All that glitters is not gold

Peter Boag, President & CEO

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Electric cars are seen by many as the solution to reducing transportation GHG emissions. Proponents consider them to be 'zero emission vehicles' warranting large subsidies for electric vehicle purchasers and recharging infrastructure, and in some jurisdictions, like Quebec, mandatory sales quotas for vehicle manufacturers. The cost of these subsidies has been well documented in a recent analysis by the Montreal Economic Institute (MEI). MEI has also made a strong case that sales quotas are a tax in disguise.

Traditional assessment of the cost-effectiveness of a GHG emissions reduction pathway like vehicle electrification is underpinned by Life Cycle Analysis (LCA) – a quantification, for comparative purposes, of the emissions produced along the complete energy production and consumption pathway. For battery electric vehicles (BEV), this includes all the emissions produced from electricity generation and transmission - it's not just about the 'zero' tailpipe emissions. Depending on the fuel used for electricity generation – coal, natural gas, nuclear, hydro, wind, etc. – the life cycle emissions for a BEV can be substantial and approach, or even exceed, those of a gasoline-fuelled internal combustion engine vehicle (ICEV) on a comparable LCA basis.

More recently, some scientists have broadened the traditional LCA approach beyond fuel production and consumption to include quantification and comparison of GHG emissions from vehicle production and end of life disposal. This 'cradle to grave' (C2G) approach makes some interesting observations about the efficacy of vehicle electrification as a GHG emissions reduction pathway. According to the Union of Concerned Scientists, the production of a BEV emits between 15 percent and 68 percent more GHGs than the production of a conventional ICEV, depending on vehicle size nd performance. End of life battery disposal remains an unresolved issue, with additional emissions implications.

Researchers at the Norwegian University of Science & Technology (NUST) have concluded that when vehicle and battery production, operation and end of life emissions are considered, net emission reductions from BEVs compared to those of a comparable sized 2015 model year ICEV, and based on the average European electricity production mix, only occur only after driving 80,000 kilometres for small cars and 120,000 kilometers for medium-sized cars. With electricity produced by natural gas, those net emissions reductions don't occur until 90,000 and 130,000 kilometres. When coal is the fuel used to produce electricity, BEV GHG emissions are far above those from comparable ICEV emissions over the complete estimated life for all vehicles sizes.

This analysis assumes no further gains in ICEV fuel efficiency. So when you consider the continuous improvement in ICEV fuel efficiency anticipated over the coming years, those net emissions reduction distances will keep getting longer, to the point that, for many BEVs, **net emissions reductions might never be achieved.**

Blindly pursuing an electrification agenda, without a robust and transparent analysis of the actual emission reductions achieved, risks a bad case of buyer's remorse. That magical, glittering solution may turn out to be fool's gold.