

Workshop handout 7th July 2015:

Choosing electric bikes for sharing and hire schemes

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No need to take notes – a full Technical Note including the contents of this workshop is available to download now at: www.carplus.org.uk/projects/shared-e-bikes/

Why this workshop

- Carplus want to help bidders get the right bikes
 - To ensure they're legally compliant
 - So schemes have the best chance of success
 - So end users get a good impression of e-cycling and e-mobility
- ***There is no minimum specification as such, but bikes must be fully legal and Carplus will need to approve their specification before purchase to ensure it is appropriate.***
- Please just ask for further advice and support

Legal matters

- Latest DfT guidelines recently issued
 - In effect now, more changes 1st Jan 2016
 - 250W max motors; 15.5 mph (25 km/h) assist limit, riders over 14
 - No "off road" modes!
 - No "twist and go" throttles which work when the rider is not pedalling!
 - Potentially legal only with type approval after 1st Jan but details have not yet been released by DfT. ***So for the purposes of this scheme, Carplus will NOT support bids with 'twist and go' bikes.***
 - Note that bikes with throttles which only work when the rider is pedalling are not affected by this. There is also an exemption for 'push and start assist' up to 4 mph.

Electric bike types

- Concentrating here on available consumer type bikes for manned hire stations. For unmanned stations custom designed bikes are likely to be used. Ask for advice.
- *As many styles as normal bikes:* MTB, commuter, cargo, folding...
- *Motor control:* torque sensor vs Rotation sensor
- *Motor type:* geared hub motor or direct drive (silent) hub motor or crank drive

Suppliers

- ***Carplus are looking into assisting with joint purchasing, leasing and possibly a supplier directory. If this interests you, please let us know.***
- In general look for
 - Trading history – three or even better five years
 - Hire scheme experience, warranty which explicitly approves hire use.
 - Support: 24 hours spares, any special tool/diagnostics, training. If possible, local support.
- Consider:
 - Straight purchase, negotiating bulk prices, become a dealer, or leasing.
 - On-hand spares and spare battery/charger requirements alongside just bikes.

How much?

- Retail prices (inc VAT) start at just under £1000 for entry level, £1000-1700 for mid range, and £1700+ for premium bikes. You will need to go to the premium end to get 'big name' motors like Bosch, Shimano. Note that trade prices are typically 30% less, and you may be able to reclaim VAT. Assistance from Carplus in purchasing may make such discounts available, but that cannot yet be confirmed.

- Therefore if you do not yet have supplier arrangements in place, **you may use £1200 per bike as an indicative price in your bid**, and you will lose no marks in the assessment for this. If your likely per bike cost is very different, please explain why.

Mechanical:

Learn lessons from existing non electric hire bikes, where appropriate to your project. In general:

- Bikes should:
 - have a high rated payload adequate for all potential users and their luggage.
 - adjust easily to a wide rider size range (or offer different frame sizes) and have step-through frames (at least as an option alongside others) for the less agile.
 - ideally have a distinctive frame shape, for anti-theft and publicity.
 - Ideally have a prominent space on the frame for branding.
 - Weigh between 20 and 30 kg, but under 25 is best.
- You want low maintenance: achieved through e.g.
 - Good quality components
 - Hub gears not derailleurs if appropriate
 - Good quality (=not cheap!) puncture resistant tyres appropriate for intended use
 - Trained mechanics (for all components fitted) and regular preventative maintenance.
- Adequate features for intended use:
 - Gearing system appropriate to users and terrain.
 - Lights for all-weather use (not just night-time).
 - Mudguards for UK weather (except MTBs).
 - Luggage capacity (pannier rack & panniers, or maybe a basket?)
 - A sturdy kick stand so customers don't drop or lean the bike (and damage it).
 - Lock(s) either frame fitted or to be carried separately, appropriate to the risk.
 - Pump and basic toolkit for hirer use, again either frame fitted or to be carried.

Electrical:

Ensure your staff can be trained to operate and repair the system used – or if repairs are a factory job, that spares can be obtained fast as replacements.

- User controls:
 - Choose a complexity to suit users. Simplest have on/off and low-med-high assist settings. Is more needed? How long will you spend explaining controls to hirers?
- Batteries
 - Capacity is measured in Watt hours. 300ish+ is adequate for most purposes, 400ish gives more safety margin for longer or hillier rides, 500+ for heavy duty use. Around 400 is most commonly available on premium bikes.
 - Bigger is generally better (can handle current draw better). But you get what you pay for – compare cell quality and weight, not just capacity per £.
 - Some will charge to say 80% in two hours – fast charge could help with busy fleets.
- Battery storage & logistics
 - Considered hazardous goods for shipping – suppliers will give special packaging
 - Real fire risk when stored in bulk and when charged. Good quality reduces risk but be aware when designing hire stations etc. Ensure no possibility of wrong charger being used – major risk.
 - Batteries do wear out and lose capacity. Mark them indelibly with purchase date so you can manage battery retirement sensibly.
 - For off season storage don't lock up and forget – keep charged to 50%-70% capacity to avoid damage.