

Jan Bastiaans – A summary of a discussion with DEMAND researchers and PhD students on 16<sup>th</sup> Dec 2015

For Jan, Lancaster University's energy manager, the story starts when he is at home on Sunday in the afternoon. There is clearly a lot of rain and he's a bit concerned about flooding at his own home. He checks Electricity NW web site and puts in the university post code to see the power status: it shows as being quite ok. He then checks on the app that they have that shows how the wind turbine is doing. It wasn't doing anything. This didn't make any sense. It should have been generating. It cuts out if there is grid failure. So he gets in the car and drives to the university to find its been without power since Saturday night, and without internet, and phone, so no one has contacted him, and no one could do so either.

When he arrives there is no plan and there are also not many university staff around.

The standby generators have kicked in and they support security, the chaplaincy centre, the water supply, and some heating. No one had tested them. No one knew for sure what they would power, or how much load they could take. They have these generators in ISS, biology, the energy centre (for security/chaplaincy), and back up for ISS in faraday.

The university was evacuating the students and providing buses to Preston. There were approximately 6,000 on campus when the power went. The university hired buses and sent everyone South not knowing what would really happen to them next. The buses stopped in the evening when the drivers reached the end of their allowed driving time. The University of Cumbria was doing the same thing, at the same time (*so Preston station must have been busy! One crisis creates another*).

The university has a high voltage ring and can switch parts on and off. The pre-planned generator arrived at its pre-planned location at the back of the Great Hall (I guess on Sunday afternoon), but there were some problems with the connections – it should just plug in but it didn't. The electricians had to battle in the arriving dark to get this thing fixed up, including sawing a hole in a door to get the cable through and rigging up an arrangement that worked. (see torch story, below). In general, there was no or only limited phone communication so also no way to call in any more skilled contractors. Relevant expertise was a bottleneck.

There were about 1,000 students staying overnight in the Great Hall and in LICA.

The only staff around were those who had figured out that they should come in (again there was no way of calling in more since no one had any communications). Since there were few/no chefs, Jan finds himself working in the kitchens – and describes the response when the first trolleys of hot food arrive in LICA (This must be as a consequence of having managed to get the generator fixed up to the Great Hall and local network).

Jan explains they needed tables to put the food on but students were charging their laptops and phones and were reluctant to move them. The university staff who were there had to sweep the phones etc. out of the way to get the food system going.... later Jan talks of people driving to Preston for van loads of bread (this must have been on Sunday) and for batteries, and for torches (which was on Monday). He also has an account of some restaurants and shops in Lancaster University, that

had food that would go to waste, giving it to students/the university – probably on Monday (also Sunday).

A second problem was that the great hall generator arrived with fuel supply for only 12 hours (not 24) so it would run out in the hours of darkness. And they had to organise refuelling, and do so with almost no means of communicating. Jan thinks that some of the landlines in security must have been still working at least intermittently.

They had no experience of how fuel efficient the generator really is, and no good understanding of the load, so they really tried hard to cut down the load – but they needed to feed and provide heating for the Great Hall and LICA. In the morning the generator still had half its fuel, so they were too risk averse, but keeping the system going was the main priority.

At some other point, also on Sunday, the second big pre-planned generator arrives for its pre-planned location by Charles Carter. The trouble is that there are some locked parking bollards in the way. Jan went off to try to find the key: there is a massive bunch of keys, and a useful list that identifies what each one does, but it is just a list – the challenge is still to identify the right key, to unlock the bollards to let the generator waggon in.

It is getting dark so Jan goes to look for a torch: he finds six, one works. Some are rechargeable/and flat. There are no batteries. He needs to find a working torch for the electricians trying to fix the generator up at the Great Hall. He gets the key to the stores but doesn't know where the batteries are: it's a huge store. He spends 45 minutes looking, by the battery light of his own mobile phone. Then someone from maintenance finds him and identifies the correct locked cupboard.

The water pumps are on the emergency generator, but 1000 people are put into a building that is normally unoccupied. Toilets are an issue – cleaners are brought in on Monday morning: and Jan is involved in carrying huge stacks of toilet paper, which are left parked outside the toilet doors.

Bedding packs are there, but they are heavy, and there are few people around to shift them about.

11pm, and as he is about to leave for home, the fire alarm goes off in the energy centre. This automatically shuts off the gas to the whole system, and thus the heating. They figure that the heating normally goes off at 11, and that there are so many students together on all three floors of LICA and in the great hall that the heat won't be a problem, plus it's a mild night. They go to security and turn off the alarm and leave the system till the morning. Not thought about ventilation and no reports of that as an issue.

Communications is the main problem. The security staff do have radios but there are not many of them. Pagers don't work without power. They really needed to get in touch with 'outside' help, but couldn't do so. (*what about driving out of the area and making the calls from the 'powered' zone??: I guess too few people, too much to do*). No sign of the emergency plan at all, or at least not at any level of detail. Staff who came in did so, like Jan, of their own accord figuring out there might be a problem on the Sunday.

In terms of organisation, there is a team 'silver team' (Gold may exist, or may not.. some of Silver went off to the Croft, the VC's residence at some point). Anyrate, Silver, which included Jan's boss was based in security and the rest of the teams were in the chaplaincy centre.

By Monday – there are many more staff around... coming in to work ‘as usual’. There was also more evacuation of students to Preston – presumably with fresh bus drivers. Refuel (the canteen) was open on Monday.

The university’s knowledge of the power situation is limited, often limited to Electricity NW twitter (so the same as everyone else). There is no ‘higher level’ communication with the utility. For example, the wind turbine is off – when the grid fails all connected generation is turned off. But in theory, ENW could have prioritised restoring just part of the system to enable the turbine to come back into use, and therefore to be of some value.

There is a consistent theme of the sheer labour of managing the situation, and the time that some activities (finding a torch) take: individuals are getting on with stuff on their own initiative, there is no clear coordination. Because of the communication failure there are simply not enough staff around.

By Monday in Lancaster as a whole – generators have arrived. But the power goes off again in the evening. In some places. At the university, the plan for graduation ceremonies to go ahead as usual on Wednesday are still in place.

On Monday, staff reconvene in chaplaincy centre at 7.30 am:– apparently the ‘silver’ team meet every hour. But on occasions, and as regards policies about evacuating buildings, its people like Jan and others (health and safety, fire officer) who work out a policy on when students/staff should be allowed back into buildings, or not. This policy is then taken to the silver team. There was no prior planning or clear strategy on this or on other similar issues. The agreed strategy, which depended on the existence of emergency lighting and fire alarm provision – meant that some buildings that were re-opened are closed again.

The communication was still a massive problem: many phone numbers were out of date, handwritten notes and flipcharts were critical. Eg. they were also used to write out rotas for staff (who would be on, and off), and to list which building had power on and which did not.

We learn about the power system and ‘island mode’: the university has the wind turbine and a combined heat and power system (as it happens it is not working at the time – waiting for a spare part -.. but even if it was, it would have been shut down on grid failure). Lots of expensive switching and protection would be required to have ‘island mode’ so the university doesn’t.

This is interesting in terms of how the grid operates – we learn that the present climate of demand response etc. is so variable and fluid that the payback of complicated demand response systems is too uncertain meaning that there is, as yet, no real form of decentralisation of power. We have some discussion of the future of storage systems for heat and power, battery back up and the like at the university. Demand response potential, and potential for storage is (or was) viewed as a financial matter – playing the tariffs, with security as a second benefit – but after the power cut there is a chance that it will be of somewhat greater significance.

At some point there is more shopping done in Preston: including for air horns so that staff working alone and with no means of communication by phone have some method of alerting others. Not able to buy compressed air versions but the university now has lots and lots of balloon variety

On communication, the mobile mast on Bowland tower and mobile masts elsewhere should have 24 hour battery back up but in Lancaster all of them failed. And in any case, none of this is anything the university can control or do anything about. The university could not enable campus wide internet and has no role in the phone system. There was intermittent phone signal by Monday.

Tuesday

Great hall is cleared out of all students and filled with chairs, ready for graduation.

At some point (Tuesday late afternoon) Elec NW eventually get to the university. Electricity NW are running on the 60+ generators, and 'real' power isn't restored until Friday. But at that point, and with generated power from Elec NW at least the university turbine can do its bit.

The university is then allowed up to 1MW compared to a baseload of 3 and peak of 5 to 6.

Tuesday, the day before graduation: A generator is brought in from Barrow to enable the conference accommodation to function (this gets going late Tuesday afternoon). There are no more generators to be had. The conference accommodation was fully booked. (80 rooms). By Tuesday night the university was providing free food in refuel, and the chefs were in, all was functioning smoothly.

Tuesday night: Elec NW 'announces' on twitter that the university has power. This was true in the sense that the grid is functioning (from Lancaster generators), but not in the sense that the university power or accommodation situation is any different.

Some students spent their third night sleeping on the floor, now in George Fox – shifted down there out of the way of graduation which was to happen in Great Hall. Meanwhile, power is largely on all over Lancaster. As a 'large' customer, the university is in a different position.

Wednesday: return to 'normal' - power is reinstated to the residences bit by bit. There are issues of how you turn such a system back on: it takes time in that there is a sequence that needs to be followed. Wednesday and graduation: parking was easy! But they couldn't power up the entire system quickly enough. Great hall was put back on Lancaster mains power, but with the generators there too. But down in Barker house farm (which was where the catering operation had shifted, because of graduation), they stayed on the generator since it would take too long to put that part of campus back on to mains and provide breakfast as well. There was also persistent uncertainty about whether putting the university back on the system would cause the very fragile Lancaster arrangement to fail.

The university went on with graduation, having informed everyone that the power could fail (as more of the Lancaster system was connected, including more parts of the university. At that point, if there had been a failure, the university hired in generators could have been switched on.