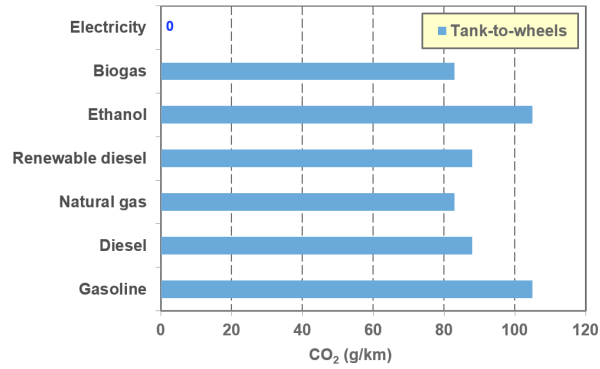


Well-to-Wheels Approach Essential for Low Greenhouse Gas Emissions

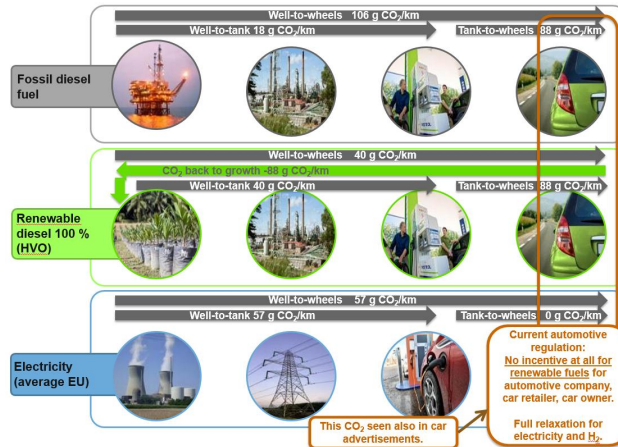
CO₂ of individual cars is today regulated based on tailpipe i.e. **tank-to-wheels** emissions. No heavy duty CO₂ limits exist yet. Electricity is "zero" regardless of primary energy, but **renewable fuels are regulated to be equal with fossil fuels**. Figures are for 100 % biofuels: E.g. E10, E85 and diesel blends need to be estimated according to actual biofuel-%.

Tank-to-wheels emissions as in current car CO₂ certification (renewable fuels not recognized)



Well-to-wheels should be the **ultimate goal** since CO₂ from fuel and energy production and vehicles will be a sum in the atmosphere. CO₂ from fuel and energy production i.e. **well-to-tank shall not be forgotten** when targeting to low greenhouse gas effects.

Current regulation does **not recognize renewable fuels** at all as a way to reduce CO₂ of individual vehicles. Renewable fuels are not taken into account in vehicle taxation. Vehicle companies have today **no reason to sell vehicles optimized for renewable fuels**.



Well-to-wheels case for renewable diesel fuel from waste and average electricity in Finland. Renewable fuels offer remarkable **cost-effective solutions to reduce greenhouse gases** with minimal investments in vehicle technology and fuel logistics.



Well-to-wheels regulation, even though ideal, is **not feasible** for vehicle companies since they can not control CO₂ of fuel and energy production. Case for a biofuel from vegetable oil and average EU electricity: **Biofuel can be better than electricity**.

Well-to-wheels could be achieved by summing well-to-tank CO₂ of fuels or energy plus tank-to-wheels CO₂ of vehicles. It would **require setting CO₂ of renewable fuels to zero** in vehicles. This would offer **holistic approach and neutral playing field** for vehicle, fuel and energy sectors without discriminating any existing solutions or future innovations.

Total Well-to-wheels emissions = Well-to-tank of fuel or energy + Tank-to-wheels of car

