



An aerial, slightly blurred photograph of a city street. The street is filled with cars, mostly yellow taxis, and some greenery. Buildings line the street, and the overall scene is a dense urban environment.

Shrinking America

PES looks at how seaways and rail networks are helping to speed up the continent's bid for a more ecologically-sound future, based around wind farm technology.

Picture the scene: you're driving along a narrow road in small town America. It's a like a scene from a Wim Wenders movie with maybe just a dash of the Coen Brothers thrown in for good measure. You're enjoying the ride, the scenery is superb and your favorite Bruce Springsteen track – Born in the USA (what else?) – blares from your state-of-the-art stereo system.

Suddenly the scene is transformed. A massive truck carrying silver blades nearly half a football field long approaches you menacingly, the sun blinding you as it reflects back from its huge chromium fender. Eyesight momentarily restored, you remark that there is barely room for you to pass and so you swerve dangerously over to the side of the highway and hope for the best as this 21st century behemoth passes.

Previously a convinced covert to the ecological soundness of wind power, you now begin to have second thoughts. "If the cost of these wind farms is that we have to have massive, threatening trucks screaming about the country, burning unacceptable amounts of fuel and polluting the atmosphere, just to transport a few windmill blades, I think I'll stick with traditional gas and electricity," you opine later, to your partner over a tea-time muffin and coffee.

And there's the problem in a nutshell: In order to convince the mass of the US population of the ecological soundness of wind as an alternative power, the propaganda battle for the people's hearts and minds needs first to be won and sending hundreds of massive trucks about the highways and byways of the US would not appear to be a terribly sensible move. In fact, it's a PR disaster.

In Minnesota in 2008, for instance, a truck carrying a tubular tower section became stuck at a railroad crossing and a train managed to stop just in time. Also in Min, a woman was killed in September 2008 when a car, driven by her husband, collided at an intersection with a truck carrying a wind turbine. After a full police investigation, officials exonerated the truck driver.

On a per-turbine basis, the cost of transportation and logistics varies from around \$100,000 to \$150,000, says John Dunlop, an engineer from the American Wind Energy Association (AWEA). In 2008 some 24 states opened, expanded

North American rail carrier CN says it makes good economic sense to transport wind turbines by rail

or announced turbine manufacturing plants, according to the AWEA. As fossil fuels decline globally, plainly this is an industry for the future, albeit that there are massive logistical problems for the transportation of wind power plant. However, there are often viable alternatives and a partial solution could be at hand.

The vast majority of turbine parts still travel by truck, but now in Texas and

elsewhere, some wind companies are looking to move more turbine parts by train to save money. General Electric, a big turbine maker, said rail transport could be up to 50 per cent cheaper over long distances and the rail company Union Pacific saw its wind-related shipments more than double in the last year. And, as the company's Byron Willis explains elsewhere in this magazine, "customer service, cost efficiency and safe transport have helped us grow from a single train in 2003 to roughly carloads in 2008. We have a clear understanding of the wind industry's unique engineering requirements and we work with manufacturers to develop solutions in the areas of securement, transportation equipment, loading and unloading."

Despite slowing orders this year, project cargo carriers on sea and land have seen little if any slowdown in volume because of a backlog of orders placed in 2008

"For ports, inland carriers and logistics specialists, the industry has huge potential along with massive challenges," says Britt Theismann of the AWEA. "The transport of turbines, tower sections and other heavy equipment over the road is fraught with high costs and a patchwork of onerous and inconsistent permitting-requirements across state lines. In some cases entire loads have needed to be unpacked and reloaded as trucks cross state lines, and some states must be avoided altogether,".

North American rail carrier CN says it makes valuable economic sense to transport wind turbines by rail because this emits six times less greenhouse gases than heavy trucks and because it can move one tonne of freight 197 kilometres on just one litre of fuel.

In July the carrier completed the first-ever rail transportation of twin-pack wind turbine blades from German manufacturer Enercon GmbH and Salco Energy Services Inc. of Calgary, Canada. Enercon is a leading global manufacturer of wind turbine systems and Salco Energy is an experienced wind turbine transport and wind park logistics management company in Canada.

Dan Bingeman, CN Assistant Vice-President, says: "The logistics of moving the turbine components were a challenge, but that is what CN and CNSS do best and we are well-positioned to support this important emerging market on account of our extensive network reach, port connections on three coasts, expertise and complete transportation solutions."

"CN, as a railway, can help address the challenge of climate change," says Bruno Demers, Director of Marketing. "CN can move one tonne of freight 197 kilometres on just one litre of fuel. Using less fuel means fewer GHG emissions. In addition, our new main-line locomotives produce approximately 40 per cent less nitrogen oxides than older locomotives and consume up to 20 per cent less fuel. Rail also relieves traffic congestion, improves mobility in urban areas, and can ease pressure to renew road infrastructure by taking goods off highways."

Canadian Pacific Logistics Solutions (CPLS), meanwhile, is also playing a major role in feeding the growing demand for wind power through a multi-million dollar transportation deal recently signed with Vestas Canadian Wind Technology.

Vestas, a leading provider of wind turbines in North America, is creating an 84-structure wind farm at Hak, Saskatchewan. To build the farm, the company must transport the European-manufactured equipment needed for the project to the prairies. CPLS is facilitating the move of seven trains – each filled with dozens of blades and generators, called nacelles – from the Port of Houston to Hak, Saskatchewan. Traveling over rail, each 67-car train will carry the equipment to build 12 wind turbines.

The story is similarly upbeat with regards to the continent's inland waterways. As Brad Hall, American Commercial Lines' (ACL) Vice President and General Manager Dry Cargo, explains: "Given the relatively large size of the equipment utilized by the wind power industry to create energy, barges, which are typically 200 feet long by 28.5 feet wide and 14 feet high, are uniquely equipped to move wind turbines, blades and towers.

"The demand for barge transportation is increasing as its economic and environmental benefits are becoming more widely known. Our nation's inland waterways system has an abundance

of unused capacity. Moving cargo to our rivers provides a safer, cleaner alternative." ACL operates a fleet of over 2,400 dry cargo barges and 130 tow boats.

Similarly, sea-going vessels, such as those operated by Beluga Shipping GmbH, offer both flexibility and reliance. As Niels Stolberg, President and CEO explains: "Whenever the client requires a specific feature we cater for the demanded vessels and immediately bring them into position. Our multipurpose heavy-lift project carriers in general can call, berth and operate in ports with a comparably less sophisticated infrastructure."

Despite slowing orders this year, project cargo carriers by water and land have seen little if any slowdown in volume because of a backlog of orders placed in 2008. The components are shipped on multipurpose vessels, mostly from Europe, before being transported to the inland wind farms by rail, barge or on three types of specialized truck trailers.

"We expect the Obama administration stimulus money coming through the Department of Energy to increase the volume of wind energy components (shipped) into the US because we don't have the capacity to meet demand that's being caused by the stimulus spending," says Tom Griffin, President of Agility Project Logistics.

The Houston-based division of the global logistics provider is gearing up to capitalize on this. "We are very optimistic about the future of the American market and are positioning ourselves into the windmill industry with a huge focus for that," says Soren Madsen, general manager of the company's branch in Denmark, where more than 20 per cent of electricity production comes from wind farms. Siemens also estimates US demand for wind power components will increase 30 to 40 per cent over the next three years and, of course, if components are not actually manufactured in the US, they will need shipping.

So, the next time you're stuck on the set of a Wim Wenders movie and a massive truck, bearing wind farm equipment the size of a football pitch, looms threateningly into view, just muse on the fact that the whole scenario may soon be condemned to the annals of history.

Transportation challenges by road are by no means confined to the US. In this case study, PES looks at Finnish heavy haulage and project forwarding company Silvasti Ltd which specializes in wind turbine projects in Finland, Sweden and the Baltic countries. The company provides total logistics solutions for the most challenging installations and, in 2008 received a major contract to deliver 13 x 3 MW wind turbines from Poland to Aulepa Wind Park, on the west coast of Estonia.

The first step of the project was to carry out careful road studies and site surveys in order to find the optimal transport routes. Silvasti wanted to find a route that would accommodate a six-metre high load which would make it possible to transport the nacelle by modular axle lines and the tower sections by semi-low loaders with a 1m loading height. Using semi-low loaders for towers is a cheaper, faster and easier solution compared to tower adapter trucks. As in Finland, northern Sweden and Estonia, it's possible to drive with relatively high loads, so use of semi-low loaders is always an option for wind turbine towers in these areas. Also, relatively high axle-loads are allowed in Finland and Estonia so the transportation of the nacelle by road was also the preferred method. Another option that was planned initially was to use a barge with tug-boats to minimise the need for road transport.

After spending several days studying the routes, Silvasti's survey staff found a route that could be driven with the necessary height allowance. The pre-planning stage of the project took several months, including route surveys, coordination with the authorities, and making a preliminary delivery schedule. The cargo dimensions and weight made the transport very demanding and the biggest challenge was the nacelle. When loaded on Silvasti's 12-axle Scheuerle Intercombi modular trailer, pulled by a heavy-duty Mercedes-Benz Actros Titan 8 x 4 tractor, the

combination was 30 metres long, 4.5 metres wide and 6.0 metres high.

In addition to heavy loads and large cargo dimensions, there were also other issues that made the project very demanding, one of these being the weather. The transportation started in the autumn 2008 and was finished in May 2009. A major part of the cargo, including 12 nacelles, was transported during the winter. The temperature reached -30 degrees at times and all roads were extremely slippery due to ice. This required very careful pre-planning as several loads of sand and gravel were needed on the roads to maximize the tyre grip. The cold climate made this project a challenge for both the equipment and the crew on the route itself was also a challenge. There were bridge controllings and cable liftings and in addition, the last 12 km before the site was a very narrow gravel road.

Deliveries started with the foundation parts in the autumn of 2008 and began with the nacelle, hub and tower transports. The preparations, including route survey all the way from Poland to Estonia, started several months prior to the actual transportation. What made it slightly easier was that in 2008 Silvasti had already transported six similar blades from Poland to another wind park in Estonia.

Transportation was made in convoys of three blades, all delivered just-in-time to site. Transport time was approximately 7/8 days. The most challenging task was co-operating with authorities in all four countries that needed to be passed. Due to need for police escorts all the way, the scheduling was one of the key factors for a successful delivery. Nevertheless, the blades were delivered safely and just-in-time to the site, ensuring 100 % customer satisfaction. ▴

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