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Issue: Analysis
Witness: James McMahon
Type of Exhibit: Affidavit in Support
Sponsoring Party: The Empire District
Electric Company
Case No: EO-2018-0092
Date: April 24, 2018

**BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI**

**AFFIDAVIT IN SUPPORT OF
NON-UNANIMOUS STIPULATION AND AGREEMENT**

OF

JAMES MCMAHON

APRIL 24, 2018

Empire Exhibit No. 89
Date 5-09-18 Reporter XF
File No. EO-2018-0092

**STATEMENT IN SUPPORT OF
NON-UNANIMOUS STIPULATION AND AGREEMENT**

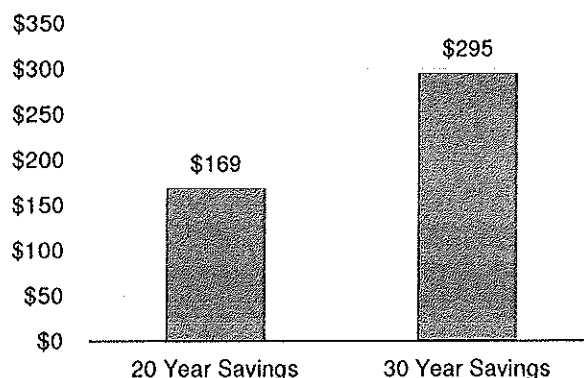
1. The purpose of this Statement in Support of Non-Unanimous Stipulation and Agreement (“Statement”) is to provide support for the Non-Unanimous Stipulation and Agreement (“Stipulation”) executed and filed by the Signatories in this proceeding on April 24, 2018. The Stipulation reflects an agreement to allow Empire to acquire up to 600 MW of wind located in or near the service territory. The Stipulation is different than Empire’s proposed Generation Fleet Savings Analysis (“GFSA”), but is nonetheless a reasonable plan that will provide customer savings relative to the 2016 Integrated Resource Plan (“IRP”) Preferred Plan. This Statement describes how the resource plan contained in the Stipulation differs from the Customer Savings Plan contained in the GFSA, provides the expected customer savings and risk reduction benefits of the Stipulation relative to the GFSA, and describes why I believe the Stipulation is a reasonable plan for Empire’s customers.

2. Under the Stipulation, Empire will acquire up to 600 MW of wind ** _____
_____**. The Stipulation authorizes Empire to record its capital investment to acquire the Wind Projects as utility plant in service subject to audit in Empire’s next general rate case. The Stipulation also includes certain market price protections for customers.

Customer Savings Relative to the 2016 IRP Preferred Plan

3. CRA has worked with Empire to forecast the customer savings under the Stipulation relative to the 2016 IRP Preferred Plan. Adding up to 600 MW of wind to Empire’s portfolio is expected to generate customer savings because the levelized cost of the wind is significantly lower than the forecast price paid for energy in Southwest Power Pool. The levelized cost reflects the average all-in per megawatt hour cost of acquiring, owning, and operating the turbines. Empire’s analysis of the Stipulation indicates that a plan with up to 600 MW of wind will generate the following customer savings relative to the 2016 IRP Preferred Plan:

Figure 1: Stipulation Customer Savings Relative to the 2016 IRP Preferred Plan (\$ millions)



The 600 MW wind portfolio analyzed above is based on short-listed bids received to Empire’s Request for Proposal (“RFP”). The projects comprising the 600 MW that were modeled are located on three different sites in or near Empire’s service territory. The expected total capital cost to acquire these projects is \$1,587/kW or \$958 million. Tax equity is expected to contribute \$529 million, leaving \$429 million to be reimbursed through rates by Empire customers. The effective cost for Empire is thus \$711/kW¹.

Risk Reduction Benefit of the Stipulation

4. Adding wind generation to the portfolio significantly reduces financial risk for Empire customers. Wind in the portfolio mitigates the impact that rising fuel and market prices have on Empire’s retail rates. In a rising market price environment Empire would be able to sell wind output at higher prices without any incremental fuel costs. This would partly, if not fully, offset the increased portfolio costs from operating Empire’s natural gas assets at a higher cost. Given that natural gas prices are at near record lows today (less than \$3/MMBtu) and that we have experienced up to \$13/MMBtu prices in the last 10 years, wind is a valuable risk reduction mechanism for the Empire portfolio.

5. Empire determined how portfolio risk would change as a result of adding up to 600 MW of wind to the portfolio, relative to the 2016 IRP Preferred Plan. Figure 2 shows the 20 year present value revenue requirement for the Stipulation and the 2016 IRP Preferred Plan under three market cases: Base, High Market, and Low Market. The Base scenario includes Empire’s base case forecast assumptions, updated with the latest forward price curves for fuel

¹ The total project cost does not include transmission cost upgrades which are estimated at \$81 million, however these costs are included in the overall cost savings estimates.

and electricity prices from ABB². The High Market and Low Market cases use ABB results that include high fuel and electricity prices and low fuel and electricity prices, respectively.

Figure 2: 20 Year Present Value Revenue Requirement Under Base, High, and Low Market

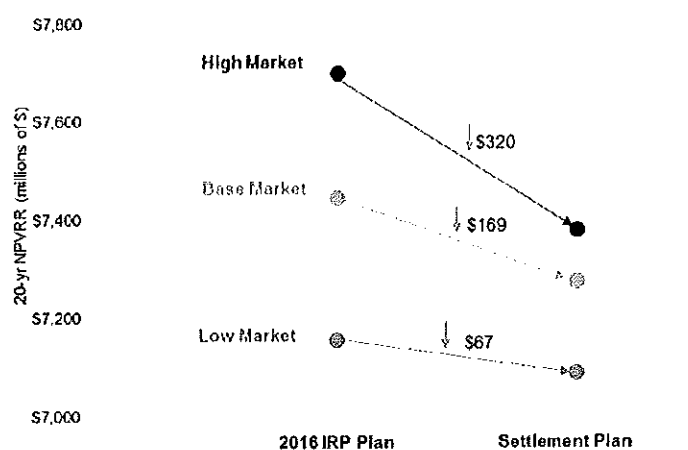


Figure 2 shows that the 20 year savings from the Stipulation are lower in all cases relative to the 2016 IRP. Moreover, the High Market and Low Market cases in the Stipulation form a tighter band around the base case than in the 2016 IRP, implying a portfolio that is at lower risk to market forces.

Differences Between the GFSa and the Stipulation

6. The Stipulation is different from the Customer Savings Plan included in the GFSa. The GFSa called for retiring the Asbury coal plant and building up to 800 MW of low cost wind. Our modeling of the Stipulation calls for retaining Asbury and the installation of the environmental controls needed for federal compliance and adding up to 600 MW of wind. The changes resulting from the Stipulation also drive a different long-term schedule of resource additions and retirements in the analysis as a result of these different near-term decisions. As a result of the differences in these near-term and long-term decisions, the cost savings of the plans also are different with respect to the 2016 IRP Preferred Plan.

Resource Build Out

7. Figure 3 below shows the difference in the 20 year build schedule between the Stipulation and the Customer Savings Plan. The plans differ in the near term with respect to the

² ABB 2017 fall market update

wind additions and the disposition of Asbury. Over the long term, the plans differ with respect to long-term capacity added: the Customer Savings Plan builds two combined cycle units and solar while the Stipulation plan would call for only a combustion turbine unit to replace Asbury.

Figure 3: 20 Year Build Schedule Stipulation v Customer Savings Plan

	Stipulation	Customer Savings Plan	2016 IRP Preferred Plan
2018	Update Asbury	Retire Asbury	
2019		800 MW Wind	
2020	600 MW Wind		
2021			
2022			
2023		Retire EC1	
2024			
2025		100 MW CC	
2026		Retire EC2	
2027			
2028			
2029			100 MW CC, 100 MW Wind
2030			
2031		100 MW Solar	150 MW Wind
2032		100 MW CC	
2033		Retire Riv 10&11	
2034			
2035	214 MW F Class CT		200 MW CC
2036			
2037			

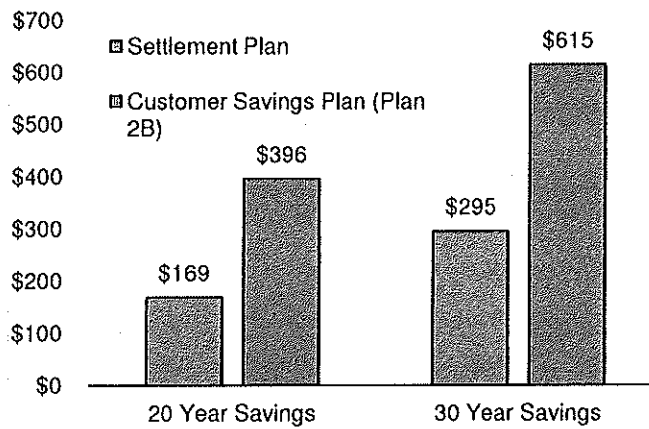
Customer Savings

8. The customer savings are, not surprisingly, different between the Stipulation and the Customer Savings Plan, though part of this difference relates to the plans themselves and part relates to the updated market assumptions used to evaluate the Stipulation (discussed below).

Figure 4 shows the difference in 20 year and 30 year present value revenue requirement savings

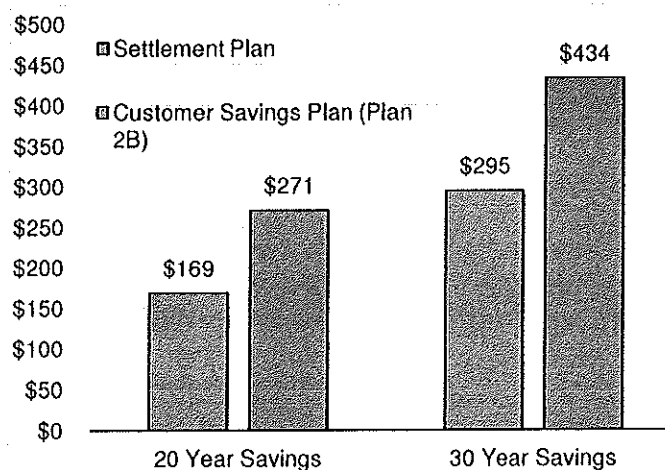
for the Stipulation and the Customer Savings Plan. Customer savings are relative to the 2016 IRP Preferred Plan.

Figure 4: Differences in Expected Customer Savings Between the Stipulation and the Customer Savings Plan (\$millions)



9. I updated the assumptions of the GFSA to be consistent with the assumptions used to evaluate the Stipulation. Figure 5 shows the difference in 20 year and 30 year present value revenue requirement savings using common assumptions. On a thirty year basis, approximately \$38 million (27%) of the difference relates to the difference in the size of the wind addition, while the remaining portion of \$101 million (73%) relates to the retirement of Asbury.

Figure 5: Differences in Expected Customer Savings Between the Stipulation and the Customer Savings Plan Using Common Assumptions (ABB Fall 2017 Reference Case) (\$ millions)



Differences in Assumptions

10. The Stipulation analysis uses different assumptions than the GFSA. Two sets of assumptions were updated: (1) the cost of acquiring and operating wind and (2) the fuel and market price assumptions. The assumed cost of acquiring and operating wind was updated in the Stipulation to reflect the latest information on short-listed bids in the RFP process. Figure 7 provides a summary of the differences.

Figure 7: Summary of the Difference in Wind Costs Between the Stipulation Analysis and the GFSA

	GFSA	Stipulation Analysis
All In Capital Cost (\$2020)	\$1,806/kW	\$1,587/kW
Empire Capital Cost	\$726/kW	\$711/kW
Capacity Factor	54%	47%
Tax Rate	35%	21%
Basis	Low LCOE Basis	Mid-LCOE Basis
Transmission Interconnection	Low LCOE Connection Costs	Low LCOE Connection Costs
Online Date	2019	2020

The fuel and market prices in the Stipulation analysis were updated to ABB's latest market outlook. ABB produces an update to its market views twice per year. The GFSA relied on an ABB view from the fall of 2016. The Stipulation analysis relies on a view from the fall of 2017. Fuel and electricity prices are lower in the most recent ABB view.

Reasonableness of the Stipulation

11. The Stipulation offers significant savings and risk reduction to Empire customers over the 2016 IRP Preferred Plan. It includes the addition of 600 MW of low cost wind to the portfolio that is able to take advantage of the federal production tax credit and tax equity

financing. Empire customers will benefit from lower rates and will be protected against unexpected high market prices. The addition of wind also enables Empire to transform its portfolio toward a more sustainable, clean energy future while simultaneously focusing on the planning priorities of cost and risk.

12. While I believe that the GFSA plan would offer greater benefits to Empire customers I am satisfied that the Stipulation still generates significant benefits. By retaining Asbury and investing in the controls needed for the plant to continue to operate past 2019, Empire will retain flexibility in the date that it ultimately retires Asbury. If power prices rise more than expected, the plant might offer additional value to the portfolio. If prices track as expected or fall further Empire can choose to retire the plant at a later date.