

Collateral Damage, Engineering Ethics and Wind Farms

Colin H. Hansen, School of Mechanical Engineering, University of Adelaide, South Australia

When a major infrastructure project is undertaken, there are many in the general population who benefit when it is completed, otherwise we would hope that the project would not have even been planned, let alone started and finished. Invariably, there is always a percentage (hopefully small) of the population whose lives are disrupted, who are put under considerable stress and whose health suffers as a result.

For a highway or rail construction project, the collateral damage is the health and well-being of people whose residence has been forcefully acquired because it lies in the construction corridor, or those who live nearby who now have to tolerate a much higher level of transportation noise than they had to prior to the construction taking place.

As a society we need first to freely admit that people genuinely suffer as a result of such projects being undertaken, and we also need to openly discuss what collateral damage is acceptable. That is, what is the acceptable number of people to have health problems as a result of the project and what is the acceptable number of people who are displaced from their homes so the project can proceed.

We also need to ask, "Is the project of sufficient benefit to a sufficient number of people that the collateral damage it will inflict is acceptable?" How does this fit in with the code of ethics for engineers, which states to the effect that engineers should place their responsibility for the welfare, health and safety of the community before their responsibility to sectional or private interests?

What it means in the context of this discussion is that it is the duty of engineers to inform both the potentially adversely affected community as well as the benefiting community of the negative as well as the positive aspects of any project. In too many instances, professionals with a vested interest in the success of a project may support the view that any complaints by those who are affected are unjustified, especially if the project is for the common good. Whether or not the ill health suffered by these people is a direct result of a physical phenomenon, such as noise associated with a project causing direct physiological harm, or a result of lack of sleep caused by the stress and annoyance arising from something associated with the project is a moot point. The end result is that in some way the project is the underlying cause of the adverse health effects, and the direct cause is not particularly important to the sufferer.

One important example that illustrates the preceding discussion is the construction of wind farms in the vicinity of residences. Most people who don't live near a wind farm believe that they are of considerable benefit to society in that they play an important role in reducing greenhouse gases, even though they may raise the cost of energy production.

However, until the energy storage problem is solved, wind farms have the capacity to contribute very little to the reduction of greenhouse gases. This is because gas-fired power stations need to be constructed and then left continually idling so they can be brought to full power in a short time should the wind farm power output be suddenly reduced. This is not all that uncommon. Even in a large country such as Australia, where the electricity supply to the eastern states is interconnected, the total wind farm power in 2010 in the Eastern grid fell below 2% of capacity on more than 100 occasions lasting 5 minutes or more (with the longest being 19 hours) and below 10% capacity for approximately 10% of the time.¹

It is important that we ask, "Are wind farms of sufficient benefit to the community as a whole that we can accept the collateral damage of health impacts to a small but significant proportion of the population?" Many will answer that there is no impact of wind farms on residents, and others will argue that when the energy storage problem is solved, wind farms will be a valuable part of our energy mix.

In support of the former statement, several studies on the adverse health effects caused by noise generated by wind farms have been conducted by the Australian medical research body, NHMRC, and Health Canada. These bodies have concluded that there is no evidence to support the view that wind farms cause adverse health effects, despite numerous cases of anecdotal evidence and case studies indicating that wind farm noise is a problem for 10% to 20% of the population who reside in their near vicinity.

However, both bodies recognize that more research needs to be done. There exist numerous case studies of residents living near wind farms who suffer health problems that did not exist prior to the wind farm becoming operational. Most of these people suffer from sleep deprivation as well, again a condition that did not exist prior to wind farm operation. It is unknown whether the adverse health effects are a result of sleep deprivation resulting from audible noise or

whether there is a direct physiological effect of long-term exposure to low-level, periodic infrasound. Not enough research has been done to rule out the latter, so it should not be discarded as a possible mechanism.


Regardless of the mechanism, these adverse effects seem to be prevalent in a small but significant proportion of the population residing in the vicinity of one or more wind farms. To help these people, should wind farms be shut down at night? With night-time being when most people are trying to sleep, it is also the time when wind farm noise becomes more audible due to amplitude modulation being more apparent. By the time the noise has reached most residences and been transmitted into a bedroom, it has become dominated by low-frequencies. And even though it is often at a very low level, it can be extremely annoying to some.

The annoyance is exacerbated when excessive amplitude modulation kicks in, possibly as a result of high wind shear causing blades to stall near the top of their arc or as a result of blade-tower interaction. The result is often a "thumping" or "whomping" noise that sounds a bit like the bass one hears when someone is having a party a few houses away, especially when a residence is downwind of a wind farm.

I have raised some questions here that can only be answered by referring to the codes of ethics that underpin engineering bodies around the world. Personally, I do not have the answers, but some things are clear to me. There must be open communication between wind farm developers and the communities where they intend to construct those farms.

It's time to stop denying that wind farm noise causes adverse health effects in some people. It's insulting to sufferers to be accused of only suffering from a "nocebo" effect. Everyone who is adversely affected by wind farm operations deserves to be heard and deserves adequate compensation, which should include an offer to purchase their property at a fair price.

Finally, society and its politicians should honestly evaluate the benefit of wind farms and whether any benefit is justified by the huge financial burden on society.

1. Miskelly, P., 2012. "Wind Farms in Eastern Australia – Recent Lessons," *Energy and Environment*, Vol. 23, No 8, pp. 1233-1260. 

Please send your comments to: chansen@bigpond.net.au.