



Alternative Energy Industry Overview

Market Drivers and Trends

Bath Township, Ohio Zoning Commission

Presented by:

Robert W. (Bob) Beaugrand, Vice President / Partner





Discussion Goals

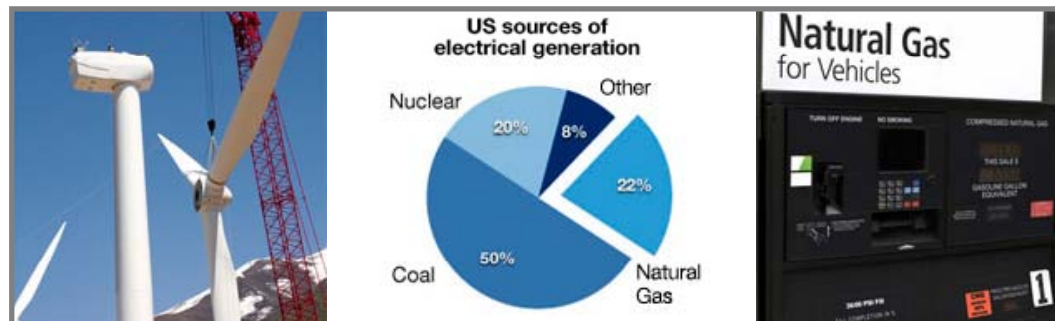
- Provide overview of alternative energy industry trends and market drivers.
- Provide overview of large scale initiatives vs. small scale projects (Distributed Power Generation).
- Provide overview of technical considerations and permitting / entitlement issues.





Industry Drivers

- **Key drivers of the various energy markets:**
 - Cost of generating and delivering energy (clean coal, wind power, solar) continues to drop.
 - Meet the demand of population growth and diversify sources and operations domestically.
 - Environmental concerns have created interest in alternative energy generation and delivery methods

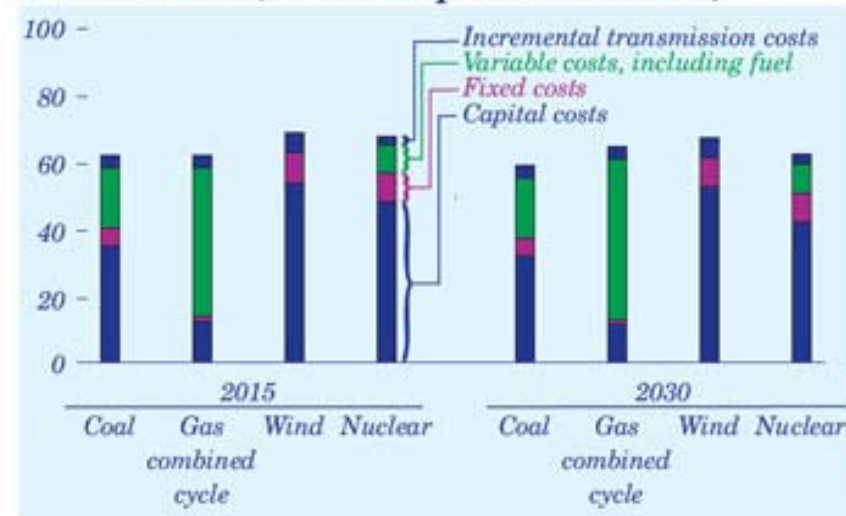




Industry Drivers

- **Cost of generating and delivering energy continues to drop**
 - Technology for new generating capacity are made to minimize cost while meeting local and Federal emissions constraints
 - Capital costs decline over time at rates that depend on the current stage of development for each technology

Figure 63. Levelized electricity costs for new plants, 2015 and 2030 (2006 mills per kilowatthour)



(EIA, 2008)



Industry Drivers

- Meet the demand of population growth and diversify sources and operations domestically.
 - The U.S. has 4% of the world's population and uses 25% of the world's oil. (*The Pickens Plan, 2008*)
 - Population growth in the sunbelt continues to expand. Eight states have population growth rates over 2.0%, which means their population will double in less than 35 years.
 - Building new wind generation facilities and better utilizing our natural gas resources can replace more than one-third of our foreign oil imports in 10 years



Industry Drivers

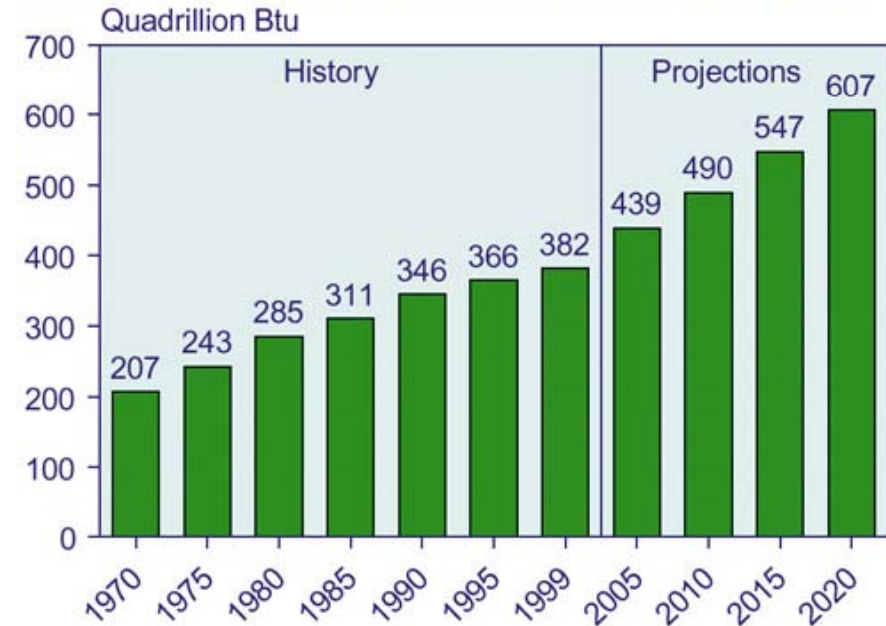
- Environmental concerns have created interest in alternative energy generation and delivery methods
 - The economy is interested in clean energy and becoming less carbon intensive. Among fossil fuels, natural gas emits the least amount of CO₂ per unit of energy provided, and renewable energy sources such as solar, wind, geothermal, hydroelectric and biomass energy, release no net CO₂. (*EIA, 2008*)
 - Alternative technologies are becoming less expensive, and more efficient; driving federal and state financial incentives.



Market Details

- Alternative Energy
 - Wind
 - Solar
- Oil & Gas Pipeline
- Electric Transmission

Figure 13. World Energy Consumption, 1970-2020



Sources: **History:** Energy Information Administration (EIA), Office of Energy Markets and End Use, International Statistics Database and *International Energy Annual 1999*, DOE/EIA-0219(99) (Washington, DC, January 2001). **Projections:** EIA, World Energy Projection System (2001).

This industry is growing at 20 percent to 30 percent a year.



Alternative Energy



Wind Power Overview

- Fastest growing renewable energy source
- Most cost efficient renewable solution for areas with significant wind activity
- Wind power can produce up to six percent of our electricity needs by 2020
- Challenges:
 - projects are backed-up due to the lengthy interconnection studies and turbine demand
 - windy areas are geographically remote from load centers
 - strong wind sites are located away from major metropolitan centers
 - Continuation of Production tax credits (PTC)



Solar Overview

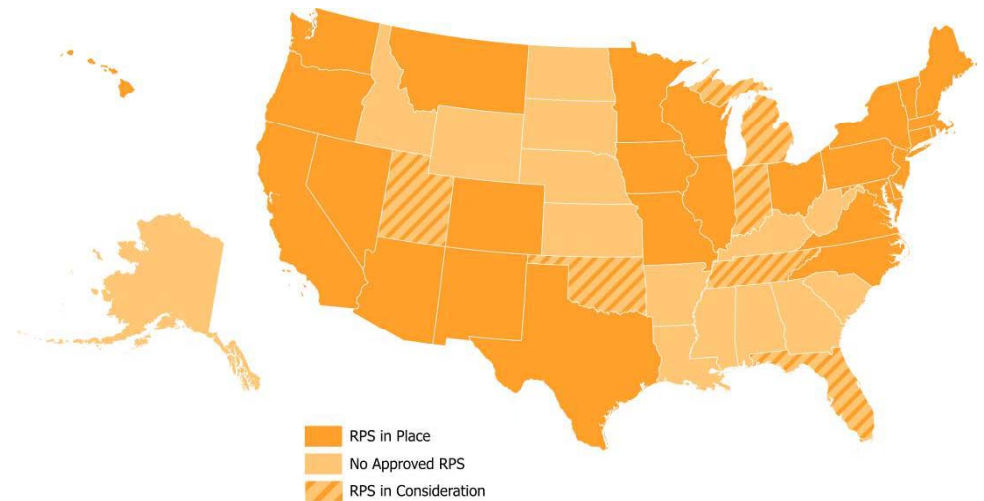
- The U.S. solar energy industry continued its double-digit annual growth rate in recent years
- Growth fueled by record high energy prices, technology advancements, and alternative energy tax credits
- Solar is still more expensive than traditional electricity without subsidies, however, in five to seven years, solar is expected to cost half what it does today



Wind and Solar

Market Terms

- RPS (Wind) – Renewable Portfolio Standard
 - State regulatory policy to increase production of renewable energy sources.
 - 32 states have passed RPS regulations.
- MW – Megawatt
 - Unit of electricity equivalent to 1,000 kW.
 - Standard measurement for wind farm capacity.

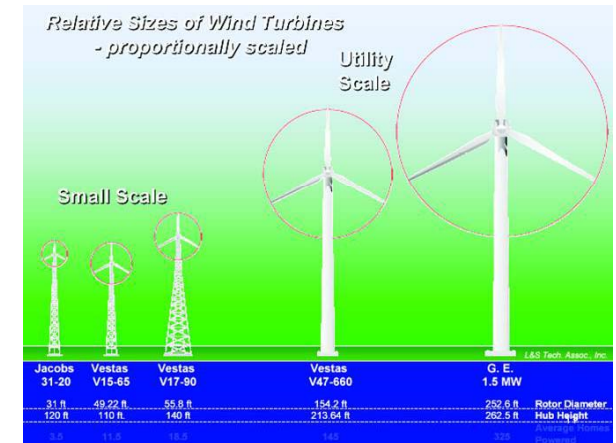




Large Scale vs. Small Scale Wind

Large Scale Wind

- Wind Project (farm or park) that produce > 5 MW
 - Regulated by PUCO and permitted by the Ohio Power Siting Board
 - Siting rules require:
 - Wildlife Studies
 - Air Transportation Facilities
 - ESWF Project Layout
 - Turbine Manufacturer Safety Standards
 - Noise Levels
 - Post-Construction Wildlife Monitoring
 - Minimum Setbacks
 - Signal Interference/Road Issues/Decommissioning



Site Selection/Field Reconnaissance*

Land Agreements*

Wind Assessment/Meteorological Monitoring

Environmental Review*

Economic Modeling

Interconnection Studies

Micrositing and Layout*

Permitting*

Sales Agreements

Financing*

Turbine Procurement

Engineering*

Construction Contracting*

Operations & Maintenance

Large Scale vs. Small Scale Wind

Large Scale Wind Process





Large Scale vs. Small Scale Wind

Small Scale Wind

- Wind Project that produce < 5 MW
 - Subject to Local Zoning Regulations
 - Regulatory Issues:
 - Setback Distances and Height
 - Lot Size
 - Aesthetics
 - Sound
 - Property Values
 - Insurance
 - Abandonment
 - Multiple Turbines
 - Building Integrated Systems
 - Structural or Electrical Failure
 - Soil Suitability

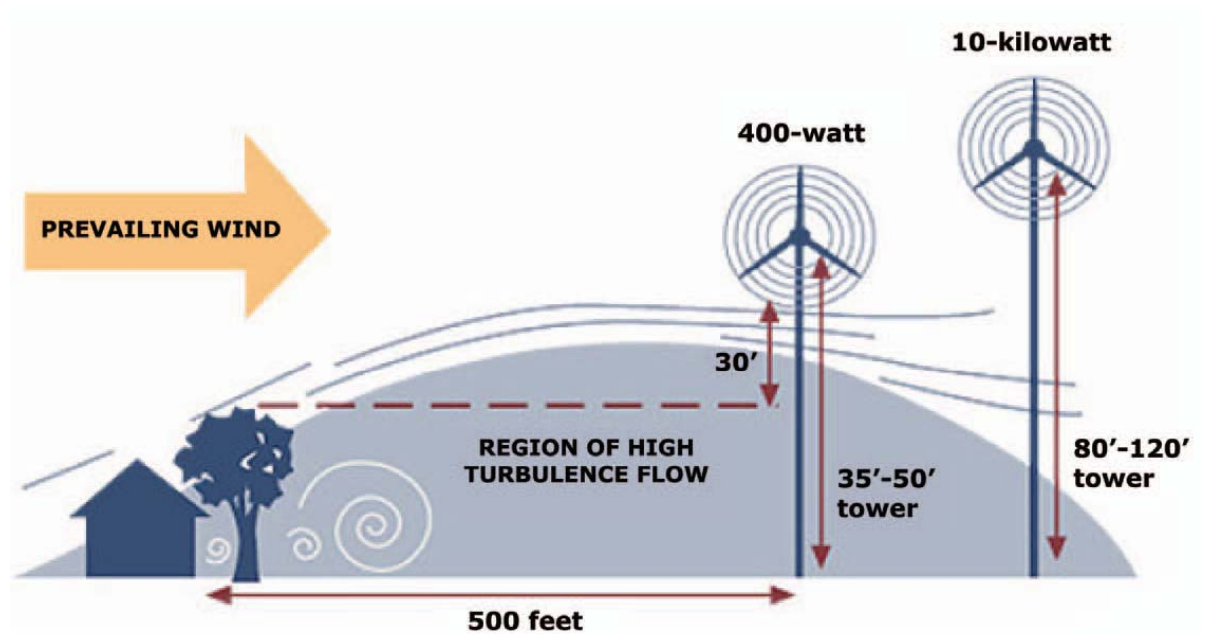
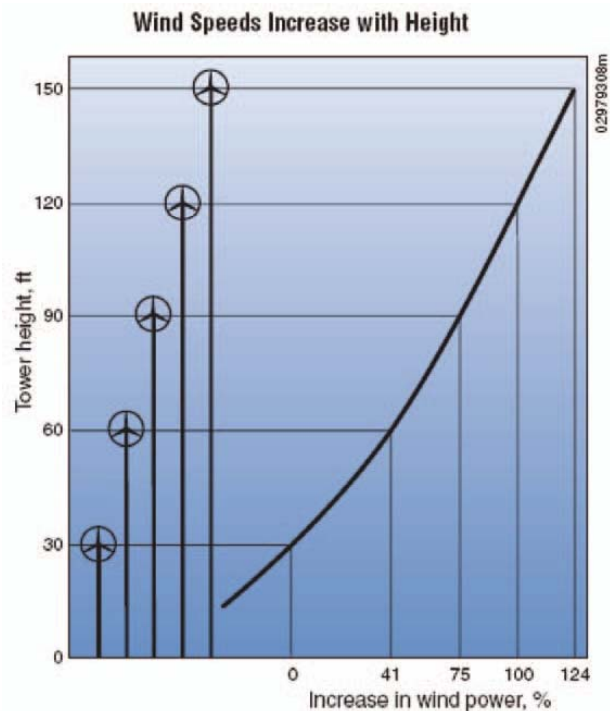




Regulatory Considerations

Small Scale Wind

- **Regulatory Considerations for some of the “Hot Button” Zoning Issues**
 - Height “Why do they have to be so tall”
 - Wind Speed and Turbulence

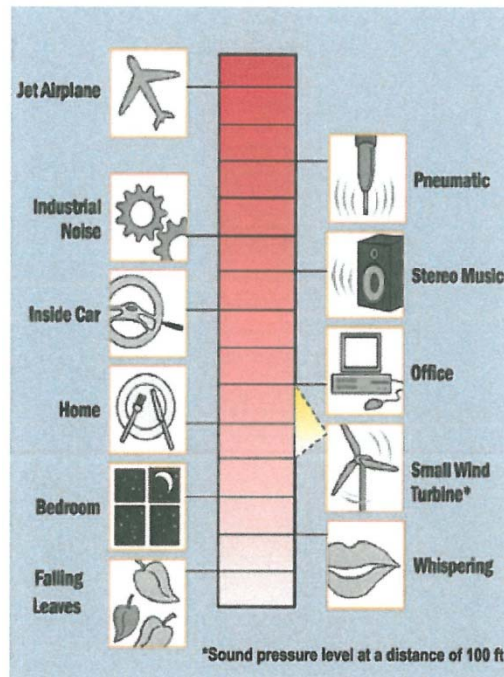




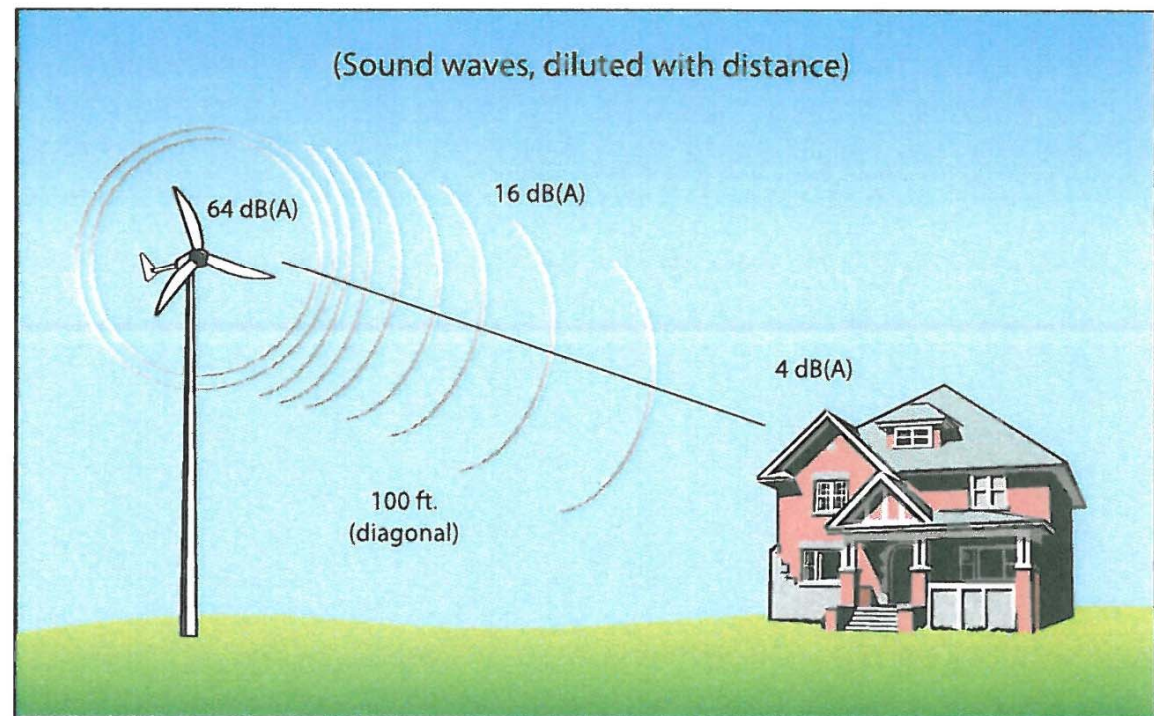
Regulatory Considerations

Small Scale Wind

- **Regulatory Considerations for some of the “Hot Button” Zoning Issues**
 - Sound “The sound of the wind turbine will keep me up all night”
 - Modern small wind turbines are typically quieter than most external air conditioners.



Sound Level Comparison

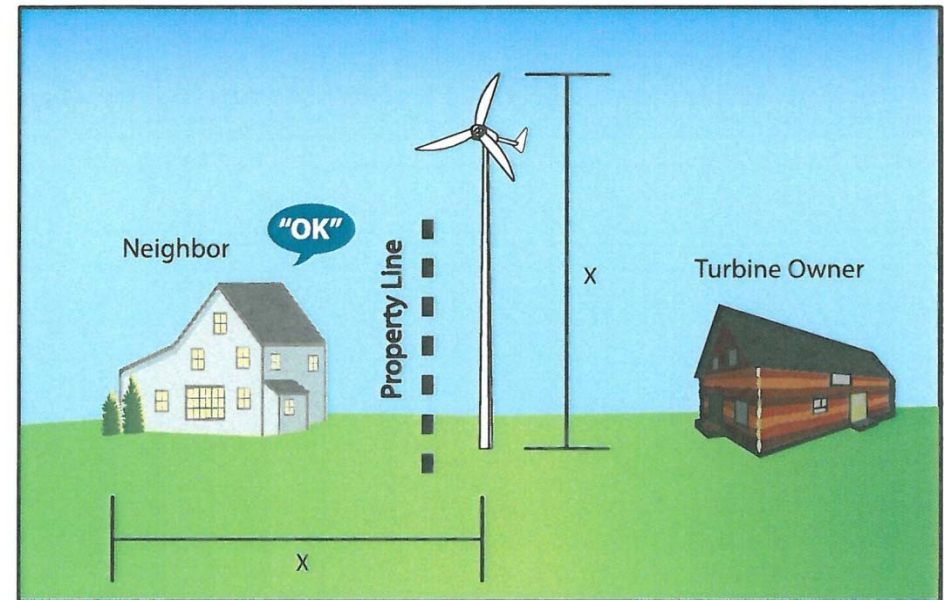




Regulatory Considerations

Small Scale Wind

- **Regulatory Considerations for some of the “Hot Button” Zoning Issues**
 - Setbacks – Should reflect valid concerns for property rights of abutting neighbors, as well as those of the turbine owner.
 - Reasonable Standards:
 - Residential Districts = Tower Height plus length of one blade.
 - Commercial Districts = Considerably less, even zero.
 - Consider abutting property owner waiver / easement.
 - Turbines are engineered to withstand hurricane force winds (110-130 mph)
 - Building permits required to meet all applicable safety and structural codes.



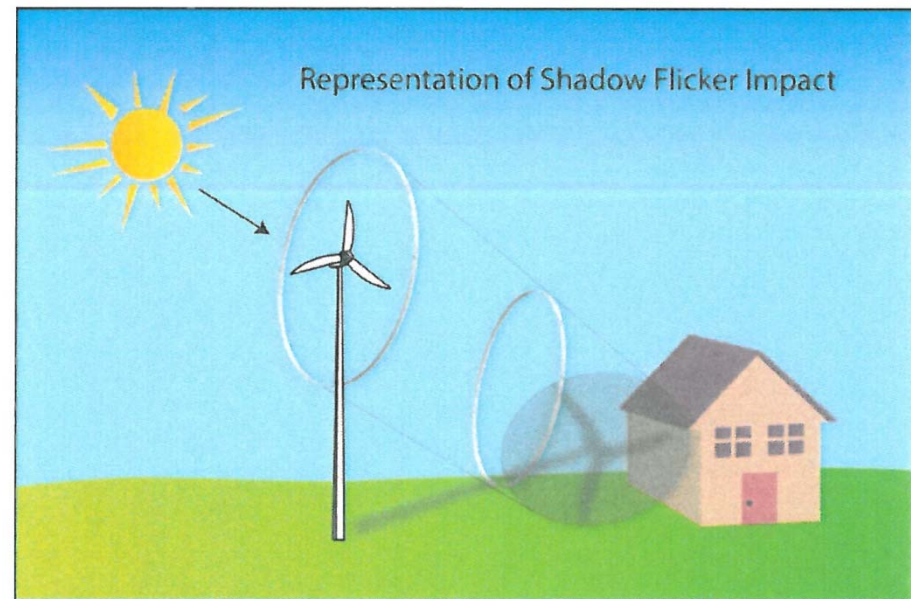
Allowing abutting property owners to submit signed easements may be an alternative form of compliance should roads and utility lines be absent in the immediate vicinity.



Regulatory Considerations

Small Scale Wind

- **Non-Issues / “Red Herrings”**
 - Shadow Flicker
 - Fences / Attractive Nuisances
 - Birds
 - Icing
 - Electrical Signal Interference
 - Lighting Strikes
 - Stray Voltage



¹¹ The possibility of shadow flicker affecting a given location can be calculated very precisely. See <http://www.windpower.org/en/tour/env/shadow/shadowc.htm> for a shadow flicker calculator.



Q&A

Resources



Industry Resources

- American Wind Energy Association
www.awea.org
- Ohio Public Utilities Commission
www.puco.ohio.gov/puco.cfm
- Ohio Department of Development (Incentives)
www.odod.state.oh.us/cdd/oeel/ELFGrant.htm#NOFA_09-02
- Wind Resource Explorer
<http://navigator.awstruewind.com/>
- Atwell, LLC (Alternative Energy Consultants)
www.atwell-group.com



Questions

THANK YOU!

Atwell Energy Group

Robert W. (Bob) Beaugrand, AICP

Vice President / Partner

rbeaugrand@atwell-group.com

30575 Bainbridge Road, Suite 180

Solon, Ohio 44139

440.349.2000

