**DT 97-171**

**VERIZON NEW HAMPSHIRE**

**Petition for Approval of Statement of Generally Available Terms Pursuant to the Telecommunications Act of 1996**

**Order on Reconsideration of DC Power Costs for Collocation**

**O R D E R N O. 24,340**

**June 25, 2004**

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## I. PROCEDURAL HISTORY

By Order No. 24,135 (March 7, 2003) the New Hampshire Public Utilities Commission (Commission) granted a limited rehearing on the issue of direct current (DC) power investment costs and monthly recurring power rates charged by Verizon New England, Inc. d/b/a Verizon New Hampshire (Verizon) to Competitive Local Exchange Carriers (CLECs) who collocate facilities in Verizon Central Offices (COs), previously decided in the Commission's Order Nos. 23,847 and 23,915.[1] The Commission's order included a procedural schedule and requested that parties to the docket indicate, by March 21, 2003, their intent to participate in this limited rehearing. Freedom Ring Communications, LLC d/b/a BayRing Communications (BayRing), WorldCom (MCI) and the Office of the Consumer Advocate (OCA) indicated their intent to participate. Sprint indicated that it would not actively participate but asked to remain on the service list.

[1] Respectively, *Re Bell Atlantic,* 86 NH PUC 774 (2001) and *Re Bell Atlantic*, 87 NH PUC 76 (2002) but hereinafter referred to as Order No. 23,847 and Order No. 23,915.

Staff and the parties attended a technical session on March 27, 2003. Verizon filed testimony on April 11, 2003. MCI filed a Motion to Compel Verizon to provide additional data on May 13, 2003, which Verizon opposed on May 23, 2003. MCI filed a second Motion to Compel Verizon to provide supporting data on May 23, 2003, which Verizon opposed on June 2, 2003. On June 3, the Commission suspended its procedural order pending review of the Motions to Compel. On June 11, 2003, the Commission granted MCI's May 13th Motion in part and denied it in part, denied MCI's May 23rd Motion, and set out a revised procedural schedule. Pursuant to the revised procedural schedule, testimony was filed by MCI, BayRing and Staff on or before July 30, 2003.

Verizon filed a Motion to Compel MCI Discovery Responses on August 22, 2003, which MCI opposed on August 28, 2003. On September 4, 2003, the Commission granted Verizon's Motion in part and denied it in part, and further revised the procedural schedule. The next day Verizon sought reconsideration of the Commission's decision and asked for additional discovery responses from MCI. MCI objected to Verizon's requests on September 15, 2003. On September 9, 2003, Verizon filed a Motion to Compel BayRing Discovery Responses, to which BayRing objected on September 17, 2003. On September 23, 2003, the Commission suspended the proceedings pending review of these discovery matters. By October 3, 2003, however, the BayRing discovery matters were resolved without Commission intervention and, on November 4, 2003, the Commission issued a Secretarial Letter containing its decision to grant in part and deny in part Verizon's Motion to Compel MCI Discovery Responses. The Commission issued a revised procedural schedule at the same time, pursuant to which Verizon filed rebuttal testimony on November 24, 2003.

Hearings proceeded on February 17 and 18, 2004, during which the Commission authorized certain record requests. On March 9, 2004, Verizon filed Exhibits 29 and 30 (hearing record requests number 1 and 2, respectively) and supplemental data to Exhibit 30 on March 24. On March 19, 2004, MCI filed an Offer of Proof demonstrating how it would use the data provided in Exhibit 30, as requested at hearing. On March 29, 2004, the Commission determined that the information in Exhibit 30 was not relevant and it was stricken from the record. The Commission directed parties to file initial briefs by April 1, 2004; reply briefs were permitted and filed on April 15, 2004 by BayRing, Verizon, and MCI. On April 22, 2004, Verizon filed a Motion to Strike MCI's Reply Brief, Addendum pp. 2-10 and all portions of the brief that rely on the Addendum pages, and filed as well a letter objecting to footnote 11 of MCI's Reply Brief. On May 3, 2004, MCI filed an Objection to Verizon's Motion to Strike or, in the alternative, a Motion to Admit Late Filed Exhibits. These various motions are addressed herein.

## II. BACKGROUND INFORMATION

DC power charges are determined by first identifying the investment in each component (*i.e.*, microprocessor plant (BUSS BAR), rectifiers, batteries, automatic breaker, power distribution service cabinet, emergency engine/turbine (auto start), and, for use under 60 amps, battery distribution fuse bay). This investment is adjusted, in some cases, to account for utilization, and then divided by the number of amps the component will provide to achieve a unit investment per amp. The various unit investments per amp are totaled, and then factors are applied to account for other expenses incurred: installation, annual carrying charge, building investment, and joint and common costs. The total charge is then converted to a monthly recurring rate per amp.

The issues addressed at the hearing and in briefs fall into five separate categories as set forth below. The positions of the parties and Staff, and the Commission analysis, are structured accordingly.

1) Installation Factor.

The installation factor is the ratio of asset investments and installation-related costs to the asset investment alone. The parties each proposed a group of investments and installation costs for consideration in developing a reasonable installation factor. In support of their particular installation factors, the parties also raised issues concerning the appropriate forward-looking equipment likely to be used in new power plants, such as the type of batteries.

2) Computation of cost per amp for the emergency engine.

The parties refer to this component as emergency engine, turbine, standby generator, and back-up generator. For convenience, the term "emergency engine" is used throughout. At issue is whether the unit investment per amp of the emergency engine, which produces AC amps, should be calculated using AC amps or DC amps.

3) Over-recovery.

In its original orders in this docket, the Commission found that there was over-recovery of DC power investments between charges for switching and for collocation. That issue is revisited herein.

4) Rate averaging.

In its original orders the Commission determined that DC power rates would be deaveraged by density zone. In its brief submitted April 1, 2004, Verizon requested that we reconsider that decision.

5) Miscellaneous.

The miscellaneous issues include discussions regarding power distribution cables, Verizon's Motion to Strike, and Verizon's objection to a particular footnote in MCI's Reply Brief.

## III. POSITIONS OF THE PARTIES AND STAFF

### A. Verizon

1. Installation factor.

Verizon proposes an installation factor of 2.8912. Verizon argues that the Commission should accept its original, statistically valid, cost study, based upon its 1995-1996 Detailed Continuing Property Records (DCPR), for determining the proper DC power installation factor. According to Verizon, its DCPR is correctly based on power construction jobs that are augments, not complete power plant installations, because power plants are never replaced all at once. Verizon claims that the use of augments does not result in overstated costs, pointing out that no evidence on the record demonstrates overstatement and that data provided using regional DCPR from 1998-99 validates the reasonableness of the earlier DCPR study. In addition, the use of data from augments, Verizon contends, may in fact guarantee understated costs since augments almost never replace the most expensive component of a power plant, namely, the emergency engine. Finally, to further support the reasonableness of its cost data, Verizon points out that MCI's proposed installation factor is based on an incomplete power plant, as well.

Verizon also argues that data it provided in response to a record request at the hearing, about a recent power installation in Concord, New Hampshire, supports its position. In its Reply Brief, Verizon argued that neither MCI nor Staff refuted the 2.4767 installation

factor that can be derived from the Concord data, a factor that is much higher than that proposed by either. The Concord data contained vendor invoices that, according to Verizon, reflected engineering and transport charges and line items for internal engineering and installation, as had been demanded by MCI and Staff. Verizon argues that MCI and Staff's failure to respond to the Concord data demonstrates an entrenched bias against Verizon. However, Verizon does not recommend the Commission use the Concord data to calculate an installation factor, contending that the data from one power plant installation would not represent forward-looking costs for all such installations since Verizon itself uses more than one type of power plant in New Hampshire and the region.

Verizon attacks installation data provided by BayRing on a similar basis. Verizon argues that because the data relates to a single project, it cannot represent forward-looking costs for all installations, and it is also unreliable because it represents costs incurred for one small CLEC's needs rather than the needs of the much larger, and necessarily more demanding, Verizon network.

Verizon further refutes BayRing's sample power plant installation, citing different power plant components such as sealed gel batteries that BayRing uses, but that Verizon would not use in its power plants. Verizon claims that such batteries have safety risks and that their actual performance does not live up to expectations.

Verizon also discounts Staff's assertion that emergency engine investment costs should be reduced, since, it contends, Staff erroneously referenced a PICS (Property Inventory Control System) spreadsheet item dealing with circuit packs rather than the Hardwire spreadsheets that actually contain power plant components. To show that a significantly higher installation factor would have resulted if Staff had used the correct

Hardwire spreadsheet line item data, Verizon included, in its brief, installation factors for four emergency engine installations contained in the 1998-99 DCPR data: 4.27, 3.41, 2.806, and 2.77.

2. Computation of cost per amp for the emergency engine.

Verizon argues that its calculation for determining a unit investment per amp, *i.e.*, dividing each unit's investment costs by the number of amps the unit produces, correctly uses alternating current (AC) amps in the denominator when calculating the unit investment per amp for the emergency engine, contrary to MCI's claim that DC amps are the proper unit measure for that component. MCI's conversion method changes the unit investment per amp for the emergency engine from AC to DC by assuming 208 volts in 1 amp on the AC side to be equal to 52 volts in 4 amps on the DC side, a method that Verizon calls erroneous. According to Verizon, MCI mixes the use of voltage, amperage and kilowatts and incorrectly implies that each denotes the same measure of power. Furthermore, Verizon declares, not all COs are rated at 208 volts, which negates MCI's attempt to use voltage in relation to rectifier output since AC and DC amperages have only kilowatts in common, not voltage. In the opinion of Verizon's expert DC power witness, Mr. Durocher, a Verizon Central Office Engineering Support Specialist (Power), the formula used by MCI is one that he had never seen used by similar experts and is not one he would use.

Verizon claims that AC power is provided by the generator during a power outage, and is used for two purposes: to provide power to the rectifiers and for environmentals, meaning the power to support the CO operations, *e.g.*, telecommunications, life safety equipment, HVAC (Heating, Ventilation and Air Conditioning) equipment, computer databases for operator services, sump pumps, day tank pumps, engine room fans,

and security systems. Even if a conversion from AC to DC amps were appropriate, Verizon surmised in its brief that only 40% of the AC power provided by the emergency engine would support the rectifiers. The remaining 60%, Verizon asserted, is never converted to DC power for its own or CLECs' use. Therefore, if any conversion is implemented, Verizon argues, the correct rate calculation must account for 60% of the power as AC amps or else Verizon should be permitted to bill an additional line item for environmentals.

3. Over-Recovery.

Verizon disputes the Commission's earlier finding and Staff's claims in testimony that UNE switching rates recover part of Verizon's costs to provide collocating CLECs with DC power. The use of multiple methods of recovering its power costs is reasonable, according to Verizon, but Staff is wrong to maintain that the multiple methods are recovering the same costs. Under the principle of Total Element Long-Run Incremental Cost (TELRIC), Verizon argues, nothing in the network is assumed to exist except for the CO locations. It follows, Verizon contends, that the calculation of costs for providing a service must include all the underpinnings of the service. In addition, Verizon argues that Staff is wrong to conclude that cost calculations for post-competition services will necessarily result in over-recovery. In Verizon's view, the date upon which a service commences does not affect the validity of a cost factor used to determine that service's forward-looking costs. The DC power cost factor that is applied to switching rates, Verizon stresses, is not intended to recover the entirety of Verizon's power plant costs at any one time; rather, it is only a ratio of DC power investments to switching investments.

Verizon insists that by using a value reached as part of a Stipulation in July, 1998, Staff erroneously constructed an argument that Verizon's rates result in over-recovery.

According to Verizon, use of the stipulated value is not permitted pursuant to the terms of the Stipulation itself. Further, Verizon argues, Staff's method for reaching the power investment is demonstrably flawed, as shown by the fact that it would reach a negative result when Verizon's actual statewide switch investment is substituted for the stipulated figure. Verizon cites to decisions in Massachusetts and New York that dismissed arguments of over collection that were similar to Staff's in this docket.

4. Rate averaging.

Verizon requests that the Commission reconsider its decision in Order No. 23,914 to deaverage the rates Verizon charges for DC power. According to Verizon, the support given for deaveraging by MCI's witness contradicts that witness's testimony in other states.

5. Miscellaneous.

*a. Power Distribution Cables.*

In response to MCI's claims to the contrary, Verizon states that its DC power rates do include the recovery of its costs for power distribution cables. According to Verizon, the power distribution cable costs are recovered in the category of "miscellaneous" charges, as has been its standard practice over the years.

*b. Motion to Strike.*

Verizon objects to MCI's attempt to file additional evidence, in the form of an addendum, with its reply brief. Verizon claims that MCI has violated Commission rules, that the inclusion of the addendum information prejudices Verizon, and that introducing this information confuses the issues surrounding the investment per amp of the emergency engine. Verizon moves that the Commission strike pages 2 through 10 of the Addendum to

MCI's Reply Brief and all portions of MCI's Reply Brief that discuss or rely on the Addendum materials.

*c. Footnote 11 of MCI's Reply Brief.*

In its April 22nd letter, Verizon took issue with MCI's allegation that Verizon did not raise the issue of miscellaneous cost accounting until its initial brief. Verizon refutes MCI's assertion, providing record evidence of its claim that major piece parts and components are defined as material costs, and that miscellaneous piece parts, such as nuts and bolts, are miscellaneous costs.

**B. MCI**

1. Installation factor.

MCI proposes an installation factor of 1.4724. MCI argues that Verizon's DCPR data is incomplete and should not be used for determining an installation factor because it consists of augment jobs rather than complete power plant installations. MCI claims that the DCPR data does not lend itself to meaningful analysis because the detail is not sufficient to reliably identify individual projects. Further, the DCPR data, MCI claims, must inflate the costs of installation because of lost efficiencies of scale. The unjust effect of using Verizon's DCPR data is proven, according to MCI, by recognizing the difference between the median material investments per CO in the 1998-99 data ($9,000 to $24,000) and the power plant investments in Verizon's cost study ($143,700 to $199,700). MCI avers that this shows that complete power plant installations involve 12 to 21 times the total material investments of augment jobs. The huge difference, MCI claims, indicates that the DCPR data should not be depended upon to approximate the installation of a complete power plant.

MCI also objects to Verizon's reliance on the DCPR data because Verizon's use of augments makes the study non-TELRIC compliant and therefore unacceptable for SGAT ratemaking. Referring to the FCC's August 8, 1996, *First Report and Order* interpreting the Telecommunications Act of 1996 (TAct), as well as the Massachusetts Department of Telecommunications and Energy's (DTE) Unbundled Network Element (UNE) rate order, MCI argues that the DCPR data cannot be used to support an installation factor because it does not use the "entire quantity of the network element" as its basis. In MCI's opinion, Verizon should have provided the Commission with new data supported by actual invoices, in order to comply with TELRIC principles and produce accurate installation costs. In its Brief, MCI rejected Verizon's post-hearing provision of the Concord, New Hampshire installation data, arguing that the invoices apply only to a minority of the costs involved, and that no evidence was provided to support the bulk of the installation costs.

MCI's proposed factor of 1.4724 was derived using the components in Verizon's cost model and the material investment costs and installation costs from a document provided by Verizon entitled "Lucent Install Model". MCI calculated its factor using Verizon's formula, dividing total installed cost by total material cost. MCI argues that its result is TELRIC compliant, as opposed to Verizon's result, because MCI uses total demand and also accounts for efficiencies of scale. In support of its proposed factor, MCI provided actual invoices from a power plant installation it recently undertook in Pottstown, Pennsylvania. MCI claims that the Pottstown actual installation factor of 1.7409 and BayRing's estimated installation factor of 1.35 corroborate the reasonableness of its derived factor of 1.4724. MCI dismisses as not credible Verizon's assertion that the large difference

between MCI's proposal and Verizon's proposal is due to different accounting practices for allocating miscellaneous costs.

2. Computation of cost per amp for the emergency engine.

MCI claims that Verizon miscalculates the rates for DC power because the unit investment per amp calculation for the emergency engine is based on AC amps rather than DC amps. Although MCI does not dispute that emergency engines produce AC rather than DC power, the effect of using AC amps in the rate calculation, according to MCI, is to overstate the per amp cost by a factor of 3.6 since the measure of a DC amp is 3.6 times that of an AC amp; the denominator of the calculation is reduced by that factor, producing a larger quotient. MCI argues that allocating the cost in DC units is logical and correctly parallels the DC format in which CLECs consume and pay for power. MCI recommends that the Commission follow the July 11, 2002 decision of the Massachusetts DTE in Docket No. 01-02 that Verizon must employ DC amps in its calculation since a consistent methodology is necessary for a properly constructed cost study. The Massachusetts decision, according to MCI, uses the AC to DC conversion formula MCI has here proposed and therefore undermines Verizon's witness's assertion that the formula is a novel idea.

3. Over recovery.

MCI disagreed with Staff, stating that it did not believe there was over-recovery of DC power investments between switching and collocation.

4. Rate averaging.

MCI agrees with the Commission's finding in Order No. 23,915 that rates for DC power should be de-averaged. Citing the approach used by Verizon in developing those

rates, and the significant difference between rates in the Urban and Rural zones, MCI states that the rates should continue to be deaveraged.

5. Miscellaneous.

*a. Distribution cables.*

MCI provided a chart comparing DC power consumption rates in 15 other states, which it argues demonstrates that Verizon's proposed rate is between 143% and 224% of those other rates. MCI argues that its comparison of Verizon's rates to those of other states is relevant, while Verizon objected that some states' rates separate power and distribution components. MCI replied that Verizon has failed to prove that it includes the costs of distribution cabling (*i.e.*, cabling from Verizon's power plant in the CO to the CLEC's collocated equipment) in its underlying cost data, and therefore the proposed rate must be comparable to consumption rates set by other states. According to MCI, Verizon's pre-competition DCPR data would obviously not include distribution cabling to CLECs and none of Verizon's testimony established where or whether those costs are recovered. Its analysis of Massachusetts data provided by Verizon in a post-hearing response to a record request (Exhibit R30), MCI asserts, firmly establishes that Verizon's 1998-99 DCPR data does not contain CLEC distribution cable costs.

*b. Objection to Verizon's Motion to Strike, or in the alternative, Motion to Admit Late Filed Exhibits.*

MCI argues that the Commission is not bound by technical rules of evidence, rather, the Commission's rules only require the exclusion of irrelevant, immaterial or unduly repetitious evidence. MCI maintains that its addendum is highly relevant, because it confirms MCI's assertion that "Power = Voltage x Current" is a standard formula, and

supports MCI's AC to DC amp conversion (*see* section B.2., above.) This material is public and readily available, and thus cannot be considered unfair to Verizon, MCI asserts. If the Commission were to find that this information should be stricken, MCI then requests permission to file the addendum as a late-filed exhibit.

**C. BayRing**

1. Installation factor.

BayRing presented cost data based upon estimates for a proposed power plant installation in Portsmouth, New Hampshire, which yields an installation factor of 1.35. However, BayRing recommends that the Commission retain the current installation factor of 1.36 unless Verizon provides a more current cost study based on current technology and costs. The DCPR data Verizon is relying on is, in BayRing's opinion, out of date and not forward-looking. BayRing asserts that its own experience in costing out a power plant, by means of a bidding process, demonstrates the inadequacy of Verizon's study. In the event that the Commission decides to change the current installation factor, BayRing recommends the MCI study as the most comprehensive.

With regard to Verizon's objection to the use of a smaller power plant cost study as a proxy for Verizon's bigger plant on the grounds that Verizon itself would not utilize the smaller plant, BayRing responds that Verizon's actual preferences do not affect the validity of the study itself. According to BayRing, Verizon continues to make choices that do not reflect economical, prudent decisions that are necessary in a competitive environment. Verizon's objection to BayRing's data on the basis of Network Equipment-Building

Standards (NEBS)[2] compliance is similarly misguided, BayRing argues, since different designs can still be NEBS compliant. Verizon's objections, according to BayRing, ignore the central facts that BayRing's data is more recent, is the best indicator of material prices currently available in New Hampshire (*i.e.*, the most forward-looking costs in the record), and reflects the most complete power plant installation.

BayRing argues that the Concord data provided by Verizon in a post-hearing record response should not be relied upon by the Commission, because the data is less comprehensive than BayRing's Portsmouth data and has not been placed in the record under oath or subject to cross-examination.

As evidence of Verizon's archaic methods and data, BayRing cites Verizon's use of outdated and costly lead acid batteries in its power plants. BayRing instead uses sealed gel batteries, which it claims are safer to transport and install. No reasonable contractor in today's environment, according to BayRing, would utilize lead acid batteries, given the benefits of sealed gel batteries.

2. Computation of cost per amp for the emergency engine.

BayRing did not address the dispute over the usage of AC amps versus DC amps in the rate calculation.

3. Over-recovery.

BayRing did not address the question of whether Verizon over-recovers its power costs by recovering from switching rates and DC power rates.

4. Rate averaging.

[2] According to Newton's Telecom Dictionary, NEBS defines a rigid and extensive set of performance quality environmental and safety requirements developed by Bellcore (the standards organization owned by the original seven regional Bell Operating Companies).

BayRing did not address Verizon's request to recover its DC power rates on a statewide average basis.

5. Miscellaneous

BayRing took no position on these issues.

**D. Staff**

1. Installation factor.

Staff supports the Commission's original decision to reduce the installation factor, stating that Verizon's proposed power charges include an over-stated installation factor. Staff claims that the use of augments to determine an installation factor is a fatal flaw and, as support, cites MCI's testimony that the mismatch in total investment between augments and complete power plants is extreme.

The MCI cost study for DC power, Staff maintains, should be adopted by the Commission as it reflects the most complete power plant installation. According to Staff, MCI's proposed installation factor of 1.4724 is reasonable, as supported by its similarity to BayRing's result, even though Staff finds BayRing's plant to be a different type than Verizon's.

2. Computation of cost per amp for the emergency engine.

Although Staff approves the methodology adopted by Verizon for its rate calculation, Staff believes that the emergency engine cost recovery must be corrected. Staff recommends that the Commission adopt MCI's calculation for recovery of emergency engine costs, and supports MCI's conclusion that Verizon's choice of AC amps as the denominator of the unit investment per amp calculation results in over-recovery of approximately 360%. Staff agrees with Verizon that the emergency engine provides AC power that is used, in part,

for certain services. However, Staff claims that Verizon's DC per amp charges should only recover the cost of the emergency engine. Therefore, Staff reasons, Verizon should not use AC amps to calculate the unit investment per amp, or the cost recovery will greatly exceed the cost.

3. Over-recovery.

Staff testified at hearing that Verizon over-recovers DC power investments in that it recovers such costs in both switching rates and collocation charges. Staff reasoned that over-recovery occurred to the extent that power is provided by existing spare capacity, the investment costs of which are included in rates for other services. According to Staff, this over-recovery would be corrected by reallocating investment expenses among categories of recovery. In its brief, Staff claimed that Verizon had effectively accomplished such a reallocation when, in June, 2002, Verizon submitted new rates for switching. Staff avers that the 17.7% reduction in switching rates in June, 2002, resulted in a 32% reduction in the recovery of DC power costs through switching, a reduction that almost mirrors the 30% reduction that Staff believed was necessary. Staff therefore changed its position, concluding that no further adjustment is necessary to account for over-recovery.

4. Rate averaging.

Verizon's request to charge averaged rates for DC power, Staff argues, should not be considered by the Commission. Staff points out that Verizon did not reference the issue in its appeal to the New Hampshire Supreme Court and the Court did not reference the issue in its remand to the Commission. Hence, Staff contends that the issue is not within the scope of this docket.

5. Miscellaneous.

Staff took no position on these issues.

## III. COMMISSION ANALYSIS

This proceeding concerns a determination of the appropriate measure of Verizon's power installation factor and the appropriate monthly recurring rate Verizon may charge collocating CLECs for DC power. Our review of the monthly DC power rate per amp will also reconsider our prior decision that Verizon recovers some of its DC power costs via its switching rates.

The Commission decided in Order No. 23,847 that Verizon utilized the proper method of calculation to develop its rate per amp, however, it determined that certain changes needed to be made to the components of the calculation in order to produce reasonable collocation charges per amp. Order No. 23,847 at p. 37. The changes the Commission required in Order No. 23,847 included adjustments: (1) to the installation factor, (2) to the joint and common cost assessment, and (3) to address double recovery of investments in power allocated to both switching and collocation. Verizon disputed the changes the Commission ordered, arguing that its original calculation is correct. In addition, in this proceeding Verizon has disputed the rate structure that de-averages the rates by density zone. The other parties and Staff have presented arguments that different changes should be made to the calculation.

Our determination in this matter is governed by TELRIC pricing principals for recurring costs, and the "just and reasonable" standards of the TAct and New Hampshire law. *See*, e.g., RSA 378:7. Section 252(d) of the TAct requires that rates be non-discriminatory and based on the cost of providing the UNE. TELRIC has been established as the method for

setting UNE rates. In previous orders, the Commission has held that TELRIC establishes a zone of reasonableness rather than one single correct answer, and that modeling a forward-looking network requires some relationship to the reality of today's networks.

**A. Installation factor**.

The installation factor is the ratio of asset investments and installation-related costs to the asset investment alone. That is:

$$\frac{\text{asset investment + installation}}{\text{asset investment}}$$

This ratio is applied to the sum of the unit investments per amp for each of the components to determine the installed cost of the complete power plant. Thus, the installation factor has a material effect on the amount Verizon will charge CLECs for DC power.

Verizon, BayRing and MCI each proposed installation factors based on their own experience, and provided supporting data. As a result, we have before us six discrete data groups, each producing a different installation factor. The data groups and their respective installation factors are:

| DATA GROUP | INSTALLATION FACTOR |
|---|---|
| 1. Verizon's DCPR data from 1995-96 | 2.8912 |
| 2. Verizon's DCPR data from 1998-99 | 2.7059 |
| 3. MCI's data from Pottstown Plant Installation | 1.7409 |
| 4. MCI's derived factor using the Lucent Model | 1.4724 |
| 5. BayRing's data from Portsmouth Plant Installation | 1.3500 |
| 6. Verizon's data from Concord Plant Installation | 2.4756 |

A threshold question is which of these data groups, alone or in combination, can be used to establish a just and reasonable installation factor. Each of the data groups has been criticized for some perceived fault(s) and, in our judgment, none standing alone provides a reasonably reliable tool for identifying the precise installation factor representing the forward-looking cost of installing a power plant in New Hampshire. We address the strengths and weaknesses of each in turn.

Verizon's originally filed DCPR data in this docket is New Hampshire specific data for power investments accumulated prior to NYNEX's merger with Bell Atlantic (and, of course, Bell Atlantic's subsequent merger with GTE to form Verizon). Verizon Direct Testimony, p. 19-20. This data, which was destroyed in the World Trade Center catastrophe, is unavailable for examination, but the evidence suggests that it is likely that: (1) it contained only a few data points because its New Hampshire specificity would have meant that only power installations within the state were included; (2) it had only piece-part installations made to augment existing equipment; and, (3) it would represent pre-TAct, pre-competition data points. Although Verizon based its proposed installation factor on this data, there is no underlying documentation available to validate that factor. Accordingly, we cannot employ the data as the basis for our decision.

Verizon provided its 1998-99 region-wide DCPR data as a proxy for the DCPR data from 1995-96. The regional nature of the data provides a larger sample size containing more numerous data points and representing a greater variety of sizes and quantities of power plant components. Arguably, this larger sample of multiple augment jobs may, as Verizon says, help to level out the highs and lows, but it does not overcome the fact that the data reflects incomplete jobs, *i.e.*, less than a complete power plant installation.

Verizon argues that its reliance on augments of rectifiers, cabling and batteries to the exclusion of emergency engines and fuel tanks means that its installation factor is actually under-estimated because of the size and complexity of a complete power plant installation. MCI argues that the installation factor is over-estimated because it is based on data that is not representative. MCI supports this by pointing out that the average job in the Verizon sample is twelve times smaller than the total cost of the power plants modeled in Verizon's cost study. We do not accept the premise that the average of augment jobs alone is the most accurate determination of a DC power installation factor. We understand, however, that this may be the best data that Verizon has available, since the construction of complete power plants is not a common occurrence, but the vintage of the data is less than ideal.

MCI provided information regarding its installation of a power plant in Pottstown, Pennsylvania, pointing out that its cost data is supported by actual invoices. This data represents a nearly-complete representation of a relatively recent power plant installation, lacking only an emergency engine and fuel tank. MCI attempted to cure this deficiency by including emergency engine material and installation data from the Lucent Install Model in its rate per amp calculation. MCI, like Verizon, is a national competitor which uses similar engineering and regulatory guidelines. Its installation project would conceivably therefore be similar to a Verizon project. On the other hand, the Pottstown installation does not include an emergency engine, as explained *infra*, was carried out in an area outside of New Hampshire, may have utilized a dissimilar accounting methodology, and, represents only a single data point. MCI did not, in fact, recommend that the Commission adopt an installation factor based solely upon the Pottstown installation data.

MCI proposed that the Commission rely on data obtained from what MCI calls the Lucent Install Model. This "model" was actually two pages attached to a data response from Verizon to MCI (Exhibit R15 C, Attachment 5), which apparently provided Lucent's estimated costs of installation for particular power plant components, including an emergency engine. This data, MCI argued, yields an installation factor most similar to a comprehensive DC power plant investment model and develops a cost per amp that is similar to that set by us in our earlier orders. Verizon argued, however, that MCI did not have access to the actual Lucent DC power pricing model, that instead MCI utilized back-up documentation contained in the Lucent Model but not the model itself. (Verizon rebuttal, p. 66). Whether the pages represent the Lucent Install Model or not, there is no supporting documentation to show whether the installation costs include the same types of expenses that Verizon would incur in installing an emergency engine. Accordingly, we cannot find that MCI's model is reasonably reliable to determine an accurate installation factor.

BayRing provided information regarding its planned CO expansion involving a new power plant that will interact with its old plant. The project will utilize newer plug and play technology, including the use of plug and play components and sealed gel batteries rather than traditional lead acid batteries. BayRing argues that its data represents forward-looking DC power investment costs that are New Hampshire specific. Verizon argued that BayRing's project does not deal with construction of a CO that is similar to a Verizon CO. Further, Verizon argued that BayRing may not adhere to the same engineering and regulatory guidelines that MCI and Verizon follow, even though BayRing may choose to insure that its installation meets the compliance requirements of the NEBs. We find credible Verizon's assertion that BayRing's installation may not be comparable in equipment or accounting

methods to the installation of a power plant in a Verizon CO, since BayRing's installation was based on vendor estimates rather than an actual installation, and uses technology that is not currently in common use by Verizon.

In a post-hearing response to a record request, Verizon provided its cost data for a power plant replacement in its Concord, New Hampshire CO. This data is the most recent New Hampshire specific data available and is for a plant that was designed to provide sufficient power to accommodate both Verizon and CLEC use. It does not represent a complete power plant, however, as it was an augment that did not replace existing batteries, breakers, fuel tank, emergency engine or battery distribution fuse bays, and it only represents a single data point, albeit in New Hampshire.

As demonstrated above, no single proposed set of data fully represents ideal basis for determining a reasonable installation factor. Preferably, the parties would have provided comprehensive, timely, geographically relevant and Verizon-specific data representing the installation of complete power plants in New Hampshire. This information simply does not exist. Accordingly, we will use the information the parties have provided to construct an installation factor that reasonably incorporates the appropriate attributes.

We eliminate from further consideration the BayRing data group for determining an installation factor, despite the fact that it is the only one that contains data reflecting the replacement of the emergency engine, because it diverges dramatically from the type of power plant that Verizon would expect to construct and it has not actually been installed. The Pottstown data group is insufficient by itself because it represents a single installation data point and is not Verizon-specific. We reject MCI's installation factor derived from the Lucent Install Model because the Lucent data was unavailable for complete

examination. We discount Verizon's 1995-96 DCPR data for the same reason and because it is too dated.

After determining that some of the proposed data groups are unacceptable, our analysis now concentrates upon the data groups that possess the attributes most relevant to an appropriate installation factor. They are the 1998-99 DCPR data, the Concord installation, and the Pottstown data as revised below.

We have examined the Concord data and the Pottstown data, exploring the various means by which either can reasonably be adjusted so as to represent a complete power plant installation. Verizon recalculates the Pottstown installation factor using its own methodology, to make it more consistent with the method Verizon used to develop its proposed factor. Verizon asserts that the resulting factor is still understated because it does not include MCI engineering-related costs or material and installation costs for an emergency engine and fuel tank. We accept Verizon's adjustments to the Pottstown data, which, according to Verizon, produces an installation factor of 2.08. (Verizon Post-Hearing Brief at pg 11).

While MCI asserted on the stand and in its brief that it derived its Pottstown installation factor by including material and installation costs for an emergency engine from the Lucent Install Model, this is not supported by Mr. Turner's prefiled testimony and the source material appended thereto. Exhibit R21 C. Further, we note that Verizon used the appended source material in Exhibit R21 C, Attachment 2, which did not include emergency engine costs, in developing its revised Pottstown factor of 2.08.

We further adjust the Pottstown installation factor to include an emergency engine, which Verizon asserts is the most labor-intensive part of a power plant. We do so by

including in the power installation factor calculation the average investment and installation costs of emergency engines from the 1998-99 DCPR (Exhibit R1 C Attachments 2 & 3) identified by Verizon in its Reply Brief on page 10. Verizon indicated that its DCPR Hardwire data included ten emergency engines, and identified the installation factors of four of these emergency engines. The Pottstown data can be supplemented by using the material and in-place investment costs of the four emergency engines identified by Verizon in its brief (Exhibit R1 C Attachment 2) to produce an installation factor indicative of a complete power plant. The resultant revised Pottstown DC power installation factor is 2.1931. We note that this refined Pottstown installation factor still may not account for internal engineering-related costs or the installation of a fuel tank.

We specifically requested that Verizon provide the Concord data group when we learned of this recent and local installation because we anticipated its usefulness to this inquiry. However, the Concord data group is missing a number of components, not simply the emergency engine. Therefore, although the Concord data has highly relevant attributes and is instructive to the final result, the data is not sufficient in itself to set the installation factor.

An appropriate installation factor for Verizon would: (1) be statistically robust, that is, based on numerous projects, as is the 1998-99 DCPR data; (2) reflect a complete and recent installation, as the revised Pottstown data most nearly accomplishes; (3) be based on recent New Hampshire experience, as the Concord data is; and (4) reflect Verizon-specific investments as the 1998-99 DCPR data and the Concord data do. Based on our review of the data underlying the various proposals and our finding that the 1998-99 DCPR data, the revised Pottstown data, and the Concord data each reflect attributes critical to

construction of a reasonable installation factor, and based on our finding that each contains no debilitating flaw that would remove it entirely from consideration, we conclude that each of the three proposals should be equally weighted to determine a reasonable installation factor. Accordingly, assigning equal weight to the 1998-99 DCPR installation factor of 2.7059, the Concord installation factor of 2.4756, and the revised Pottstown installation factor of 2.1931, yields a New Hampshire DC Power installation factor of 2.4582.

BayRing further challenged Verizon's installation factor by arguing that Verizon's costs were inflated due to its use of lead acid batteries rather than sealed gel batteries. According to BayRing, the choice reflects Verizon's dated approach to technology. On the basis of our review of the record, we are persuaded that Verizon's choice is a reasonable engineering decision. Verizon's witness stated that safety and service are paramount in selecting power plant components, and cited the safety record of lead acid batteries, as well as the long life-cycle, which minimizes service outages that can occur during battery replacement projects. The Commission, in its original SGAT Order, *Re Bell Atlantic*, 86 NH PUC 419, 453 (2001), stated that a forward-looking cost study can and should be based in reality. We conclude that Verizon's use of lead acid batteries is reasonable.

**B. Computation of cost per amp for the emergency engine.**

MCI argued that Verizon's cost study inappropriately allocated the cost of the emergency engine based on AC amps rather than DC amps, pointing out that the charge to CLECs is per DC amp. Verizon rebutted this idea, claiming that MCI's assertion was solely designed to reduce the cost per DC amp charged to CLECs. After carefully reviewing the record and considering the evidence regarding the number of amps used to allocate the cost

of the emergency engine, we have determined that it is appropriate to allocate the cost of the emergency engine over the number of DC amps associated with the power capacity of the emergency engine as sized by Verizon's experienced power engineers.

In his Rebuttal Testimony dated July 28, 2003, (Exhibit R21 C) MCI witness Steven Turner determined the size of the emergency engines, in kilowatts (KW), based on the investment cost used in Verizon's cost study. Verizon witness Clark confirmed that the sizes of the emergency engines displayed in Exhibit R21 C on page 25 are accurate (*i.e.*, 350 KW in an urban office, 250 KW in a suburban office and 80 KW in a rural office). Tr. Day 1, p. 98. Ms. Clark developed the cost study from information provided by the power engineers including sizes, amperage and material investment from each of the components. Tr. Day 1, p. 46. It is understandable that the power engineers gave Ms. Clark the size of the emergency engines in AC amps since power engineers were not expected to understand the costing process involved. In fact, when asked on the stand why it would not make sense to recover the cost for the emergency engine on a DC amp basis, Verizon witness Marc Durocher stated it was not his area of expertise, that he was a power engineer and that this was more a costing issue, and his job was to determine what had to be there, not who pays for what. Tr. Day 1, p. 99.

Ms. Clark established that once power is generated by the emergency engine and goes through the rectifier, it is consumed by CLECs as DC amps. Tr. Day 2, p. 221. Although Ms. Clark testified that the cost study allocates the costs of each component based on DC power per amp, (Tr. Day 1, p. 99) we find, to the contrary, that the cost of the emergency engine is not allocated based on DC power per amp.

While an amp is an amp, the relationship between AC amps and DC amps is defined by the relationship between power and voltage: Power (in Watts) equals Voltage (in Volts) times Current (in Amps). We take official notice of this formula, pursuant to RSA 541-A:33 V (c), as a generally recognized scientific fact within our specialized knowledge.

A rectifier converts AC current into DC current. The voltage is also transformed from AC voltage to DC voltage. Since the Power remains constant (except as affected by the efficiency of the rectifier), and the Voltage is transformed down to 48 volts for a typical DC power plant, the DC amp output by the rectifier is greater than the AC amp input. In allocating the cost of the emergency engine over DC amps, we must therefore consider (1) how much power is used for ancillary services (that is, the power that will not be consumed in DC amps), (2) how much power is lost due to rectifier efficiency, and (3) the computation of the number of DC amps produced by the remaining power.

We make an adjustment for ancillary services, as we are persuaded by Verizon's argument that a portion of the emergency engine is used to produce AC power for ancillary services during a power outage and therefore that not all of the emergency engine's power is converted to DC by the rectifiers. MCI has accounted for this in its formula by multiplying the power in kilowatts times the percent telecom usage (80 percent). Although Verizon stated for the first time in its brief that the figure should be 40%, it did not cite to the record in support of its assertion.

MCI also accounts for the power lost through the rectifier by including a rectifier efficiency factor of 90%. Exhibit R21 C, p. 28. Thus, MCI's formula allocates the cost of the emergency engine over 72 percent of the emergency engine's power, or 252

kilowatts for an urban CO. (.80 x .90 x 350 KW = 252 KW). We find this reasonable and adopt it.

The number of DC amps can then be calculated by dividing the power, in Watts, by the DC volts. MCI calculates the number of DC amps over which the total cost of the emergency engine should be recovered in an urban office, by dividing the 252 KW by 52.08 volts. MCI uses 52.08 volts because, while a typical power plant operates at 48 volts[3], MCI claims that the voltage at the rectifier is an engineering standard. We find the use of 52.08 volts reasonable and conservative. Therefore, the current in DC amps for an urban office is calculated to be 4839 DC Amps as displayed in Mr. Turner's Rebuttal Testimony. (252000 / 52.08 = 4839) Exhibit R21 C, p. 26. We will adopt the DC Amps calculated by Mr. Turner for the three classes of COs for use in allocating the emergency engine costs.

While MCI proposes to further adjust the cost study by removing Verizon's utilization figure of 70%, we reject MCI's change, finding that MCI has not accounted for the unused capacity of a properly-sized emergency engine. We direct Verizon to revise its power cost study, by substituting the DC amp capacities described above for the "AMP capacity" (L22) in the Emergency Engine/turbine section of Exhibit R4.

**C. Over-recovery**

This limited proceeding permitted extensive examination of Verizon's recovery of power costs for switching and for DC power. The record of the proceeding demonstrates that, due to switching rate reductions made after the Commission's Order No. 23,915, Verizon is not over-recovering and the adjustment the Commission ordered is not warranted. We will therefore eliminate the prior adjustment.

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[3] *See* Exhibit R15 C Attachment 5, Exhibit R23 Attachment A, Exhibit R2 Attachment F.

**D. Rate averaging**

In written testimony, MCI supported the Commission's prior decision to de-average rates for DC power, "in the event that the Commission feels that this is an open issue." Turner at p. 31. Verizon pursued the rate averaging issue during cross-examination of MCI's witness, placing on the record the fact that a number of other states have approved statewide averaged DC power rates. Tr. Day 2, p. 19-22. Citing only to the MCI testimony, Verizon argued that the Commission should reconsider its decision to de-average. We find no compelling reason to re-open the question.

Our decision not to re-open this issue is supported by several considerations. First, the record contained adequate detail to support our decision in Order No. 23,915 as being more reflective of cost and requiring no additional work to implement. Second, Verizon did not seek reversal of the decision, while it did appeal three specific issues relating to the reduction of the power installation factor, power investment costs, and monthly recurring power rates in its petition to the New Hampshire Supreme Court in March 2002. Verizon Appeal by Petition, Docket No. 2002-0140. Third, Verizon filed a motion, that the Supreme Court granted on December 27, 2002, to withdraw its appeal "[I]n light of the Commission's order granting rehearing of the issues that were the subject of this appeal…." We therefore decline to take up Verizon's request as it is not properly before us.

**E. Miscellaneous**

1. Power Distribution Cables.

MCI supported its proposed installation factor by comparing the resulting DC power rates to power consumption rates in other states. Verizon argued that this was unreasonable, as Verizon's proposed rates in New Hampshire include both distribution and

consumption. This generated debate on the record due to the many differences in the way power costs are recovered in other jurisdictions. In particular, MCI asserted that Verizon's cost studies and underlying data do not include investments made for so-called distribution cabling, *i.e.,* the cabling between Verizon's power distribution bay and a CLEC's collocation, and that Verizon is therefore not entitled to recover its costs for distribution in its rates for power consumption. Verizon's witness, on the other hand, stated unequivocally on the record that such distribution costs are recovered in the New Hampshire rates.

We find, on balance, that comparisons to rate design from other jurisdictions is not probative evidence. On the basis of the evidence before us on this point, we find that Verizon is recovering its distribution costs in the DC power rates it has proposed, and that no additional rate element for distribution is necessary.

2. Verizon's Motion to Strike pages 2-10 of the Addendum to MCI's Reply Brief and MCI's Motion to Admit Late Filed Exhibits.

As noted above, we have taken official notice of the equation regarding the relationship of power to volts and amps, support for which, according to MCI, is the primary purpose of its addendum. Since the information is already known to us, the addendum is moot and, therefore, we will grant Verizon's Motion to Strike. For these same reasons, MCI's Motion to File Late Filed Exhibits is denied.

3. Verizon's Concern Regarding Footnote 11 of MCI's Reply Brief.

In footnote 11 of its reply brief, MCI argues that there is no record support for the description of Verizon's accounting methods in its Post-Hearing Brief. To the contrary, Verizon's response in its letter dated April 22, 2004, cites to the record. We find that the

record supports Verizon's description of its accounting methods, and, in fact, adopt Verizon's reorganization of costs for MCI's Pottstown installation.

**Based upon the forgoing, it is hereby**

**ORDERED**, that Verizon shall revise its power cost study by using an installation factor of 2.4582 to determine DC power charges to CLECs; and it is

**FURTHER ORDERED**, that Verizon shall revise the unit investment per amp calculation for the emergency engine as described herein, using the emergency engine DC amp capacities displayed in Exhibit R21 C for urban, suburban and rural central offices in the Amp Capacity line of the Emergency Engine/turbine section of its cost study; and it is

**FURTHER ORDERED**, that the reduction in material costs of 38% previously ordered in Order No. 23,915 to adjust for over-recovery of DC power costs is hereby eliminated; and it is

**FURTHER ORDERED**, that Verizon's Motion to Strike pages 2-10 of the Addendum to MCI's Reply Brief is hereby granted; and it is

**FURTHER ORDERED**, that MCI's Motion to Admit Late Filed Exhibits is hereby denied; and it is

**FURTHER ORDERED**, that within thirty days of this Order, Verizon shall file compliance pages and a revised cost study reflecting the adjustments ordered herein, such rates to be effective on the date of this Order.

By order of the Public Utilities Commission of New Hampshire this twenty-fifth day of June, 2004.

| Thomas B. Getz | Susan S. Geiger | Graham J. Morrison |
|---|---|---|
| Chairman | Commissioner | Commissioner |

Attested by:

Debra A. Howland
Executive Director & Secretary