Burns and McDonnell were retained to conduct a decommissioning cost evaluation for the proposed 98 Megawatt, 49 turbine Hoopeston Wind farm in Vermilion County.
In developing their cost estimate for the project there were multiple assumptions made. These assumptions created a very favorable final cost estimate for the presumed end of the project time frame of 30 years.
Some of the largest assumptions made include……

1) The value of the scrap metal will completely offset the removal cost of the turbine components.
2) With the removal of the access roads and restoration of that acreage, there will be no hauling or disposal costs incurred by the project.
3) There will be no inflationary costs over the next 30 years. Therefore pricing today will be sufficient for the year 2044.

After making these assumptions Burns and McDonnell (BMcD) made a remarkable disclaimer under 4.0 STATEMENT OF LIMITATIONS

"In preparation of this decommissioning obligation cost evaluation, BMcD has relied upon information provided by the client. While BMcD has no reason to believe that the information provided to BMcD, and upon which BMcD has relied, is inaccurate or incomplete in any material respect, BMcD has not independently verified such information and cannot guarantee its accuracy or completeness."

BMcD states very clearly that they have not moved past their office desk, have not made one phone call, have not consulted with any union shops that would complete the decommissioning work. BMcD has given complete control of their analysis to the wind farm developer in the incorporation of different costs and values in their cost analysis.
BMcD's cost evaluation is the first attachment at the conclusion of this paper, so you can verify my summary of their cost estimates.
BMcD found that after removing the 49 turbines and their foundations, access roads and then reseeding the land that there would be no cost but instead a credit after receiving cash for the scrap portions of the project.

After additional costs and contingencies are added into the turbine and road removal credit there is a final balance of $986,000, which would return the property to the pre-project conditions of 2014.

At this point I would like to take issue with BMcD's decision to rely on the developer's information in making their evaluation on this 98 MW wind project.

There are two distinct ways of estimating the cost of decommissioning 30 years in the future. One is to complete the study as BMcD has done, which was completely "in house" and the other is to make use of various professions involved with this type of work today to find out what the estimated cost 30 years ahead might be.

In 2012 this study was completed on a proposed project in Northern Illinois. Three union shops, actively developing WECS projects bid on decommissioning a 100-turbine project sometime in the future using today's dollars. I chose the lowest of the three bids. The turbines used in the analysis were the same used in the Hoopeston project. The transportation distances for the scrap and waste were 15 miles and the transportation distances for the gravel after it's removal was 20 miles.

The cost of the removal of one turbine was $550,000 and the bid sheet is included immediately after the first attachment near the end of this document. As part of that bid, the cost of the crane to remove the turbine was in the $125,000 area. ($75,000 for the crane and $50,000 for the set up and tear down of the crane.) Costs of construction related equipment in the last two years have dramatically increased, with the cost of the crane having one of the largest increases.

The final article at the end of this paper, from "North American Wind Power" provides the latest estimate of crane costs for this type of work. This article speaks of the cost associated with machinery of this size and scale. If I were going to update the 2012 bid with the 2014 crane price, the cost of taking one turbine down would be increased to the $675,000 range.

When developing the credit portion of the BMcD analysis I would again take issue with the work they have done. The scrap values given to BMcD are exceedingly generous. Scrap steal prices at local yards for the highest valued scrap are in the $200 per ton range, (not the $235 per BMcD.) The copper price for copper in the generator and in the 30-year-old wiring, which runs the length of the turbine, has no labor costs associated with it and is grossly exaggerated.

When a multiple ton generator is dropped off at a scrap yard it is weighed and given a value of $.20/lb, (not the $2.35/lb per BMcD.) It is understood that 12-13% of that generator is copper and the remainder is cast or steal. The copper in the electrical wiring is treated better at $.30-40/lb.

When developing a credit for the scrap in a turbine, the met tower and the various buildings, BMcD proposed an inflated number of $3,388,000. Using todays scrap values in central Illinois, $2,744,000 would be far closer to reality.

One final area of concern is the decommissioning of the access roads. The cost was $734,000 for the road removal and $131,000 for reseeding. Since BMcD feels there is a ready market for these 30-year-old roads, there should be no cost for moving the gravel once it is taken off the land. That is a huge assumption. A quick call to local gravel yards will yield a much different answer. The cost of gravel is in the transportation, not just the removal from the land. In 2012 my analysis between two competing bids from Illinois and Wisconsin was $50,000 for each 1,000 ft. access road. Whether the reclaimed area was to be reseeded or farmed would be up to the landowner, but the $865,000 road removal project proposed by BMcD should be closer to $2,450,000 (Plus seeding if the land owner requires it).

In summary, BMcD has put together a cost analysis for the decommissioning of the WECS project at Hoopeston at $986,000 or $20,122 per turbine.

In contrast I would estimate the cost of just the turbine and road removal at $35,525,000, with a scrap value of $2,744,000 applied against it for a net cost of $32,781,000 or $669,000 per turbine. Any additional costs from the removal of the met tower, sheds and substations would be added to that.

Please remember these are 2012 (and some 2014) dollars. Inflation has increased the cost of this operation at a tremendous rate these last two years. Analysis at specific times during the upcoming 30 years to add in the cost of inflation in this evaluation is essential to protect the interests of Vermilion county.

Thank you,
Marshall Newhouse
13407 Capron Rd.
Capron, IL 61012

Report on the

Decommissioning Obligation Cost Evaluation Hoopeston Wind Farm in Vermilion County

The Hoopeston Wind Project

Project No. 77853

February 2014

Decommissioning Obligation Cost Evaluation
Hoopeston Wind Farm in Vermilion County

prepared for

The Hoopeston Wind Project

February 2014

Project No. 77853

prepared by

Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri

TABLE OF CONTENTS

LIST OF TABLES

1.0 EXECUTIVE SUMMARY

1.1 Introduction

Burns & McDonnell (BMcD) was retained to conduct a decommissioning obligation cost evaluation for the proposed 49-turbine Hoopeston wind farm (Project) located in Vermilion County, approximately five miles east of Rossville, Illinois (Project Site). The Project will use the Vestas V100 - 2.0MW wind turbine generator and have a total nominal rating of approximately 98 megawatts (MW). The purpose of the decommissioning cost evaluation was to review the wind farm and to make a recommendation regarding the decommissioning plan for retiring the facility at the end of its useful life for the purpose of complying with the Building Permit issued by Vermilion County.

1.2 Results

BMcD estimates that the Project should have an expected useful life of 30 years or more. When it is determined that the Project should be retired, the above-grade steel structures and turbine nacelles are assumed to have significant scrap value to a salvage contractor. Removal of the turbine nacelles, towers, and associated equipment is assumed to have sufficient value as scrap to completely offset the removal costs of these items. However, the Project will also incur costs for removal and disposal of the blades, foundations and other project facilities as well as for the restoration of the site following the removal of salvageable equipment.

The decommissioning costs include the costs to return the site to a condition compatible with the surrounding land, similar to the conditions that existed before development of the Project. Included are the costs to retire the power generating equipment that is part of the Project as well as the costs to retire the Project balance of plant facilities. All equipment, structures, and supporting facilities will be removed to a depth of three feet below grade (as specified in the Vermilion County Wind Ordinance). At plant construction, underground cable for the power collection system is assumed to be buried at a depth of four feet below grade or greater and, therefore, will be abandoned in place at decommissioning.

Based on the results of this evaluation, the estimated decommissioning obligation cost for the Project is estimated to be approximately a net positive credit of $269,000 for wind turbine decommissioning plus $986,000 for balance of plant Project site decommissioning costs, resulting in total decommissioning costs of approximately $717,000.

2.0 INTRODUCTION

2.1 Site

The Project is located in Vermilion County, Illinois, with the center of the Project Site located approximately five miles west of Rossville, Illinois.

2.2 Wind Turbine Units

The Project will consist of 49 Vestas V100 – 2.0MW wind turbines, which are rated at 2.0 MW, resulting in a total nominal rating for the Project of 98 MW. Each wind turbine will consist of a single pole steel tower, with the turbine nacelle mounted at the top. The nacelle of each turbine will include three blades that are 49 meters (160 feet) in length, respectively, and mounted to the nacelle rotor.

Each wind turbine tower will be supported by a concrete foundation. Foundation design drawings specific to the Project were not provided for review as site development has not begun and foundation drawings are not yet available. For the purposes of this study, foundation removal costs were based on wind turbine foundation dimensions of similar equipment involved in recent wind development projects as provided to BMcD. Removal cost calculations were also based on the expectation that the county will require the removal of all construction-related material down to a depth of three feet below grade (as specified in the Vermilion County Wind Ordinance).

Each wind turbine will have an access road to support construction and allow for vehicle access to facilitate inspections and maintenance of the turbines and associated equipment. To the extent possible, existing roads will be utilized; however, new roads will be required as well. Some of the existing roads will require improvement to a condition suitable to support construction and operation of the Project. Additional new roads are all assumed to be crushed rock surfaced roads.

2.3 Substation and Interconnection

The Project site includes an underground 34.5 kilovolt (kV) electrical power collection system that collects the electrical power from the wind turbines and routes it to a central project substation. The project substation increases the voltage from 34.5 kV to 138 kV. Foundation design drawings of the project substation were not provided for review as foundation drawings are not yet available; however, preliminary site work has begun on the substation. For the purposes of this study, the project substation was assumed to be supported on drilled shaft concrete pier foundations. Furthermore, the project substation is assumed to be surrounded by a perimeter fence and the area inside the fence is surfaced with crushed rock.

2.4 Maintenance/Warehouse Facility

The Project includes an operation and maintenance (O&M) facility. This facility is assumed to consist of a metal building on concrete slab foundation with an approximate size of 60 feet long and 40 feet wide. The Project also includes one permanent meteorological tower.

3.0 DECOMMISSIONING

3.1 Decommissioning Plan

BMcD estimates the Project should have an expected useful life of approximately 30 years. When it is determined that the Project should be retired, the above-grade steel and copper equipment is assumed to have significant scrap value to a salvage contractor. Removal of the turbine nacelles, towers, and associated equipment is assumed to have sufficient value as scrap to completely offset the removal costs of these items. However, the Project will incur costs for removal and disposal of the blades, foundations and other project facilities and for the restoration of the site following the removal of salvageable equipment.

The wind turbine blades will be removed from the wind turbine nacelle rotors using a crane, cut into manageable sized sections, loaded onto a trailer, and hauled to a local landfill for disposal. The wind turbine blades are constructed from a composite material that is assumed to have no salvage value at the time of decommissioning. The turbine nacelles will be removed from the towers with a crane and loaded onto a trailer. The towers will be disassembled and loaded onto a trailer as well. The demolition contractor will take ownership of the turbine nacelles and towers and all salvage value will be retained by the demolition contractor. The nacelles and towers will have a significant value for salvage or scrap due to a high content of steel and copper. The salvage value of the nacelles and towers will be utilized to offset the costs for removal.

The equipment in the project facility substation and surrounding fencing will be removed and the demolition contractor will take ownership of the equipment with all salvage value to be retained by the demolition contractor. The Project substation equipment will have a significant value for salvage or scrap due to a high content of steel and copper. It is assumed that the salvage value of this electrical equipment will be used to offset the demolition costs. All substation fencing will be removed, loaded into a dump truck or trailer, and hauled to a local landfill for disposal. The underground cabling for the power collection system within the wind farm is assumed to be buried at a depth of greater than three feet, and therefore will be abandoned in place. However, the scrap value of aluminum is likely to be equal to or greater than the cost to remove it depending on the value of aluminum at the time of decommissioning and should be evaluated by the demolition contractor prior to decommissioning activities.

All underground improvements, including concrete foundations will be removed to a depth of three feet below grade (as specified in the Vermilion County Wind Ordinance). This will include the removal of the

wind turbine foundations and project substation foundations. The concrete will be demolished, loaded into a dump truck and hauled to a local landfill for disposal. The portions of the concrete foundations that are greater than three feet below grade will be abandoned in place. The circular concrete pedestal, situated on top of the wind turbine spread footings, will be completely removed. The remainder of the spread footings associated with the wind turbines will be removed to achieve a removal depth of three feet below grade. Voids left from the removal of the concrete footings will be backfilled with surrounding subsoil and topsoil and fine graded to ensure suitable drainage.

Finally, to the extent required, crushed rock surfacing will be removed. For purposes of this study, it is assumed that all of the private turbine access roads will be removed as part of the decommissioning of the facility. Areas where crushed rock surfacing has been removed will be fine graded to ensure suitable drainage. In all areas where the ground has been disturbed as part of decommissioning activities, the ground will be seeded to prevent erosion. The removed crushed rock will be loaded into a dump truck and the demolition contractor will take ownership of the crushed rock. It is assumed that the crushed rock can be reused by the contractor. The cost to remove the crushed rock and load it into dump trucks will be at the expense of the Project; however, no hauling or disposal costs will be incurred by the Project.

3.2 Decommissioning Costs

The decommissioning cost estimate includes the cost to return the site to a condition compatible with the surrounding land, similar to the conditions that existed before development of the Project. Included are the costs to retire the Project's wind turbines as well as the cost to retire the Project balance of plant facilities. Table 3-1 and Table 3-2 present the decommissioning costs for the wind turbines and balance of plant, respectively, for the wind farm.

Table 3-1: Estimated Cost for Wind Turbine Decommissioning (2014$)

Estimated Cost	$ 2,837,000
10% Contingency	$ 284,000
Scrap Value	$ (3,390,000)
Total Cost	$ (269,000)

Table 3-2: Estimated Cost for Balance of Plant Decommissioning (2014$)

Estimated Cost	$ 967,000
10% Contingency	$ 97,000
Scrap Value	$ (78,000)
Total Cost	$ 986,000

Breakdowns of the above costs are included in Appendix A.

The Project might also utilize Vestas V110-2.0MW wind turbines instead of the anticipated Vestas V100-2.0MW models. If the Project were to incorporate the V110-2.0MW wind turbines, the estimated decommissioning cost for balance of plant would remain unchanged, however, the estimated decommissioning cost per turbine would decrease by approximately $245 (approximately $12,000 for all turbines) due to additional scrap material in the turbine rotor to support larger blades.

3.2.1 Decommissioning Assumptions

The following assumptions were made as the basis for the cost estimates:

1. An offsite landfill is used for disposal of demolition waste.
   a. Approximately 25 miles from site location
   b. Disposal costs for clean waste at $69 per ton
2. No hazardous construction material abatement is required.
3. No environmental costs have been included to address site clean-up of contaminated soils, hazardous materials, or other conditions present on-site having a negative environmental impact.
4. Wind turbine nacelles, wind turbine towers, transformers, switches, breakers, cabling, and other electrical equipment are removed from the Project by the demolition contractor and ownership transferred to the contractor with all salvage and scrap value to be retained by the contractor.
5. Demolition costs for the meteorological tower has been accounted for and included in the wind turbine demolition costs.
6. Buildings are removed as part of site demolition activities.
7. All fencing is removed as part of site demolition activities.
8. The project substation removal cost is included with the Estimated Cost for Balance of Plant Decommissioning.
9. The O&M building removal cost is included with the Estimated Cost for Balance of Plant Decommissioning.
10. Underground electrical power collection system cabling will be abandoned in place as it is assumed to be greater than three feet below finished grade.
11. Any foundations will be removed to three feet below finished grade (as specified in the Vermilion County Wind Ordinance).
12. Because no topsoil or subsoil is ever removed from the site, the existing topsoil and subsoil will be re-graded in areas where crushed rock surfacing and foundations have been removed to achieve suitable site drainage to natural drainage patterns.
13. Disturbed site areas will be graded. In all areas where the ground has been disturbed as part of decommissioning activities, the ground will be seeded to prevent erosion.
14. Market conditions may result in cost variations at the time of contract execution.

4.0 STATEMENT OF LIMITATIONS

In preparation of this decommissioning obligation cost evaluation, BMcD has relied upon information provided by the client. While BMcD has no reason to believe that the information provided to BMcD, and upon which BMcD has relied, is inaccurate or incomplete in any material respect, BMcD has not independently verified such information and cannot guarantee its accuracy or completeness.

Engineer's estimates and projections of demolition costs are based on Engineer's experience, qualifications and judgment. Since Engineer has no control over weather, cost and availability of labor, material and equipment, labor productivity, construction contractors' procedures and methods, and other factors, Engineer does not guarantee the accuracy of its estimates and projections.

The cost estimates were prepared based on current knowledge of site conditions, current regulations, and current hazardous material classifications. Engineer has no evidence or reason to believe that the cost estimate will be inaccurate in 20 years; however, Engineer's estimates do not include allowances for unforeseen environmental liabilities associated with unexpected environmental contamination due to events not considered part of normal operations, such as fuel tank ruptures, oil spills, etc. Estimates also do not include allowances for environmental remediation associated with changes in classification of hazardous materials.

APPENDIX A - DECOMMISSIONING COST SUMMARY

Estimated Cost for Wind Turbine Decommissioning (2014$)

Wind Turbine Nacelle & Tower Removal Cost			
Nacelle & Tower Removal	$	419,000	
Hauling	$	1,640,000	
Total	**$**	**2,059,000**	
Total Turbine & Met Tower Scrap Value	**$**	**(3,388,000)**	[1]
Wind Turbine Blade & Foundation Removal Cost			
Blade & Foundation Removal	$	417,000	
Hauling	$	37,000	
Disposal	$	310,000	
Total	**$**	**764,000**	
Blade & Foundation Scrap Value	**$**	-	[1]
Met Tower and Foundation Removal Cost			
Blade & Foundation Removal	$	8,000	
Hauling	$	1,000	
Disposal	$	5,000	
Total	**$**	**14,000**	
Blade & Foundation Scrap Value	**$**	**(2,000)**	[1]
Total Estimated Cost	**$**	**2,837,000**	
Contingency (10%)	**$**	**284,000**	
Total Turbine Scrap Value	**$**	**(3,390,000)**	[1]
Net Total Cost with Contingency	**$**	**(269,000)**	

[1] Salvage values based on steel value of $235 per ton and copper value of $2.35 per pound.

Estimated Cost for Estimated Cost for Balance of Plant Decommissioning (2014$)

Substation Removal Cost			
Above Ground Equipment Removal	$	5,000	
Above Ground Equipment Hauling	$	8,000	
Demolition (Foundations, Fencing, Crushed Rock Removal)	$	25,000	
Demolition Hauling	$	3,000	
Disposal	$	21,000	
Total	**$**	**62,000**	
Transformer Copper Scrap Value	**$**	**(78,000)**	[1]
O&M Facility Building Removal Cost			
Building & Foundation Demolition	$	29,000	
Hauling	$	1,000	
Disposal	$	10,000	
Total	**$**	**40,000**	
Building Scrap Value	**$**	-	[1]
Transmission Line Removal Cost			
Conductor and Tower Removal	$	-	
Foundation Demolition	$	-	
Hauling	$	-	
Disposal	$	-	
Total	**$**	-	
Steel & Conductor Scrap Value	**$**	-	[1]
Crushed Rock Road Surface Removal Cost			
Surfacing Removal	$	734,000	
Hauling	$	-	
Disposal	$	-	
Total	**$**	**734,000**	
Crushed Rock Scrap Value	**$**	-	[1]
Seeding Cost	**$**	**131,000**	
Total Estimated Cost	**$**	**967,000**	
Contingency (10%)	**$**	**97,000**	
Total BOP Scrap Value	**$**	**(78,000)**	[1]
Total with Contingency	**$**	**986,000**	

[1] Salvage values based on steel value of $235 per ton and copper value of $2.35 per pound.

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Burns & McDonnell: Making our clients successful for more than 100 years

The following is a quote I (M.Newhouse) secured 3/2012

We are pleased to provide a budgetary quote for the removal of a 490-foot tall Wind Tower at a location in Boone County based on the following scope of work to be provided;

1. Set crane mats for large crane to set up on
2. Deliver cranes to site and set up
3. Dis-connect electrical wiring from Nacelle (head) to ground
4. Remove blade assembly and stage in field
5. Remove Nacelle and haul to scrap yard
6. Remove column sections, cut into manageable sections and haul to a scrap yard
7. Cut blade assemblies into manageable sections and haul them to a landfill
8. Remove the existing concrete footing base to a depth of 4-foot below ground level and fill in with field soil
9. Remove cranes and mats from site

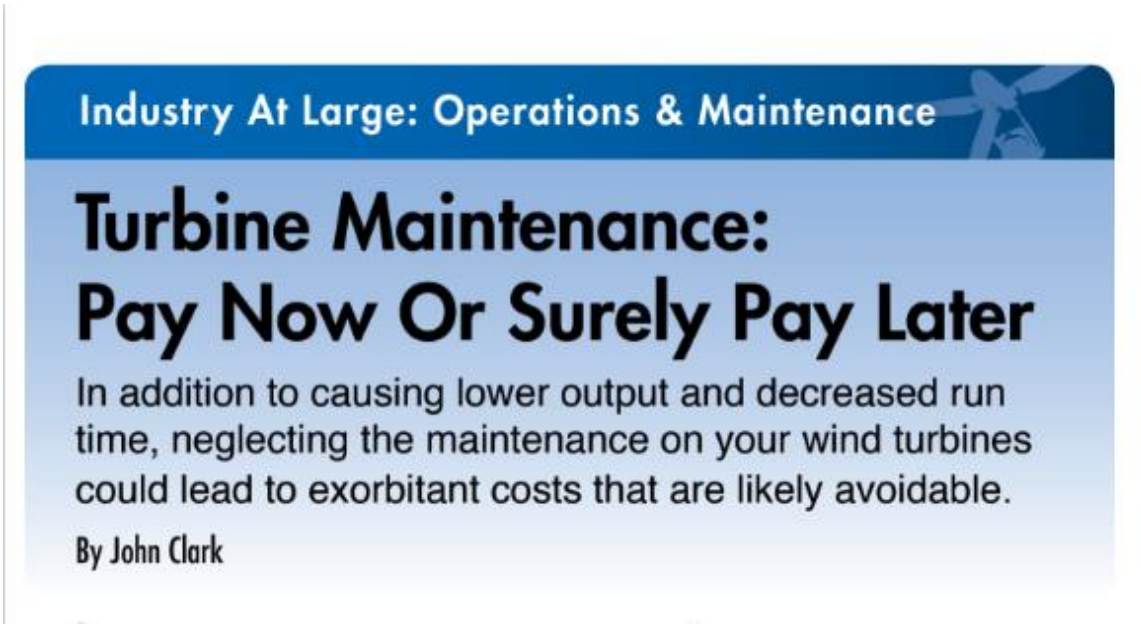
Based on the terms stated below,
We will do this project for a budgetary sum of ... $550,000.00 per turbine.

Exclusions:

- No overtime.
- No removal of underground wiring, conduits, etc.
- No oil removal or fees to dispose of oil.
- No access road prep or removal after tower removal.
- Fees for disposing of materials at a landfill are not included.
- Permit fees, if required, are not included.
- Soil removal from any contamination from the towers.

Project Uncertainties that can change this quote:

- Existing roadways to be adequate to get cranes, trucks, etc. to and from site.
- If the towers have oil lube systems, reservoirs in them.
- If we can remove more than one tower per month. We can remove up to four (4) towers per month which can reduce the price by up to $50,000.00 per tower.
- Money received for scrap fees.



Emergency maintenance. Also known as the “fix it when it breaks” model, emergency maintenance is the least efficient and most costly because it drives up the expense of repairs that might be prevented through properly scheduled maintenance. The reactive approach to catastrophic failure of a gearbox, generator or bearing for a single wind turbine can result in very expensive removal and replacement.

Mobilization of a main lift crane onto a site to repair one turbine can exceed $200,000, and that does not include the expenses for the crew, tools and equipment. Moreover, it can take 25 truckloads to transport a big crane to a job site and two to four days to assemble the crane. The downtime is costly as well.

Cited From:

North American Wind Power

http://www.nawindpower.com/issues/NAW1310/FEAT_03_Turbine-Maintenance-Pay-Now-Or-Surely-Pay-Later.html