

Light Green Transport for Rural Wales

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1 The Goal

To introduce funky, lightweight, low energy vehicles (LGV's) to replace short, everyday car journeys to work, shops, school or railway station in rural Wales.

These could range from electric assist quadracycles to buggies or micro cars like the Renault Twizy¹. Our aim is to power as many as possible via our own natural elements - sun, rain and wind. This is only possible if we keep them lightweight and low energy.

We want the vehicles to be practical and cheap for local residents – replacing the 2nd car where possible – but also a novel and fun attraction for tourists visiting Wales. We'd like the Brecon Beacons to become the first National Park where visitors don't need or want a car to get around on holiday.



The b-bug² is an early, opportunistic example of the kind of vehicle we have in mind.

Longer term, we hope to encourage the use of shared community cars for longer journeys (reachable from home by LGV's).

¹ <http://www.renault.com/en/vehicules/renault/pages/twizy.aspx>

² www.b-bug.com

2 Why?

Car journeys account for 40% of our personal carbon footprint in rural Wales. If we are aiming to be carbon neutral then this is the big challenge to address.

An average car with 1 person in it consumes 1.3 kWh per mile so an average mileage of 12,000 miles/year equates to 15,600 kWh of energy. That is more than 3 times the electricity used by the average household in the same time period.

63% of our car journeys in Wales are less than 5 miles³. The cars we use for these are designed to travel at speeds of 70mph for hundreds of miles with great passenger comfort. They are highly inefficient for everyday trips of 2-5 miles involving frequent stopping and starting and a cold engine. It takes 2 miles for engines to reach optimum temperature during which time emissions are 20% higher/mile⁴.

In a standard car, only 25% of the energy is used for propulsion. 75% is lost in making the engine and radiator hot.⁵

Modern cars are also extremely heavy (~1500 kg). It's claimed that only 1% of the energy they consume goes into actually moving the person driving it!⁶

In a sparsely populated, rural area like ours, public transport is uneconomic and therefore unavailable for most door to door transport. The hills make cycling challenging and, although many households own bicycles, they tend to be used "for exercise or leisure" or not at all. On average people make 6 trips per year by bike for "commuting reasons".⁷

The Green Valleys, Talybont Energy, Llangattock TGV⁸ and other local communities are working hard to switch the production of our local electricity to green renewable sources - micro hydro and solar PV. These schemes tend to produce excess electricity which is sold to the Grid because there isn't an easy way of using it locally. Could we use more of it to move us around?

3 What?

We want to motivate the design, production and widespread use of lightweight, low energy, personal vehicles (LGV's) which are suitable for rural hilly terrains.

There needs to be a range of LGV's from pedal assist to fully automated, single seaters to family versions, open air to fully weather proofed.

³ <http://wales.gov.uk/docs/statistics/2011/110324wts2010ch6ency.pdf>

⁴ UKERC Report

⁵ Sustainable Energy without the hot air, David Mackay, UIT Cambridge Ltd, 2009.

⁶ Sustainable Energy without the hot air, David Mackay, UIT Cambridge Ltd, 2009

⁷ www.racfoundation.org

⁸ www.thegreenvalleys.org, www.talybontenergy.co.uk, www.llangattockgreenvalleys.org

The key point about LGV's is that they are not trying to compete with cars on range, speed or comfort. They are seeking to cater only for the 63% of rural journeys which are short (less than 5 miles).

They focus on being ultra lightweight in order to transport people over short everyday distances to their local workplace, shops, school or railway station at reasonable speeds *using as little energy as possible*.

We believe that LGV's need to be interesting, trendy and fun to drive to attract people to adopt such a radically different performance/use model. It needs to be clear that they offer different values to a car.

They also need to be significantly cheaper than a car to buy and run. Cheap LGV's could help economically stressed households stay mobile (as fuel prices rise) whilst also incentivising a move to less carbon intensive transport.

Because they use far less energy than full blown electric cars, they could conceivably be run using only local green electricity generated by sun, micro-hydro and wind.⁹

The 2011 b-bug trial suggests that the availability of funky LGV's could become a major eco-tourist attraction for the Brecon Beacons. People can travel here by train or leave their own cars parked up at their holiday cottage or campsite and enjoy the novelty of funky LGV travel for their entire visit here.

Many LGV's will be classed as 'quadracycles' meaning they can be driven by 16 year olds.

4 How?

4.1 Experimentation

Our approach is to experiment on twin fronts: behavioural and technological.

4.1.1 Behavioural

We hope to make a variety of interesting and fun LGV alternatives available for both local people and visitors to try.

Research shows that simply doing something different changes people's thinking and attitudes. In this case, driving a different kind of vehicle will impact people's thinking about the energy involved in moving themselves around and this will likely affect their subsequent behaviour.

When people are on holiday, they have time and are more open to new experiences so, by offering them an additional fun attraction during their stay in the Brecon Beacons, we can challenge how people think and use their cars for local travel.

⁹ E.g. the b-bug consumes only 140 Wh/mile to transport 2 people and the output of one set of domestic PV panels would support 3 b-bugs. The Talybont rurbine could keep 150 of them on the road.

4.1.2 Technological

Explore which LGVs work best for what? Which parameters are most critical and why – e.g. performance (speed, range, hill climbing), passenger and load carrying capability, pedal assist or fully automated propulsion, weather proofing, stability, rugged terrain, security.

b-bugs are just one point in this space – a useful starting point. The soon-to-be-released Renault Twizy is another. At the other end of the spectrum are electric assist bikes and quadracycles.

- a) We ran a trial of electric bicycles (2009) for use by locals for commuting. 8 electric bikes have been purchased as a result. However, we discovered that some people are nervous about using a bicycle or don't want to have to pedal at all.
- b) We ran a trial of 2 prototype electric buggies (2011) and are now looking to set up a test of their economic viability as a tourist rental market whilst encouraging local tourist businesses to use them themselves as well.
- c) We are exploring the possibility of running a trial with Twizys for rural commuting in 2012.
- d) We have purchased a Ricksycle¹⁰ (tandem recumbent) which we plan to modify as electric assist to see how it copes with hills and whether non-cyclists are willing to try it.

4.2 Coupled development

1. Develop LGV's in conjunction with community renewable electricity production schemes and explore the potential for time-shifted storage. Can we make our local transport carbon neutral?
2. Develop LGV's in conjunction with community car share schemes to cater for longer journeys.
3. Develop charging points at bus stations and railway stations.

4.3 Stimulate local industry

1. Establish the Brecon Beacons National Park as an eco-tourism destination where moving around on holiday is fun, innovative and powered only by Welsh sun, wind and rain.
2. Stimulate local design, manufacture and export of rugged style rural LGV's¹¹.

¹⁰ <http://www.ricksycle.com/>

¹¹ Most of the current emphasis and development of this style of vehicle is city oriented.