CO2 from the Manufacture, Delivery & Construction of a Modern Wind Turbine.

[Note: In this document we will convert everything to US tons. 1 (metric) Tonne = 1.10231 Ton (2000 pounds), which is sometimes called a short Ton.]

Wind turbine manufacture Vestas estimates that each onshore turbine used 250 metric tonnes of coal = 276± tons.

The US Energy Information Agency (EIA) says this about burning coal:

> "Complete combustion of 1 ton of this coal will generate about 5,720 pounds (2.86 tons) of carbon dioxide."

Therefore, the structural steel manufacture of one turbine will produce:
276± x 2.86 = 800± tons of CO2

So, the steel mfg for a 100 MW wind project w 2.5 MW turbines will produce:
800± x 40 = 32,000± tons of CO2 = **64,000,000± pounds of CO2**

The high temperature needed for **cement** manufacturing (a kiln at 3400 degrees F) makes it an energy intensive process. The analysis is that: "Every pound of **cement** manufacture and delivery produces a pound of CO2".

This and this both say that a typical modern wind turbine base has 1000± tons of concrete & steel. Concrete is typically comprised of 15%± of cement.

So each 1000± ton (2± million pounds) concrete tower base would produce:
2,000,000± x .15 = 300,000± pounds of CO2 into the atmosphere.

So the concrete of a 100 MW project (40: 2.5 MW turbines) would produce:
40 x 2,000,000± x .15 = **12,000,000± pounds of CO2**

Therefore, the Manufacture and Assembly of a 100 MW wind project:
64± million + 12± million + misc (e.g. delivery) = **80± Million pounds of CO2**

The question then is: How much CO2 does wind energy actually save — so that the payback period can be accurately calculated.

This is a complex problem, and the answer depends on several variables.

A good discussion is here.

John Droz aaprjohn@northnet.org 2/16/14