



# Byers Auto Group: A Case Study into the Economics, Zoning, and Overall Process of Installing Small Wind Turbines at Two Automotive Dealerships in Ohio

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# **BYERS AUTO GROUP: A CASE STUDY INTO THE ECONOMICS, ZONING, AND OVERALL PROCESS OF INSTALLING SMALL WIND TURBINES AT TWO AUTOMOTIVE DEALERSHIPS IN OHIO**

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## **ABSTRACT**

Pathways to installing renewables, including small wind turbines, can sometimes be difficult due to economics, zoning issues, public perception, and other barriers. Persistence and innovation, however, can result in amazing successes, leading to transformations in local communities.

In a process that began in 2008, the Byers Auto Group, an Ohio-based automotive dealership, established itself as a renewable energy leader by utilizing energy efficiency, recycled materials, and renewable energy technologies at two of its showrooms.

While planning and designing a new Toyota showroom at the Delaware County location, the Group integrated high-efficiency lighting, recycled glass tiles, and other approaches to create a greener and healthier facility. In addition, the dealership installed a Proven Energy 15-kilowatt (kW) turbine. The Group also installed a Northern Power Systems Northwind 100 turbine at its Columbus location. Both turbines became operational in fall 2010.

The Group experienced various challenges and learned valuable lessons while siting projects in these locations without zoning regulations specific to wind energy systems and with limited project examples to follow. With more diverse applications becoming increasingly common, examples of projects and the required steps — from idea through installation — will become more available to pave the way for future project installations.

This case study will delve into the specifics of the \$600,000 small wind project and describe the process (including financing, zoning, site evaluation, and turbine selection). Estimated annual energy production, as well as

an estimate of the percentage of energy needs met by these turbines will also be discussed.

## **1. INTRODUCTION**

The process of successful wind turbine installation can require research into many different areas. One needs to have knowledge of various zoning and permitting regulations, including height restrictions, setbacks, electrical and building codes, and noise restrictions. Information about the local wind resource and an understanding of the various turbines that are currently available on the market are also required.

With wind energy systems becoming more readily available for consumers and businesses to install, it is important to inform the public about the process through real-life examples that detail funding, siting (including zoning and permitting), and the construction and installation process. This paper explores the experiences of the Byers Auto Group, an Ohio automotive dealership that installed wind turbines in two of its locations. What makes this case study all the more interesting is that these decisions were made during a down economy.

This project began 2 years ago when the Byers Auto Group began constructing a new Toyota Scion store in Delaware County. The team hired Renier Construction and Architectural Alliance to work with them on the design and construction of the project. According to George Kauffman, vice president of Byers Auto, the new facility had an important goal of integrating Toyota's environmentally friendly ideals into the building.

Toyota, makers of the Prius and various other environmentally friendly vehicles, provided the dealership with a list of potential options that, if installed, could aid a dealership in becoming a Leadership in Energy and Environmental Design

(LEED) certified location. While the Byers team chose not to pursue LEED certification, they did look into various green options such as high-efficiency heating, ventilation, and air conditioning units; green lighting options; and floor tiles made of recycled glass. As the group looked into “greening” its new facility, Kauffman’s uncle, who lives in a rural Ohio community, drove past a farm and saw a small wind turbine.

“This got him thinking about things like, ‘Is this doable?’ ‘How neat would it be to have a wind turbine on one of our lots?’ He threw the idea out there and we thought, ‘How is that going to be possible?’ It took quite a while to start diving into the how-tos of how it could be possible. Through the help of Renier Construction, which did a lot of the legwork, we figured out the costs, how the city of Delaware would feel about this, are they going to allow us to do this? When the idea really kind of took off, we honestly thought there was no way we could do this. It was kind of just a pipe dream, but as we continued down the road, we realized if we just get enough done, just get enough confidence about the project to say, you know what, there is hope to really keep it rolling. Eventually, it was an idea that we knew we were going to get done,” Kauffman said.

The company did look into other renewable energy options, but wind energy’s combination of cost, visibility, and electricity (kWh) versus other renewables led the Group to choose wind energy systems. Table 1 provides a summary of the two systems.

## 2. TURBINE AND SITE SELECTION

To optimize a wind turbine installation, many factors must be considered. These include the wind resource, surrounding structures, the location and its potential interference with the wind resource, the type of turbine to be installed, and safety during construction and operation.

Though six utility-scale wind farms comprising of over 1,000 MW of capacity are in various stages of planning and construction (personal communication, William Spratley, Green Energy Ohio), Ohio currently has only 9.72 megawatts (MW) of installed projects (American Wind Energy Association), comprised almost entirely of large wind facilities. Thus, the experience with wind turbine installations in the state is relatively minimal. When Mike MacKay, Renier Construction project executive, began searching for locals with wind experience, he found that Ohio didn’t offer many.

“The wind market in Ohio is an emerging market. There are not a lot of companies that can say they’ve put up a lot of wind turbines. There are a lot of companies trying to sell them, but there are very few companies that actually put many up. What that translates into is a lot of different information. We had to sort through who’s telling us the

right information? Who do we put our trust in equipment-wise? What equipment is going to last, have longevity to it? What’s going to have low maintenance? What’s going to have the best power production?” MacKay said.



Fig. 1: The Proven turbine at Byers Toyota in Delaware, OH. NREL/PIX 18222

The group continued its effort, considering many factors in determining the siting of the turbines and what type of turbines to purchase.

To ensure that the winds at each location would be adequate for investing in wind technology, the Byers Group and Renier Construction utilized multiple wind resource maps to estimate their wind resource. They plugged the wind resource estimates into manufacturers’ power output data and calculated the estimated production of each turbine. While this is not the ideal way to conduct a wind resource assessment, with the exception of simple terrain, it allowed the turbine to be installed in a timely, cost-effective manner.

If the team was only concerned with electricity production, a more in-depth wind resource assessment could have been conducted to ensure optimal production at the site. An anemometer could have been installed to measure the wind speeds at the site for a year. This would have supplied more accurate data for the team than a wind resource map can. Another option to assess wind resource is to utilize a national wind resource assessment company’s ability to conduct wind measurements with virtual anemometers. Virtual anemometers model wind speeds at a specific location without the installation of an actual anemometer. Accuracy for virtual anemometers is dependent upon the location’s distance in regards to existing met masts.

Since the Group was also very concerned about making an environmental statement, the decision to estimate resource availability using maps was an acceptable method.

An additional step for the team in the turbine/site selection process was contacting various individuals and businesses with wind installations to gauge their satisfaction with the

performances of different turbine models. By doing this, the team managed to eliminate many products that were not performing at the levels advertised by the manufacturers.

“From our perspective, the selection was a combination of factors. What could we put in? Where can we get the most bang for our buck? What could we get that would have a very large impact and would make a big statement? We also had to consider that at the end of the day, we are a retail-oriented company. A few of our stores are located next to very congested, urban highways. We wanted to look at those locations for the possibility of getting visibility alongside the alternative energy benefits. We wanted to get the most out of it,” Kauffman said.

When Kauffman and the team approached Delaware officials to discuss their interest in installing a Northwind 100, which is a 100kW turbine on a 150 foot tower, the city hesitated about the height of the structure. At the same time, the Byers team realized that the wind resource at the Delaware location was not sufficient to support the Northwind. Instead of abandoning the location and the project, the Group decided to install a smaller Proven 15-kW turbine at the Toyota Scion store in Delaware and began looking for a second location for a larger wind turbine.



Fig. 2: The Northwind 100 wind turbine at Byers Mazda Subaru in Columbus, OH. NREL/PIX 18221

“The city of Delaware was a little bit worried about having something like that so close to the busiest road of their city. I think they were a little bit nervous about putting in such a large structure,” Kauffman said. At the Byers Mazda Subaru site in Columbus, the team discovered that their location had a stronger wind resource since it was located at one of the highest points in the city. They decided to install the Northwind 100 there.

### 3. ZONING AND PERMITTING PROCESS

A successful project requires local government support in terms of the zoning and permitting of the turbine. Many regulations must be considered when installing a wind turbine: height restrictions; noise ordinances; and setbacks from structures, including nearby homes, businesses, schools, and roads. Turbine installers must also obtain all required permitting to ensure a legal project.

With two locations, the Byers Group had to interact with two jurisdictions with differing regulations. Established wind-specific regulations did not exist for either location, making this an educational process for both jurisdictions.

According to MacKay, the group had to present the Proven turbine project to the Delaware Planning Commission. They originally planned to install a 52' turbine, but after learning more about wind energy, they altered their plans and decided to increase the turbine height to 82'. The group went back to the planning commission and requested an amendment, which the commission granted.

For the Columbus turbine, the zoning and permitting process was simpler because the city decided to use existing language pertaining to cellular towers. According to MacKay, that worked to the group’s benefit.

For any differences and questions, the Byers group approached city officials and asked their opinion prior to moving forward. Kauffman believes that the open communication aided in installing the Columbus turbine.

Renier and Architectural Alliance secured all building permits that were needed to begin construction.

### 4. INSTALLATION AND MAINTENANCE

Once the Group finalized plans for turbine selection, construction started. TCT Erectors, a Youngstown company, installed both turbines. The qualifications to install a Proven are much different than what is needed to install a Northwind 100. The Byers Group and Renier Construction ensured that the TCT was qualified to install the turbines.

“The same company that erected both, they’ve installed five or six of the Proven units. They had gone to the Northern Power training program. They spent a week and a half up there and got certified by the manufacturer to install and do maintenance on the Northern Power units. They were a well qualified company,” MacKay said.

Work on the Northwind 100 started in September 2010. The turbine was dedicated on October 22, 2010 with a public ceremony to welcome Columbus, Ohio’s first commercial wind turbine. Construction on the Delaware turbine began soon after. That project was dedicated on November 19, 2010 with similar fanfare and public acceptance. Manufacturers of

both turbines provided a 5-year parts warranty. The Byers Group is still finalizing a 5-year maintenance contract for both turbines.

## 5. FINANCIALS

Renewable energy projects require a significant investment. There are many options available to offset cost. With a total cost of nearly \$600,000, it was essential for the Byers Group to utilize funding mechanisms to reduce capital cost expenditures. The Group applied for and received an Ohio Department of Development Grant for \$200,000. They also took advantage of Section 1603 of the Federal Tax Code, which is an investment tax credit for renewable energy projects providing up to one-third of the total project cost in the form of a grant or line item tax credit. The Group decided to take this incentive as a line item tax credit.

"Between the state grant and the federal credit, it one hundred percent made this project feasible and doable in our eyes. Without one I think it would have been a much harder pill to swallow to do it. The whole project overall was a pretty big risk for us. Knowing that those monies were available to us definitely put a large amount of comfort and some satisfaction knowing that we were getting that. It all helped quite a bit," Kauffman said.

The Byers Group provided the additional funding out of pocket. Based on the turbine's production since installation, Kauffman estimates that the Northwind 100 could offset the dealership's electricity consumption by 15% to 20%. He estimates that the Proven system will offset electricity consumption by 5% to 10%. They currently believe that the payback for the project will be approximately 3 to 5 years, but until more production data are collected for both turbines during their first year of operation, these numbers are considered an estimate.

## 6. INTEREST

The Byers Group chose not to investigate why customers chose to purchase a vehicle from them instead of purchasing one at a different location, thus it is impossible to attribute an increase in sales directly to the installation of the wind turbines. Though no data was explicitly collected to quantify vehicle sales directly related to customer interest in the wind turbines, the Group believes that interest about the turbines, during and after construction, attracted attention and more visitors to their lot. On occasions, visitors drawn in by the wind turbine ultimately ended up purchasing a new vehicle. Other visitors have expressed interest in installing wind energy systems themselves and have sought information from the Byers Group on its experience.

"At one point we were on the news at least two times a week, sometimes three times a week. At one point it was

five days, every business day. It was positive press. Everyone was very interested in what we were doing and why we were doing it. That type of press, you can't buy it. It's absolutely wonderful, and the amount of interest that it brought to our lot, still to this day it's unbelievable. I still get asked daily about both turbines. It's been great. We've absolutely had people that have come in and say, 'Hey, I just want to look at your wind turbines.' Then they'll say, 'While I'm here, tell me about this new Mazda. Tell me about this new Subaru.' They've left, whether it's that day or two days later, in a new car," Kauffman said.

## 7. CONCLUSION

A 2-year process of identifying the best turbine for each dealership, acquiring the necessary permits, and securing incentives to offset the system costs culminated in the 1-day erection of turbines at two separate auto dealerships in Ohio, a state not well known for its use of wind energy. With interest in wind energy growing in Ohio, the Byers Group showed that wind turbines can work. The Byers' experience is now serving to educate and inform the public on the viability of wind technology. These turbines will also soon serve as educational tools for the local community. Beginning this spring, field trips will be scheduled for local school children to visit the Columbus wind turbine. The Northwind 100 will be included in Ohio's 2011 Solar Tour which features 33 wind turbines out of the 243 total tour sites (personal communication, William Spratley, Green Energy Ohio.)

TABLE 1.: BYERS GROUP WIND TURBINE SYSTEMS

|                    | <b>Byers Toyota</b>      | <b>Byers Mazda/Subaru</b> |
|--------------------|--------------------------|---------------------------|
| Location           | Delaware County, OH      | Columbus, OH              |
| Permitting agency  | City Planning Commission | Building Department       |
| Turbine            | Proven 15 kW             | Northwind 100             |
| Tower height       | 80'                      | 150'                      |
| Installation date  | October 2010             | September 2010            |
| Avg est wind speed | 9.2 mph                  | 12 – 13 mph               |
| Cut-in wind speed  | 5 mph                    | 7 mph                     |
| AEP (est)          | 25,000kWh/yr             | 150,000kWh/yr             |
| % energy needs met | 5 – 10%                  | 15 – 20%                  |