISO node of COB as described in Section 5.0 of this exhibit. Based on the production cost modeling that has been performed using the PLEXOS by Energy Exemplar, LLC (Appendix D-1), it is anticipated that generating electricity values will be approximately \$54 per megawatt-hour (2023\$) and this will be akin to on-peak or super-peak energy prices. Similarly, pumping electricity values will be approximately \$15 per megawatt-hour (2023\$), and this will be akin to off-peak or super-off-peak energy prices.

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APPENDIX D-1

Swan Lake Pumped Storage Facility Economic Evaluation using PLEXOS – Phase 3

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APPENDIX D-2

PacifiCorp Integrated Resource Plan 2015

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Appendix D-2 has been submitted as a standalone pdf.

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