

Dear BEIS / OFGEM,

I had a process hiccup in a response that I submitted online for Zero Carbon Bristol, which I note immediately below – and I enclose a second response as founding chair of Bristol Power Co-op.

### **Zero Carbon Bristol Response – Process Hiccup**

I have already submitted a response on behalf of Zero Carbon Bristol – and a member of Bristol Energy Network, who have filed a separate, rather specialised response around local community networks which I wholeheartedly endorse. My response as Zero Carbon Bristol was intended to supplement this with some more general ideas around the growth of PV (for generation) and EVs (for storage). **I hit submit and got a message that a link was broken and nothing had been submitted.** That was a heart-stopping moment after a fair amount of work, and it was a few minutes before I got confirmation email to say I had actually submitted something, linking to the PDF copy – which is very useful, thank you...

Your response ID is ANON-BJ6H-GNJ5-X. Please have this ID available if you need to contact us about your response. If you would like to download a PDF copy of your responses, please click the link below, or copy and paste it into your browser's address bar. [https://beisgovuk.citizenspace.com/energy-strategy-networks-markets/call-for-evidence-a-smart-flexible-energy-system/consultation/my\\_response?user\\_id=ANON-BJ6H-GNJ5-X&key=efc6d6b8c7be4efb4b0f3c7659142fcfb13fe3b2](https://beisgovuk.citizenspace.com/energy-strategy-networks-markets/call-for-evidence-a-smart-flexible-energy-system/consultation/my_response?user_id=ANON-BJ6H-GNJ5-X&key=efc6d6b8c7be4efb4b0f3c7659142fcfb13fe3b2)

### **Bristol Power Co-op – Founder's Response – Attached...**

However useful you may find it to have answers submitted online in your questionnaire, filling in the online forms and spreading one's ideas between 48 questions can feel a little like playing Twister – contorting our own views, experiences and ideas to fit someone else's framework – however admirable and well considered. So I would like to take this opportunity to submit a free form response from Bristol Power Co-op, of which I was founder and initial Chairman. This is a personal reflection and other Co-op members and in particular the board may have differing views.

#### **Background.**

During 2011-2013 we explored putting solar PV on ordinary people's roofs as a direct response to fuel poverty, and in conjunction with a smart meter developer CEPRO. From this we got quite a lot of useful learnings, which have gone towards formation of new projects involving local partners – specifically to use smart meters in a partnership with both local energy suppliers and local community renewable energy generation groups – aimed at increasing the supply of renewables, and reducing the cost to end users and communities of energy.

#### **Proposal as Bullet Points**

I have summarised our ideas – distilled from learnings for Community Energy Generation and wider issues around Energy Storage into a couple of sets of bullet points. There is nothing new in them, but I believe it all adds up to a provocative proposal, and a disruptive future, which nevertheless resolves the energy trilemma, and works towards an abundant and highly renewable, and highly affordable smart energy future for all. It also forecasts a timescale for a 100% renewable (and hence pretty much zero carbon) future rather sooner than the Paris Climate Talks envision.

I attach these below as a submission. In the coming months these will transmogrify into blog entries, presentation slides, community energy consultations and events, and a business plan.

### **Community Energy**

1. The cost of solar energy is coming down exponentially. In Abu Dhabi last year the government agreed contracts to buy it at 2.4 cents/unit (we pay 14-16 pence per unit for retail electricity).
2. In Wales, Energy Local have found a way to get energy from producer to user (hydro scheme to energy club member) using smart meters and Co-op Energy, without a 400% retail mark-up
3. Abu Dhabi does NOT have more than 2.5 times as much sun as us, so 1+2+3 means we could generate energy on solar farms and sell it to people for 5 pence per unit. Quite a saving.
4. I am proposing that instead, we use a price of 7 pence per unit, and still get people energy for half price (7p, as in Wales hydro), while making enough profit to create jobs to replicate 1-4.
5. This will only improve with time – as in putting solar on whole house roofs, using thin film solar from MIT, and perhaps even quantum plasmonics (also from MIT) increasing the efficiency.
6. Our best finance contact so far already has offer letters for up to £100m in finance at 5-6% (Abu Dhabi was done with cash at 7%) to finance renewable and energy retrofit schemes.
7. Energy supply companies need to adapt their billing software for this – to connect the generators with the consumers via their energy bills. Tilix have the experience to help them do this.
8. A very quick win would be to connect EXISTING community solar and wind farms to co-op members, community members and people in fuel poverty, creating massive benefits for both sides.

QED. Everyone gets some of their electricity at half price or better, and then we rinse and repeat until energy is around 1-2 pence per unit. The economic opportunity in the community is matched by the possibility of job creation for the team / groups / partners implementing these ideas for the greater good. But not everyone sees this picture at all, and the biggest issue is storage.

### **Energy Storage**

1. The challenge with solar energy is that it is not constant – it varies because of ‘clouds’, ‘nights’ and ‘winter’. But it is pretty regular and predictable. And sunshine is plentiful and free.

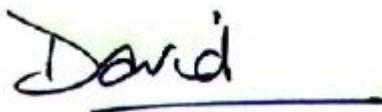
2. Average UK daily electricity use is 40Gwh, peak is 62Gw. If a third of our cars (10m) were electric, at an average 50Kwh that's 500Gwh of storage, more than enough to smooth demand.
3. And then there's winter. And total energy use – electricity is only about a third of our energy. If we cut total energy use by 40% we need 600Twh/year, which needs 666Gw of PV to generate.
4. Note: 666Gw is ten times peak electricity demand, so most of peak generation goes to make Hydrogen to go in the gas grid for later use – in homes and vehicles, and of course air transport.
5. We should put as much of this as possible on our roofs, which can be 100% building integrated PV – weighing less than existing industrial roofs, and costing less than slate and tile roofs.
6. We get the rest of what we need from solar farms, solar roadways, and importing it from the Sahara. 600Twh needs 666Gw of PV (85 miles square) in UK, 300Gw (50 miles sq) in Sahara.
7. The science is from John O'Mara Bockris in 1975 'Energy – The Solar Hydrogen Alternative'. Especially hydrogen for efficient energy storage and transmission, and as an aircraft superfuel.
8. Hydrogen has three times the energy density of methane, petrol, or aircraft fuel. Hypersonic jets can run on a slush of liquid/solid hydrogen, with extended range/payload – and no GHGs.

QED2. And just a reminder that at current exponential growth rates, solar will be generating enough energy for 100% of world electricity demand by 2028, latest, and 100% of world energy demand by 2030 or so. Governments who think it is 2050 before we are fully decarbonised are running on linear growth forecasts from the likes of the International Energy Agency, who are the same people who imagine solar energy will cost 4-16 cents/unit in 2050, and have not yet noticed it passed 2.42 cents/unit in 2016, a mere 34 years ahead of time. At this price it is hard to even buy the fuel to generate energy by other means, or pay the transmission charges or generation taxes. While with solar energy, once the capital cost is paid off, the marginal cost drops still more.

Thank you very much for creating this consultation. The governments earlier consultations and strategies on Community Energy and Solar Energy were also terrific catalysts for the development of community energy and renewables – in particular the Feed in Tariffs got us to the point that was intended – bootstrapping us from near zero to around 10-Gw of solar. Brilliant.

Thanks for being so proactive around smart meters, smart energy, distributed storage and disruptive change – so we can have the energy system of the future.

With best wishes,

A handwritten signature in black ink that reads "David". The signature is written in a cursive style and is underlined with a single horizontal line.

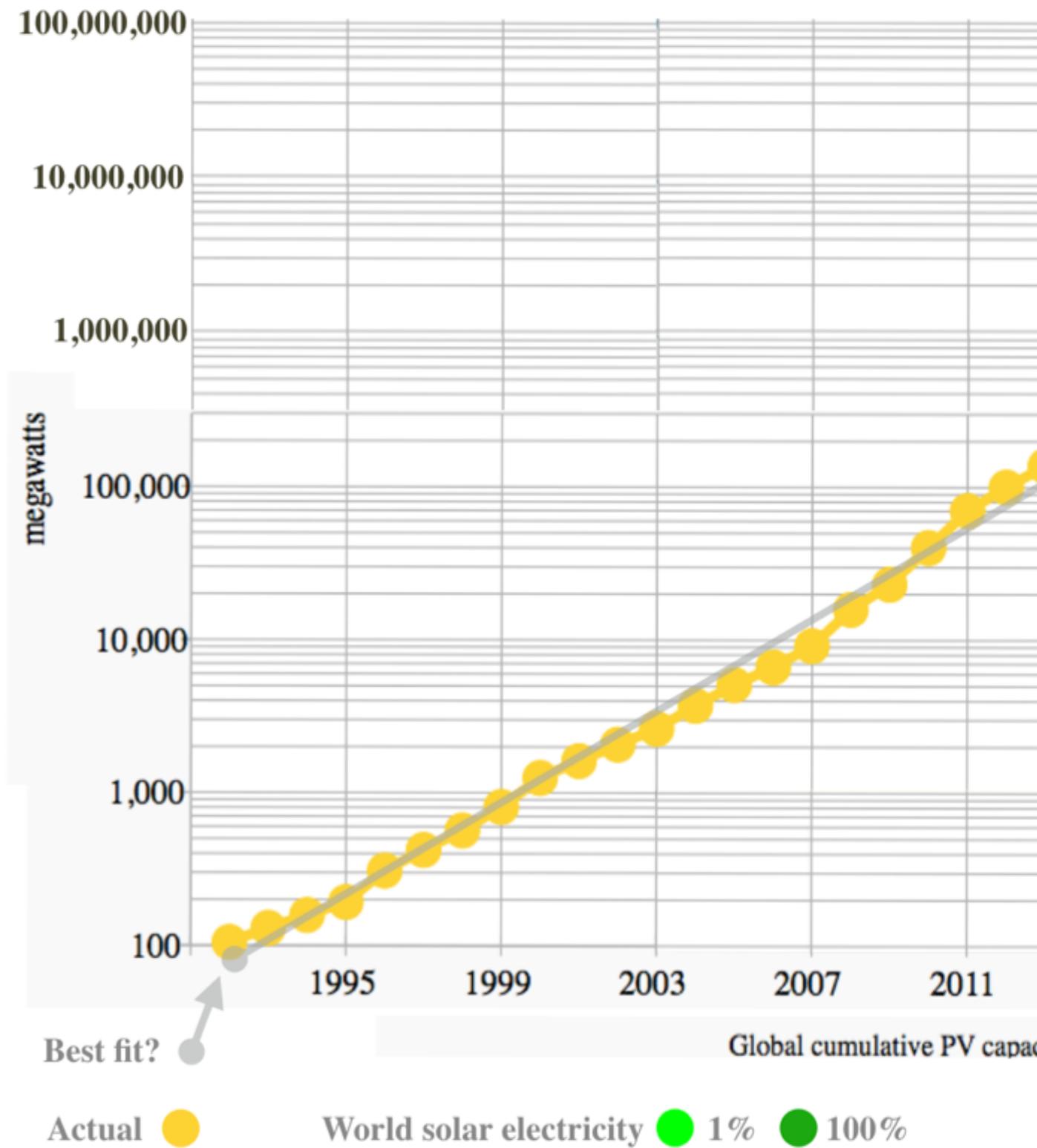
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Attached – extended graph adapted from Wikipedia on Growth of Photovoltaics – showing exponential growth of solar electricity hitting 100% of electricity and energy around 2028 and 2030...

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## Wikipedia on 'Growth of photovo



*Extrapolation from historic data by Zero Carbon Bristol*

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