

The power cut in London on 28 August 2003

A report from the London Assembly's Public Services Committee

February 2004



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Chair's foreword



Those of us who got caught up in the power cut on 28 August 2003 can recall the chaos that ensued.

I walked with an American whom I had not met before trying to find a train from Waterloo Station having left an evacuating London Bridge Station.

The power cut came after much bigger power outages in the United States.

My American companion for that walk to Waterloo said he thought the English had said it could not happen here and that it would teach limeys for being so cock-sure.

The emergency has taught the authorities much for future emergency planning. I trust that they will pick up our recommendations on the importance of information flow in such emergencies. The next time this happens timeliness of information flow could be a matter of life or death. In a multiple major terrorist emergency there would be a danger that people might unknowingly be shepherded towards rather than away from danger because of poor information flows.

A handwritten signature in black ink that reads "Andrew Pelling". The signature is written in a cursive style with a long horizontal stroke underneath.

Andrew Pelling AM
Chair of the Public Services Committee

The Public Services Committee

The London Assembly established its Public Services Committee on 10 April 2002. It is one of eight Committees that between them cover the range of policy areas relevant to London government.

The members of the Committee are:

Andrew Pelling (Chair)	Conservative
Diana Johnson (Deputy Chair)	Labour
Meg Hillier	Labour
Elizabeth Howlett	Conservative
Jenny Jones	Green
Graham Tope	Liberal Democrat

The terms of reference of the Committee are:

- To examine and report from time to time on the strategies, policies and actions of the Mayor and Functional Bodies
- To examine and report from time to time on matters of importance to Greater London as they relate to the provision of services to the public (other than those falling within the remit of other committees of the Assembly) and the performance of utilities in London
- To take into account in its deliberations the cross cutting themes of: the health of persons in Greater London; the achievement of sustainable development in the United Kingdom; and the promotion of opportunity
- To respond on behalf of the Assembly to consultations and similar processes when within its terms of reference

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1. Introduction

1.1 The London Assembly's Public Services Committee agreed on 16 September 2003 to undertake a scrutiny of the circumstances surrounding the power cut in London on 28 August 2003. The aim of the scrutiny was to identify the causes and consequences of the power cut in London, and consider the implications for London's electricity industry. It was envisaged that this would also provide an opportunity to examine some of the current investment strategies that are in place to address the maintenance needs of London's electricity providers.

The terms of reference for the scrutiny were:

- To investigate the causes and consequences of the power cut in London on 28 August 2003.
- To consider the likelihood of any similar recurrence and the prevention of further power cuts in London.

1.2 The Committee received written evidence from a number of organisations including the Office of Gas & Electricity Markets (Ofgem), National Grid Transco plc, EDF Energy (London Electricity is part of EDF Energy, who in turn are a subsidiary of Electricité de France), Amicus-AEEU Union, and London Underground Limited. The Committee held an evidentiary hearing on 16 September 2003, where they took oral evidence and a full list of the witnesses can be found at Annex B. The Committee is grateful to everyone who contributed to this scrutiny.

1.3 Assembly Members on the Committee also visited the National Grid's Power Substation at St John's Wood in West London on 20 January 2004. This is part of the National Grid's London Infrastructure Project to help to fulfil the increasing electricity demand in central London and to replace existing circuits that are coming to the end of their natural life. The Committee wishes to thank the employees of the National Grid for their time and trouble in taking them around the substation and down the 28 m shaft to view the new 20 km long, 400,000 Volt cable tunnel from St John's Wood to Elstree. The Committee commends the National Grid employees for the essential work they do in a tough and demanding environment.



Members of the Committee at the St John's Wood Substation



National Grid employees took Members of the Committee down into the new 20km cable tunnel

2. A faulty fuse

- 2.1 The electricity industry was privatised in 1990. The National Grid is now part of National Grid Transco and not only supplies electricity in the UK, but also in North America. Their business operations include the high voltage electricity transmission network in England & Wales and the natural gas transportation system in Great Britain.¹ The London Electricity Board became London Electricity which is now part of EDF Energy (a subsidiary of Electricité de France). Ofgem (the Office for Gas and Electricity Markets) is the regulator for Britain's gas and electricity industries, its role is to promote choice and value for all customers.² The London Assembly's Public Services Committee is uniquely charged with investigating issues of importance to London, in particular the provision of services to the public and the performance of utilities.
- 2.2 On 28 August 2003 at 6.20pm a substantial part of London suffered a major power cut. The power cut was widespread covering an area from central London to south London. Although power was restored in 30 minutes, the resulting chaos lasted well into the night. Many commuters were stuck, as only a reduced rail service was restored and most of the Underground was out of action until the next day.
- 2.3 The Public Services Committee wondered how this could happen in London, especially after Stephen Timms MP, the Energy Minister, had said a fortnight earlier after the power cut in North America that it "could never happen here" and that, "it is highly unlikely that a single fault could lead to the collapse of the whole system".³
- 2.4 During our investigation we found that the power cut across London was caused initially by a single fault, resulting in the collapse of much of the system. It all began at a substation at Hurst in Kent, where a warning signal sounded, called a "Buchholz alarm", because gas had accumulated within the oil inside the transformer's equipment. On average the National Grid have 13 such alarms per annum.⁴
- 2.5 Following normal industry practice in this situation, the transformer at Hurst was temporarily disconnected from the transmission system to allow the defective equipment to be taken out of service. This left supplies dependent upon a single transmission circuit from Wimbledon.
- 2.6 This single transmission circuit had an incorrect protection relay (similar in principle to a domestic fuse). In June 2001, a 1 ampere protection relay had been fitted instead of a 5 ampere protection relay, as part of a maintenance programme.⁵ The change in power flows due to Hurst being disconnected caused the protection relay to be triggered. This disconnected the transmission system and caused the loss of supply to a large area of central and south London, including the underground and railways.

¹ www.ngtgroup.com

² www.ofgem.gov.uk

³ The Times, 29 August 2003, p.3

⁴ National Grid Transco, Investigation Report, Loss of Supply Incident, 10 September 2003, p.4

⁵ National Grid Transco, Investigation Report, Loss of Supply Incident, 10 September 2003, p.21

- 2.7 After this event, the National Grid initiated a full survey of similar equipment across England and Wales and so far has not found any further cases of incorrect protection relays being installed.⁶ However, it is of concern to the Committee that an incorrect installation of a protection relay over two years ago was not spotted either at the time or during routine inspections.
- 2.8 At the time of the power cut the Mayor suggested that the power failure was due to under investment, but this remains unproven. It should be noted that the former alternate Lots Road facility to back up London Underground power had failed 14 times in the same period that the National Grid has failed twice. The Committee noted that the power contracted from EDF Energy to supply the Underground in the event of loss of power was readily available. Delays to services were due to other inadequacies within the London Underground infrastructure which are noted below.

Recommendation 1

We recommend that Ofgem together with the DTI monitor and inspect the National Grid's programme of equipment review.



National Grid employees showed Members of the Committee the transmission circuits

⁶ National Grid Transco, Investigation Report, Loss of Supply Incident, 10 September 2003, p.21



A protection relay similar to the one that caused the power cut

3. Communication

- 3.1 The communication, or lack of it, on the evening of 28 August 2003 contributed to the chaos that ensued for most of the night. The National Grid and EDF Energy were in contact with each other within minutes of the power cut arranging the shutting down of the transformer at Hurst and the restoration of supply. However, we found from our investigation that communication from the electricity providers to the outside world left a great deal to be desired.
- 3.2 The National Grid did not inform New Scotland Yard until 30 minutes after the power cut that the loss of power was not due to a terrorist incident. The Mayor and other public service providers were informed between three quarters of an hour to two hours later. Under the Government's contingency plans for London, called London Resilience, in the event of a major terrorist incident, the Metropolitan Police are meant to be the first point of contact for the various utilities and public service providers. The Mayor is the Deputy Chair of London Resilience, working with the Minister for London who is the Chair.⁷ Therefore informing the Police and Mayor should have been of the utmost priority.
- 3.3 The Committee feels that this length of delay is unacceptable in the post 9/11 era. At our evidentiary hearing, Nick Winsor of the National Grid agreed that there was "a need to work closely with EDF, the Mayor, London Underground, Network Rail, and other emergency and public services to see whether there can be improvements made in communications in the event of major power loss".⁸ We agree with this sentiment and would like to emphasise that there is manifestly room for improvement in communications.
- 3.4 The lack of information caused the chaos of the evening of 28 August to deepen. London Underground and railway staff had received little information. Many of these staff believed that the power loss was localised to the station or line where they were deployed. London's radio stations had not been informed of the incident. So tube, rail and road users were left with little or no information. This resulted in dangerous flows of people moving across London's main road junctions, that were no longer traffic-signal-controlled, as they walked to other stations in search of a way home. In a multiple major terrorist emergency there would be a danger that people would be unknowingly shepherded towards rather than away from danger because of poor information flows.
- 3.5 In their report into the power cut, London Underground said that they contacted the EDF Control Room who confirmed that the power loss was due to a fault on the National Grid network, but that "EDF could not explain the nature of the failure or confirm when supplies would be restored".⁹ Although London Underground has long lead-in times to restore services even after a modest power interruption, not knowing when power supplies would be restored would affect the action London Underground would need to take. EDF told us in their written submission that "calls were made by EDF Energy during the evening of

⁷ www.londonprepared.gov.uk

⁸ Minutes of Evidence, 16 September 2003, p.7

⁹ London Underground, Formal Investigation Report, Operational and Customer Service Response to Power Loss on 28 August 2003, p.8

28 August and the following day to the DTI, the Energy Minister, the office of the Mayor, energywatch, Ofgem” and others.¹⁰

- 3.6 The Committee believes that public service providers, such as the power companies, must be made to realise that internal incidents can have far reaching effects on the public at large.
- 3.7 London Underground contingency plans involve the evacuation of trains and stations in the event of a power loss and this was successfully achieved. We believe that this contingency plan should be further reviewed to take into account that in future such a power loss may no longer safely be assumed to be entirely accidental. However, the dissemination of the plan to switch the power back on was not communicated effectively as telephones became congested. Each Tube Line was trying to contact the Network Control Centre. London Underground admit that this meant they could not “establish a strategic overview of the network until after 20.00” i.e. 8pm.¹¹
- 3.8 In our view, London Underground must review how they communicate with each of their Lines, how calls are prioritised and handled, and how vital information is disseminated. We believe LU must also clearly identify for future contingencies, what information about resumption of services is given to the public, quickly give a clear indication to the public of the likely time scale for that resumption, and identify who should make that call within their organisation. It is better to tell the public the system is likely to be down for four hours and make arrangements to move them to other transport options, only to find that you can in fact get the system back running within two hours, than it is to tell the public nothing and have them waiting for hours in a potentially unsafe environment.
- 3.9 We welcome London Underground’s admission in their report that the quantity and quality of information was “poor”.¹² Recognising this is a step in the right direction. They pointed out that the Network Control Centre was ill equipped to deal with an incident on this scale.¹³ This is a view with which we concur.
- 3.10 It is not the first time that there has been a power loss on the underground or that communication difficulties have been raised. Previous power losses in the 1990s and their subsequent reports have made recommendations to address the radio communication systems. The condition of the train radio system was well understood by 1997 and plans for a £1.5bn PFI were well advanced. This culminated in the CONNECT system which is scheduled to be implemented by 2006.¹⁴ By the time this new system is operational almost 10 years will have passed since the communication problem was officially identified.

¹⁰ Memorandum – EDF Energy

¹¹ London Underground, Formal Investigation Report, Operational and Customer Service Response to Power Loss on 28 August 2003, p.14

¹² London Underground, Formal Investigation Report, Operational and Customer Service Response to Power Loss on 28 August 2003, p.15

¹³ London Underground, Formal Investigation Report, Operational and Customer Service Response to Power Loss on 28 August 2003, p.17

¹⁴ London Underground, Formal Investigation Report, Operational and Customer Service Response to Power Loss on 28 August 2003, p.21

Recommendation 2

The Committee recommends that protocols be drawn up for the utilities and other public service providers to inform the Mayor and New Scotland Yard immediately in the event of a major incident and that the Metropolitan Police then take control of the timely dissemination of this information to the public via radio, TV and other media.

Recommendation 3

The Committee recommends that TfL together with London Underground keep under review progress with their new train communications system and endeavour to ensure its implementation before 2006.

4. Consequences

- 4.1 The power cut in London lasted for just over 30 minutes, yet the disruption that followed lasted for the entire night. Members of the Committee witnessed the chaos at first hand as they tried to travel home or to other engagements. The question on our minds was how could this be happening in London after all the reassurances given to Londoners post 9/11.
- 4.2 The travel routes in and around the city descended into chaos. For example, the staff at London Bridge Station initially told commuters that the power failure was restricted to the Jubilee Line, and this was later updated to a power failure affecting the Northern Line as well. The decision was then taken to evacuate the station to avoid overcrowding problems. Some commuters waited outside the station, whilst others walked to neighbouring stations such as Waterloo, Monument, Bank and Liverpool Street. It was now, around 30 minutes after the power cut, that tube staff were informing members of the public that the power cut had affected the entire tube network and that there were no tube services. There was no information available as to when services might be resumed.
- 4.3 At our evidentiary hearing, Daniel Howarth of London Underground told us that “safety comes before service. My priority is to ensure that we close the system and we have got everybody out. We could then think about reopening and starting service in a controlled way, if you like, in our own time”.¹⁵
- 4.4 Whilst we agree with safety coming first, we do believe that London Underground need to give more consideration for the service needs of their customers, many of whom live in Zones 4, 5 and 6, many miles from central London. We believe that this can best be done by a review of restoration procedures with a modernisation programme of the various signalling systems currently in use. We believe that LU must take account of the safety of those members of the public displaced from their system by any such failure.
- 4.5 Thousands of people were milling in the streets, some queuing for taxis, others queuing for already overcrowded buses. The over ground rail network had also been suspended. Traffic lights were out of action. There were no extra police officers on the streets. Pedestrians mingled with cars as thousands of people tried to head off in the general direction of home.
- 4.6 Very few extra buses are available to be provided in such emergencies. So the usually busy rush hour bus service had to cope with massive demand from stranded commuters. There was no information available to tube and rail commuters as to which buses they should use to try and get home.
- 4.7 The Committee is concerned that at a time of supposed higher awareness of the terrorist threat, there should be such confusion and lack of information. After about two hours limited services were restored to the rail network and some people were able to get home. The bus service also eventually managed to convey many people. However, the majority of the tube service did not function for the whole evening. In our view, this is unacceptable for a supposedly world-class city.

¹⁵ Minutes of Evidence, 16 September 2003, p.23

- 4.8 At our evidentiary hearing we questioned London Underground managers about on why the rail network managed to resume services, yet the underground did not. Daniel Howarth of London Underground was the duty officer on the evening in question. He told us that some Tube Lines had “quite significant difficulties with their signalling systems, which needed manually resetting, and they were not really in a position to offer a service until after 10 o’clock at night”.¹⁶ He also told us that many of the Tube Lines use different signalling systems some of which took a long time to re-boot. In addition, some of the lines have computerised systems that produce logs of train positions, e.g. the Bakerloo Line, whilst other lines do not have these computerised systems and so keep manual records of movements, e.g. the Northern Line.¹⁷ This seems a strange practice in the 21st Century for a supposedly modern metro to be using a mixture of uncoordinated equipment and systems.
- 4.9 This concerns us as power was restored to London Underground at 6.51pm, with London Underground restoring power to the tracks at 7.40pm. However, as mentioned before, there was virtually no service on the underground that night. Indeed the last train to be evacuated was at 8.20pm, forty minutes after the power had been restored. In our view the lack of communication between London Underground management and their staff at stations was shocking. By London Underground’s own admission “station and train staff were not fully aware of the extent and nature of the failure and the plan for the restoration of power”.¹⁸
- 4.10 In their own report London Underground have said that they will address their communication problems. However, this still leaves the issue of the length of time it takes to re-boot the underground’s inefficient signalling systems. If newer and better signalling systems are required on the underground, so that they can re-boot at least as quickly as the rail network, then London Underground should confirm whether they will be delivered under the PPP or, if not, they should make a business case for the necessary improvements to be made.

Recommendation 4

We recommend that London Underground should confirm whether new quick re-booting signalling equipment will be delivered under the PPP or if not they should make a business case for the improvement of these systems to compare at least with those of the rail network.

¹⁶ Minutes of Evidence, 16 September 2003, p.5

¹⁷ London Underground, Formal Investigation Report, Operational and Customer Service Response to Power Loss on 28 August 2003, p.9 and Appendix C

¹⁸ London Underground, Press release, LU publishes report into August 28 power loss, 11 Dec 2003

Annex A: Summary of Recommendations

Recommendation 1

We recommend that Ofgem together with the DTI monitor and inspect the National Grid's programme of equipment review.

Recommendation 2

The Committee recommends that protocols be drawn up for the utilities and other public service providers to inform the Mayor and New Scotland Yard immediately in the event of a major incident and that the Metropolitan Police then take control of the timely dissemination of this information to the public via radio, TV and other media.

Recommendation 3

The Committee recommends that TfL together with London Underground keep under review progress made on their new train communications system and endeavour to ensure its implementation before 2006.

Recommendation 4

We recommend that London Underground should confirm whether new quick re-booting signalling equipment will be delivered under the PPP or if not they should make a business case for the improvement of these systems to compare at least with those of the rail network.

Annex B: Evidentiary Hearing and Written Evidence

The following expert witnesses appeared before the Committee and submitted written evidence:

Nick Winsor, Group Director of Transmission, National Grid Transco

Boaz Moselle, Managing Director of Competition, Ofgem

Steve Argent, Technical Adviser, Ofgem

Keith Beattie, Chief Engineer, London Underground

Ian Buchanan, Energy Contract Manager, London Underground

Daniel Howarth, General Manager Customer Services, London Underground

Ken Biggs, Regional Officer, Amicus-AEEU Union

EDF Energy (Electricité de France) submitted written evidence, but declined our invitation to attend the hearing

Annex C: Public Services Committee Publications

The Public Services Committee has also produced the following scrutiny reports, which can be downloaded free at: <http://www.london.gov.uk/assembly/reports/pubserv.jsp>

London's Water Supply
October 2003

The future of Rail Mail
April 2003

Elections and Electorate Engagement
May 2002

Reaching Out – Is the Mayor Listening?
April 2002

Annex D: Orders and Translations

For further information on this report or to order a bound copy, please contact:

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Annex E: Principles of Assembly Scrutiny

The powers of the London Assembly include power to investigate and report on decisions and actions of the Mayor, or on matters relating to the principal purposes of the Greater London Authority, and on any other matters which the Assembly considers to be of importance to Londoners. In the conduct of scrutiny and investigation the Assembly abides by a number of principles.

Scrutinies:

- aim to recommend action to achieve improvements;
- are conducted with objectivity and independence;
- examine all aspects of the Mayor's strategies;
- consult widely, having regard to issues of timeliness and cost;
- are conducted in a constructive and positive manner; and
- are conducted with an awareness of the need to spend taxpayers money wisely and well.

More information about the scrutiny work of the London Assembly, including published reports, details of committee meetings and contact information, can be found on the GLA website at www.london.gov.uk/assembly

Annex F: Photography Credits

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