This is a determination of the Energy & Water Ombudsman NSW under Clause 6 of the Constitution of the Energy & Water Ombudsman NSW scheme.

Introduction

This determination relates to a claim from a customer for compensation for damage to electric ceiling fans – Mr and Mrs E.

By way of introduction I wish to note that during its seven years of operation, EWON has dealt with a large number of complaints from customers in relation to claims for damage. Overall, this has proved to be a complex and difficult area.

There appears to be no certainty for electricity suppliers or customers in relation to responsibility/liability for damage caused by electricity incidents. Although NSW electricity providers generally incorporate into their customer contracts a position of no responsibility/liability for damage caused by electricity incidents, in practice they pay many claims by customers on an ex gratia, without prejudice basis.

Electricity providers have adopted different approaches to customer claims so that there is no consistency in response across NSW utilities.

It appears that insurance companies are increasingly excluding 'electrical' incidents from their coverage, and directing policy holders back to their electricity provider for redress.

As a result of these factors, the position regarding claims for customers is not clear.

It is worth noting that the Essential Services Commission of Victoria has issued a guideline about compensation of customers. This guideline has had the effect of significantly reducing the need for the Energy & Water Ombudsman (Victoria) to be involved in customer claims for compensation.

In my view there does not appear to be any sound reason for an inconsistent approach by electricity providers in NSW to customer claims for damage. We cannot see any competitive advantage to a different approach by companies, and it does not seem equitable for customers to be treated differently in relation to claims depending on the distribution area in which they live. We have called for discussion of these issues by

relevant stakeholders, including electricity distributors, regulatory bodies, and consumer groups.

In the absence of any clear guidelines for customer claims in NSW, it has been left to my office to investigate claims that have been denied by distributors. My determination in individual matters does not create any precedent, but simply reflects an attempt to resolve each case in relation to its individual circumstances.

I believe that the development of standards for claims in NSW will benefit customers, their electricity providers, and the general community.

The Complaint

Mrs E made a claim to her electricity supplier on behalf of Mr E and herself for damage to three ceiling fans at their home in the late evening of Sunday 22 June 2003 or the early morning of Monday 23 June 2003. In his discussion with EWON on 1 September 2003, Mr E advised that when he contacted the electricity supplier on either 23 or 24 June 2003 to enquire if there was any record of electricity supply disruptions in his area, the supplier informed him there had been an explosion in a substation and offered to forward a claim form to him if he thought this incident had contributed to the damage to his fans. The customers emphasised in their discussions with EWON that the ceiling fans were less than two years old and had been operating trouble-free since installation.

Mrs E submitted her claim form on 29 June 2003 for $761, which represented the total [rounded up] of the replacement cost of the three ceiling fans at $72.18 per unit; the installation cost of $462 and the service call-out charge by their repairer on 24 June 2003 for $82.50.

In describing the incident which led to the damage to the ceiling fans, Mrs E advised in her claim form that "*an aberration in the power supply, believed to be caused by an explosion in the nearby Substation, caused damage to the 3 ceiling fans in the bedrooms"*. Although the fans were not in use at the time, she noted that when her family awoke on 23 June 2003, *"the fans were flicking on and off uncontrollably, one not responding to the remote control at all"*. She informed the supplier that the fans' infra-red receivers had been damaged and that the existing fan remote control units did not work with the replacement relays. The repairer's report dated 24 June 2004 accompanying the claim form confirmed that the repair/replacement of the relays to three ceiling fans was required. This involved the removal and dismantling of the fans and the removal and replacement of the receiver unit in each one. Mr and Mrs E subsequently clarified for EWON that the date that their fans sustained damage was the same day the repairer attended their premise and completed the repair work – that is, 24 June 2003.

The supplier wrote to Mrs E on 16 July 2003 declining to pay the claim on the basis that their records did not disclose any variation in the electricity supply that did not comply

with their supply standards, on or about 23 June 2003. The supplier noted that in such circumstances it is not their policy to make offers of compensation.

Mrs E wrote to EWON on 11 August 2003 requesting a review of the reasonableness of the supplier's decision. In her letter, she advised that her enquiries had *"established that there had been an explosion in the substation feeding our area at the time the fans were damaged."* She also noted that their electrician and the fan manufacturer had advised that the damage to the fan relays *"was more than likely a result of the substation explosion"*. Mrs E emphasised that she considered it was *"far too coincidental"* that the fans had sustained damage at the time The supplier had advised them that there was an explosion at the substation.

The supplier's Response

On 18 August 2003 the supplier wrote to EWON and confirmed that they stood by their denial of Mr and Mrs E's claim on the basis of the terms of the Customer Contract and because "*the interruption to supply was beyond the reasonable control of [the supplier] and was due to an unpredictable mechanical fault in a transformer tap changer"*. The reference to a supply interruption was corrected in a subsequent report to EWON.

In their initial *Investigation Report* to EWON dated 12 August 2003 the supplier confirmed that the customers are supplied electricity via Distribution Substation [number..] and the 11kV feeder [number] out of the Zone Substation. The Report also indicates that the supplier had interrogated their system analysis records for the period from 20 June to 25 June 2003 and this had revealed that there were no records of any system events on either 22 or 23 June 2003 and, in particular, no records of an explosion involving network on or about the date claimed. However, there was a record of a "system abnormality" at 6.45am on 24 June 2003. This network incident occurred when "the tap changer on No 1 Transformer at the Zone Substation jammed, causing higher than normal voltage [in excess of 260V] to be supplied". In response to this situation, the System Operator isolated the transformer from the supply when abnormal voltage alarms were received in the Control Room.

In their advice to EWON about the implications of this event for customer installations, the supplier advised that the abnormal voltage condition affected all customers connected to that section of the 11kV busbar at the Zone Substation supplied by No 1 Transformer and lasted for approximately 1-2 minutes. There were no other claims made by customers in the area as a result of this incident. The supplier further noted:

> *"There was no interruption to supply to customers and the event did not cause any 'surge' condition."*

The supplier provided additional *Investigation Reports* to EWON on 19 November 2003, 8 January 2004 and 19 February 2004 in response to EWON's enquiries about the nature of the tap changer incident.

The second *EWON Investigation Report* dated 19 November 2003 provides information relating to the supplier's customer contact records for the event which occurred on 24 June 2003 as well as some additional technical information. The supplier advised EWON that their records of customers' calls to the Contact Centre on 24 June 2003 indicated that a supply event had occurred at around 7.46am on that date and that this information *"made reference to an explosion at a transformer that affected [local] areas*". The supplier emphasised that this information was based on incoming calls from customers and, as such, *"is [the supplier's] best information at the time"*. The supplier confirmed with EWON that their usual practice is not to relate such information to customers, as "*it has not been confirmed as correct at that stage"*.

The supplier further emphasised that there was no 'script' provided to their Contact Centre staff regarding the network event on 24 June 2003. Rather, The supplier's contact staff would only advise that the supplier was aware of a problem affecting parts of [some suburbs]. However, the supplier acknowledged that "if pressed, the Contact Centre Operator *"may have advised that there had been a report of an explosion at a substation"*. In any case, any information provided to customers calling to report supply problems *"is not intended to infer that the customer was affected by the event – rather, it is simply general information about a reported event"*.

The supplier reiterated that the tap changer incident affecting No 1 Zone Transformer did not result in a supply interruption to any customers as the System Operator manually isolated the transformer and supply to the 11kV busbar was maintained by an alternate transformer. The supplier emphasised that this did not result in any 'surge'. Rather, the *"event was an abnormal voltage alarm signifying that the output of No 1 Transformer rose to a level equivalent to about 260V on the low voltage reticulation, when the tapping switch jammed"*. The supplier provided further specific information about the rise in voltage, emphasising that:

- the tap changer could not respond to the voltage regulation control so that there was a rise in voltage *"to about 8 to 9% above the nominal voltage at the low voltage reticulation"*

- a voltage level of around 260V at the low voltage reticulation was within the supplier's stated objectives of +/-10% of the nominal voltage of 240V and the event was of short duration

- it was unlikely that the incident with the tap changer jamming could cause damage to appliances suited to Australian supply conditions

- all customers connected to the affected section of the 11kV busbar at the Zone Substation would have all been equally affected by any variation in voltage and there were no other claims received as a result of this event.

The supplier also reported that their statement in the *Claim Determination* section of their initial *EWON Investigation Report* dated 12 August 2003 should be amended to read:

> *"The system event was beyond the reasonable control of [the supplier] and was due to an unpredictable mechanical fault in the transformer tap changer mechanism"*.

Following EWON's further enquiries, the supplier provided a further *Investigation Report* on 8 January 2004 detailing additional technical information about the tap changer incident affecting No 1 Transformer at the Zone Substation. This Report noted that the supplier continuously monitors the voltage levels on the busbars and transformers at major substations via the System Control and Data Acquisition (SCADA) system. The System Operator is alerted to any abnormal conditions (such as voltage variations outside normal parameters) by the alarms that are part of the monitoring system. Furthermore, "significant abnormalities will cause automatic protection devices to isolate fault conditions". The supplier emphasised that the voltage level that was indicated in their *Investigation Report* dated 19 November 2003 *"would have been fairly constant"* as the fault condition *"was related to the tap changer being jammed on a particular tap"*. This meant that:

> *"The transformer was jammed on a fixed output setting and did not vary under the control of the automatic voltage regulation equipment."*

EWON sought clarification from the supplier regarding their reference to *"the system abnormality at 0645 on 24 June 2003"* as noted in their Report dated 12 August 2003 and the advice in their Report dated 19 November 2003 relating to *"the outage information provided to the Contact Centre Operators on 24 June 2003."* The latter Report indicated that *"a supply event occurred at about 0746hrs on that day and made reference to an explosion at a transformer"* that affected three contiguous suburbs, including the customers' suburb. The supplier's fourth *Investigation Report* to EWON dated 19 February 2004 advised that:

> *"The recorded system abnormality on the transformer at the Zone Substation at 0645hrs and the system event recorded by the Call Centre at 0746hrs was in fact the same incident. The time discrepancy could be either a communication error between the System Operator and the Call Centre or an interpretation error by the Call Centre entering the information"*.

The supplier reiterated in this Report that the fault on the tap changer [affecting Zone Transformer No 1] *"may have caused a voltage rise of about 8% for a short time prior to the System Operator manually isolating the transformer."*

EWON's Investigation

In the course of our investigation of this matter we considered in detail the following:

- information provided by Mr and Mrs E
- information provided by the supplier
- a technical report by an independent electrical engineer.

Technical Advice

EWON obtained independent technical advice from an experienced electrical engineer on both the nature of the network incident on 24 June 2003 and the particular damage to the customers' ceiling fans.

In his report dated 3 November 2004, EWON's technical adviser advised that during a period of abnormal voltage, different customers will be affected differently or unequally as "*the supply voltage level to individual customers varies with the location of that customer in relation to the local distribution substation, the location of that local substation in relation to the zone substation, and the fixed tap setting of the local distribution transformer."* He noted further that even under normal operating conditions, voltage varies quite considerably from one customer to another, depending on tap settings at the relevant distribution transformers, customers' proximity to the distribution substation, and *"other network variables"*. The significance of this is that during a system event of abnormal voltage at the Zone Substation 11 kV busbar, all affected customers would suffer a voltage rise of similar magnitude but that rise would be *relative* to the voltage supplied to those customers under normal circumstances so that:

> *"If Ms E's premises were normally supplied at a voltage near the top of the standard range- and in the circumstances as damage was actually sustained, this seems probable –any abnormal voltage associated with the tap changer failure - and subsequent switching arrangements - on 24 June 2003 is likely to have affected her considerably more than other customers who are normally supplied at a voltage lower in the range even though they were connected to the same section of 11kV busbar"*.

Review of technical information in the supplier's EWON Investigation Reports

EWON's technical adviser observed that in their earlier *EWON Investigation Reports,* the supplier did not respond to EWON's question as to whether as a result of the tap changer incident [affecting No 1 Zone Transformer] the voltage might have risen higher than the normal range or higher than the point at which the abnormal voltage alarm would be triggered. His report also highlighted that *"initially[the supplier] seemed to have been reluctant or unable to provide in its* [EWON] *Investigation Reports, data about the voltage levels on the busbars, and the recording of the "continuous monitoring" of those levels"*. However, the technical adviser confirmed that this information had subsequently been provided to him for the preparation of his report. He noted that the significance of EWON's question about the level of voltage rise and the triggering of the alarm was that:

> *"an abnormal voltage alarm necessarily has a threshold voltage at which it operates; voltages higher than this threshold do not have any further effect on the alarm system. Therefore, the alarm system cannot tell what the actual voltage is; it can only tell that the voltage reached or exceeded the threshold. Thus the setting of that threshold or triggering point, per se, provides no definitive information about the actual level of over voltage."*

The technical adviser also noted that while the supplier's advice to EWON[1] that *"significant abnormalities will cause automatic protection devices to isolate fault conditions"* is true of protection systems in a general sense, in his view this is unlikely to apply to voltage control systems in relation to abnormally high voltage levels caused by tap changer malfunction:

> *"To my knowledge, [the supplier] has no protective systems which would automatically isolate the condition in this case. This is consistent with the fact that, in the event, the System Operator responded to the abnormal voltage alarm and intervened to isolate the transformer manually."*

EWON's technical adviser has highlighted information, which he considers suggests that the supplier did not know the exact level of voltage rise which actually occurred or the duration of the event or did not wish to state what these parameters were. He notes that the *EWON Investigation Report* dated 19 February 2004 stated that *"the fault on the tap changer …may have caused a voltage rise of about 8% for a short time prior to the System Operator manually isolating the transformer"*. In reviewing the information relating to voltage level(s) and the duration of the event in the supplier's four *Investigation Reports*[2] to EWON, he observed that:

> *"the quantum of the abnormal voltage has evolved from in excess of 260 volts, to about 260V or about 8 to 9% above nominal, to, in this Report [dated19 February 2004] about 8%. The time period, stated in the report of 12 August 2003 to be approximately 1-2 minutes, has also become more tenuous, now stated as "a short time"."*

While EWON's technical adviser has emphasised that his examination of the supplier's *Faults, Outages and Damage* (FODs) Report for 24 June 2003 indicates that the information recorded is *"very sketchy"*, he has also highlighted that the information that the tapchanger jammed on Tap 27 with a corresponding 11kV busbar voltage of 12.0kV, is significant as this facilitates gauging *"the effect in terms of the corresponding voltage on the low voltage reticulation system"*.

The supplier's Technical Investigation Report [provided to EWON's technical adviser] dated 30 August 2004

Among other points made in their response to the enquiries from EWON's technical adviser, the supplier advised that:

- *" …… there was no explosion at a transformer or substation in the area on 24/06/03. The operation of the 132 kV switchgear in response to the alarm may have been the noise reported"*

[1] Statement made in the supplier's third *EWON Investigation Report* dated 8 January 2004
[2] The supplier's *EWON Investigation Reports* dated 12 August 2003, 19 November 2003, 8 January 2004, 19 February 2004.

- *"the tapchanger itself did not jam. The tapchanger ran to top tap, which was caused by the raise cam mechanism sticking due to hardened grease. ……"*

- *"the high volts alarm on both transformers is set at 10.9 kV. Voltage can exceed the alarm setting (in this case voltage levels of 12.0 kV were noted)"*

- *"the normal voltage range (on the 11 kV busbar) is 10.3 to 10.8 kV"*

- *"it should be noted that* [the customers' Distribution Substation], *shown on Sheet 2, is normally supplied from No. 2 transformer. When No. 1 transformer was taken off line (in response to alarms), this distribution substation would have momentarily experienced high volts."*

The supplier also provided copies of the load and voltage readings for both transformers at the Zone Substation for 24 June 2003 and reiterated their previous advice that *"the busbar voltage reached 12 kV for a short time prior to disconnection of transformer No. 1."*

EWON's technical adviser concluded that the matter of the *"explosion"* is probably not directly related to the customers' claim and reports of an explosion conveyed by the Contact Centre *"must remain a mystery"*. However, he has queried the supplier's suggestion that the noise thought to have been an explosion might have been caused by the operation of the 132kV switchgear commenting that this *"is extremely dubious"* as the voltage and current charts the supplier provided for both transformers at the Zone Substation indicate that *"the 132kV supply was not switched – that No 1 Transformer remained energised throughout the events of 24 June 2003, and all switching was confined to the 11kV busbars."*

From his examination of the current and voltage charts provided by the supplier, EWON's technical adviser was able to establish a detailed chronology for the network incident on 24 June 2003. Some of the key points made in this section of his Report follow:

- *at approx. 0645 hours, the voltage on the 11 kV busbar supplied by No. 1 Transformer rose sharply, to at least 12.0 kV. The chart appears to show that the cursor or electronic recording pen was constrained or limited by the recording system (as if by a fixed "stop" or allowed maximum scale reading) to 12.0 kV, so that the actual voltage was almost certainly in excess of 12.0 kV. Customers supplied by No. 1 Transformer would have experienced abnormally high voltage levels between 0645 and about 0725*

- *at the same time, the No. 1 Transformer current, which was increasing as the morning load grew, increased somewhat more sharply*

- *at approx. 0745 hours, an hour after the event which gave rise to the abnormally high voltage referred to above, No. 1 Transformer current suddenly fell to zero. This is*

consistent with the System Operator's isolating the transformer from the 11 kV busbar

- *at the same time, No. 2 Transformer current rose sharply, from approx. 1,000 amps to about 2,300 amps. This is consistent with the isolation of No. 1 Transformer, so that all the load in the Zone had to be supplied by No. 2 Transformer*

- *at some time between the abnormally high voltage event on No. 1 Transformer, beginning at 0645 hours, and the isolation of the transformer at approx. 0745 hours, the System Operator must have closed appropriate bus-section and bus-tie circuit breakers preparatory to isolating the transformer, so as to supply all of the substation load from No. 2 Transformer, without any interruption to supply. In view of the dip on the No. 1 Transformer voltage chart at approx. 0725, it seems likely that this switching occurred at that time. During this period, of up to 20 minutes, both transformers would have been on-line in parallel (with all busbars effectively connected together) so that the 11 kV busbar voltage would have been of the order of 12.0 kV. All customers supplied by the Zone Substation would have subject to abnormally high voltage during this period, though as stated earlier, the actual voltage level and hence the effect on customers' equipment would have varied considerably from one customer to another, with the variation over a range approaching 20%.*

EWON's technical adviser emphasised that the supplier's Report dated 30 August 2004 confirmed that "*irrespective of the alarm threshold setting, the transformer voltage may exceed that setting. It has also confirmed that "voltage levels of 12.0 kV were noted"*. In addition, it seemed *"highly probable"* that between 6.45am and approximately 7.25am, customers connected to No. 1 Transformer were subjected to abnormally high voltage, corresponding to a voltage of at least 12.0 kV on the 11 kV busbar; and between about 7.25am and 7.45 am, all customers supplied from the Zone Substation *"were subjected to abnormally high voltage, corresponding to a level of or approaching 12 kV on the 11 kV busbar (while both transformers were connected in parallel, before isolation of No. 1 Transformer)."* He further emphasised that irrespective of whether Mr and Mrs E's premise was connected to No. 1 or No. 2 Transformer, the level of abnormal voltage applied to their installation "*could well have been 23% above nominal voltage (up to or exceeding 294 volts)"*. If the premises were connected to No. 1 Transformer this could have been the case between approximately 6.45am and 7.25am. If the premises were connected to No. 2 Transformer this could have been the case between approximately 7.25am and 7.45am. Additionally, the information from the data provided by the supplier *"suggests strongly that the duration of the period of abnormally high voltage applied to the network was more like an hour"*.

EWON's technical adviser provided comprehensive information about automatic tapchangers fitted to zone transformers and this emphasizes both the complexity of these devices and the fact that they are subject to wear and mechanical failures, and require appropriate maintenance – by highly skilled personnel - over their 'working lives'. He advised that a specific maintenance regime is required as the switches themselves operate

in a tank of insulating oil, and the contacts – and the oil - deteriorate over time and need to be serviced or replaced. He also provided detailed information as to why tapchangers, which are generally reliable, might fail:

> *"Causes of jamming might include failure or distortion of mechanical parts, contacts sticking or welding, or similar types of mechanical failure or sticking in the motor-box. These occurrences in turn can come about through wear and aging of components, or through inadequate maintenance – either insufficiently frequent in relation to the condition of the equipment, or by staff error (perhaps incorrect reassembly after overhaul, or poor workmanship)…In this case, the problem – sticking of the "raise" cam mechanism in the motor box - has been stated to have been caused by hardened grease. Presumably this was not a problem which was known to [the supplier] before this event".*

In their initial *Investigation Reports* to EWON, the supplier stated that the tapchanger jammed; however, in their *Investigation Report* dated 30 August 2004 in response to further questions from EWON's technical adviser, the supplier confirmed that the tapchanger itself did not jam; rather, it ran to the top of the tapping range (Tap 27). The supplier also advised that the sticking of the "raise" cam mechanism, which is part of the motor drive and control gear rather than the tapchanger itself, had caused the supply problem. EWON's technical adviser has noted that the failure mode specified by the supplier was "*the result of hardened grease causing sticking of the "raise" cam mechanism"*.

In his review of this identified cause of the sticking of the "raise" cam mechanism, EWON's technical adviser has noted that grease used as a lubricant for mechanical equipment is subject to aging, leading to hardening and loss of effectiveness as a lubricant. This lubricant aging process *"is a function of the type of grease used, time, and temperature…and a result of gradual evaporation of the volatile petroleum components from the solid (clay or similar material) substrate, together with oxidation of the petroleum (oil) components to create acids and sludge which tend to solidify the grease"*. In his assessment, this appears to have underpinned the incident on 24 June 2003. He emphasised that *"grease needs to be replaced at intervals, before its lubricating properties are reduced to the point where it ceases to be effective for the function or duty required"*. He has summarised the implications of the identification of the hardened grease as being the cause of the supply variation as follows:

> *"if the incorrect grease is used, or if replacement/re-lubrication intervals are excessive in relation to the duty required (in terms of temperature and mechanical load), the grease may harden and cause failures of the type experienced".*

The nature of the damage to the ceiling fans

In his Report, EWON's technical adviser has addressed the supplier's observation in their *Investigation Report* to EWON dated 19 November 2003 that *"it is unlikely*

that such an event [abnormal supply voltage] would cause damage to appliances suited to Australian supply conditions". He has noted in response to this that the Australian Standard on supply voltage levels - *AS 60038: 2000 – Standard Voltages* - is based on an international standard and has concluded that, in light of this, the supplier's statement *"is highly questionable*". Notwithstanding this, he acknowledges that while there are many appliances that are quite robust and are able to withstand significant periods of abnormally high voltage without failure, in most cases, their life will be shortened when exposed to such conditions. Furthermore, different types of domestic appliance respond differently and electronic devices or appliances containing electronic devices, especially digital equipment and microprocessors, remain highly susceptible to overvoltages. Those devices that *"include "consumer" electronics, which are built to a price and whose reliability is not critical (unlike industrial or military applications), are particularly susceptible"*.

The Report notes that "*as far as modern consumer electronic equipment is concerned, the event under consideration, involving abnormally high voltage supplied for at least a number of minutes, can be regarded as a sustained or steady-state condition. In relation to the likelihood of damage to the equipment, it is immaterial whether the event lasted for 10 seconds, 20 minutes or an hour"*. The reason for this is that as the remote controllers for Ms E's fans are an example of modern consumer electronics using microprocessor technology, they were, therefore, *"in all probability very susceptible to overvoltage"*. However, the technical adviser has emphasised that because the units which failed on 24 June 2003 have not been retained and cannot be inspected or tested, it is not possible *"to assert definitely*" that their failure was caused by overvoltage. However, he has concluded that:

> *"given the coincidence of their failure with the system events between 6:45 a.m. and 7:45 a.m., and their inherent susceptibility to overvoltages (especially if the voltage exceeded 16% more than the nominal voltage as seems highly probable) it is extremely likely that they failed because of the abnormally high supply voltage caused by the tapchanger failure at the Zone Substation (and the subsequent events including switching arrangements)"*.

Analysis

EWON's investigation considered the information obtained from all sources listed above. However, the information discussed below was considered to be particularly relevant in determining that it is reasonable for the supplier to address Mr and Mrs E's claim.

The supplier informed Mr and Mrs E on 16 July 2003 that their records did not disclose any variation in the electricity supply that did not comply with their supply standards. In their final *Investigation Report* to EWON, the supplier advised that the fault on the tap changer *"may have caused a voltage rise of about 8% for a short time"* however, according to the supplier[3], a voltage level of around 260V at the low voltage reticulation *"is still within the The supplier stated objectives of +/- 10%"*. The independent technical

[3] The supplier's *EWON Investigation Report* dated 19 November 2003

report commissioned by EWON has concurred with The supplier's advice that there would have been a voltage rise associated with the supply incident at the Zone Substation on 24 June 2003 but has concluded that this was at a level significantly higher than the supplier has suggested.

In regard to the nexus between the network incident and the claimed damage to the ceiling fans, Mr and Mrs E were unable to specify the exact time when they awoke to find their ceiling fans "flicking on and off uncontrollably". However, they have indicated to EWON that they awoke to this situation on the same day that their repairer came to replace the damaged units – that is, on 24 June 2003. This information suggests that the damaged sustained to the fans occurred at a time that is approximately coincident with the times specified in the supplier's records for the tap changer incident at the Zone Substation on 24 June 2003. In addition, the supplier has confirmed with EWON's independent technical adviser that while the normal range of the 11kV busbar voltage at the Zone Substation is 10.3 to 10.8kV, "*voltage levels of 12.0 kV were noted*" regarding the tap changer incident on 24 June 2003.

Although EWON's technical adviser has emphasised that it is difficult to know exactly what the voltage applied to the customers' premise was, "*an actual figure of 12.0kV on the 11kV busbar represents a rise above the top of the range (10.8kV) of 13.4% or relative to the middle of the range (10.55kV), of 13.7%. This is considerably more than the figure of 8 to 9% suggested by [the supplier] in its investigation.*" Furthermore, "*it is clear*", in his view, that a period of some 40 minutes of "*sustained abnormally high voltage*" elapsed between the operation of the abnormal voltage alarm and the System Operator's preparatory switching and there would also have been a further period of about 20 minutes of abnormal (but probably slightly lower) voltage before No. 1 Transformer was isolated. The technical adviser has noted that for the first period, only those customers supplied from No. 1 Transformer would have been affected, but for the second, all customers supplied from the Zone Substation would have been affected.

The independent technical advice suggests that there is a strong nexus between the nature of the network incident and the nature of the damage sustained by the customers' equipment. The technical adviser considers it is "*extremely likely*" that:

- the customers' fans failed "*because of the abnormally high supply voltage caused by the tapchanger failure at the Zone Substation*" given that the fan controllers are based on digital electronics and are thus highly susceptible to overvoltage

and

- the voltage rise on the network was in fact of the order of 13.4% and "probably more". EWON's technical adviser suggests that the voltage rise above "normal" was either at least 13.4% (corresponding to a minimum of 12.0 kV on the 11 kV busbar) or close to that (depending on whether Mr and Mrs E were supplied by No. 1 Transformer or No. 2 at the time). Depending on the level of voltage normally supplied to Mr and Mrs E's premises, he has concluded that:

> *"it is possible to deduce that the* voltage *supplied to Ms E could easily have risen to something of the order of 294 volts. This is 23% above nominal and 11 – 12% above the upper limit of the acceptable range"*.

On this basis, the strength of the relationship between the damage occasioned to the customer's appliances and the event on network is considered *"to be extremely strong."*

The supplier has confirmed with EWON that their records indicate there were no other customers who submitted claims for damaged equipment in respect of this event. EWON's technical expert considered this information and noted that this is not conclusive and does not invalidate Mr and Mrs E's claim given that:

> *"customers connected to the same section of the 11 kV busbar would have been affected quite differently depending on their location and hence their "normal" voltage level; the voltage variation between different customers could well have been of the order of 20%."*.

In addition, it should be noted that Mr E rang the supplier on the day his fans sustained damage to enquire if there had been any electricity supply incident affecting his area, not because there had been an actual interruption to supply. While there is little value in speculating whether other customers sustained damage to equipment or appliances, the conclusions of the independent technical report suggest this is feasible that might have occurred, and that those customers did not link this to the possibility of an electricity supply incident because there was no outage.

The supplier have advised EWON that they denied Mr and Mrs E's claim on the basis that the supply incident on 24 June 2003 was caused by an unpredictable mechanical fault in a tapchanger mechanism, an event that was beyond their reasonable and practical control. EWON acknowledges the independent technical adviser's observations that automatic on-load tapchangers are mechanically complex devices that are extremely well engineered and generally very reliable and that the long-term maintenance of complex electrical plant such as this equipment is itself a complex issue. As with all mechanical equipment, tapchangers are subject to wear and mechanical failure and, as it is not unknown for them to "jam" on a fixed setting, the technical adviser considers it is *"completely plausible that the tapchanger on No. 1 Transformer did so on 24 June 2003 as [the supplier] initially stated that it did"*. However, the supplier later stated that this incident involved the sticking [on the top tap] of the "raise" cam mechanism, which is a part of the motor drive and control gear rather than the tapchanger itself and that the supplier had determined that this, in turn, was caused by *"hardened grease*". In their written response to EWON's technical adviser's enquiries[4], the supplier addressed the issue of equipment maintenance, advising that:

> *"this unit is maintained in accordance with the appropriate Network Standards and the manufacturer's recommendations…*[and] *the last maintenance was carried out in 2002 and the next scheduled maintenance was due in 2008."*

[4] Cf The supplier's Investigation Report dated 30 August 2004

The supplier has not provided specific details relating to the *"appropriate Network Standards"* in the course of EWON's investigation, despite having had several opportunities to do so. Similarly, while EWON's technical adviser suggests it can reasonably be presumed in light of the advice provided on 30 August 2004 that the supplier *"carries out maintenance of tapchangers of the type in question on the basis of fixed time intervals - in this case, every six years"*, he has also emphasised that:

> *"it is impossible, from the information currently available, to know whether this - and the Network Standards - have been established on the basis of the manufacturer's recommendations or on some other basis. It is also impossible to know whether, in its maintenance of this particular tapchanger, the supplier had complied with its own requirements"*.

EWON's technical adviser has indicated that an appropriate lubricant replacement regime is necessary for this equipment and has highlighted the implications of the *hardened grease* being the cause of the supply variation:

> *"if the incorrect grease is used, or if replacement/re-lubrication intervals are excessive in relation to the duty required (in terms of temperature and mechanical load), the grease may harden and cause failures of the type experienced"*.

He has concluded that both of the causal factors identified above are within the control of the supplier and has noted the possibility that either the incorrect grease was used at the last maintenance, or the maintenance intervals chosen by the supplier were excessive for the circumstances. However, he has informed EWON that in the absence of further information, it is also impossible to know what maintenance regime is/was applied by the supplier as records pertaining to this have not been provided. The supplier has not responded to the information EWON provided to them on 6 December 2004 regarding the conclusions of the independent report which EWON commissioned.

Conclusion

Given the available information, EWON is not in a position to comment further on the technical aspects of the claim. However, in a situation where there is credible technical information to support Mr and Mrs E's position, I believe it is reasonable for the benefit of any doubt to go to the customers.

Under the provision of Clause 6 of the Constitution of the Energy & Water Ombudsman NSW scheme I therefore determine that the company should pay the sum of $800 to Mr and Mrs E as full settlement of their claim. This amount consists of the replacement and installation costs for the damaged ceiling fans plus a small gesture acknowledging the delay that has occurred in resolving their complaint.

Under the EWON Constitution, this decision is binding on the supplier. Mr and Mrs E may elect within twenty-one days whether or not to accept this decision. If Mr and Mrs E

accept the decision, they will fully release the company from all claims, actions, etc in relation to this complaint. In the event that Mr and Mrs E do not accept my decision, they may pursue their remedies in any other forum they may choose, and the company is then fully released from the decision.

Clare Petre
Energy and Water Ombudsman
5 September 2005