2015 General Rate Case

Generation
Volume 9 – Peakers

Before the
Public Utilities Commission of the State of California

Rosemead, California
November 2013
SUMMARY

The SCE Peakers O&M forecast of $10.4 million for Test Year 2015 includes:

- FERC 549 – Miscellaneous Other Power Generation Expenses - $6.4 million
- FERC 554 - Maintenance of Miscellaneous Other Power Generation Plant - $4.0 million

The SCE Peakers capital forecast of $13.8 million for years 2013-2017 includes:

- McGrath Spare Gas Compressor - $3.5 million
- McGrath Multi-Purpose Building - $2.6 million
- Turbine Overhaul - $2.6 million
- Variable Inlet Guide Vanes (VIGV) Upgrade - $2.6 million
- Various Small Projects - $2.2 million
- Blanket Work Orders - $0.3 million
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I.

INTRODUCTION

Southern California Edison Company (SCE) owns and operates five operating gas-fired peaker power plants (Peakers) that provide an aggregate of 245 MW of efficient, reliable power. Peakers serve the electrical grid by starting and ramping to full load very rapidly, including the capability of starting and stopping more than once during a day. Each Peaker can reach full load within 10 minutes after start-up and have relatively low start-up costs. In addition, these Peakers can provide “black-start” capability in the event of a system black-out.

SCE forecasts Test Year 2015 O&M expenses of $10.450 million (2012$) to operate the five Peakers. SCE’s capital expenditure forecast for 2013-2017 is $13.775 million (nominal dollars) for work on the Peakers. Funding these O&M and capital forecasts will enhance the five gas-fired Peakers’ ability to: (1) provide efficient, reliable service to our customers; (2) comply with applicable laws and regulations; and (3) maintain safe operations. This testimony supports SCE’s Test Year 2015 Peaker O&M expense and capital expenditure forecasts.
II.

BACKGROUND AND OPERATIONAL ROLE OF THE PEAKERS

A. History Of The Peakers

In the summer of 2006, California experienced an unprecedented heat wave. Temperatures were higher than those recorded in the weather model used by the CAISO based on the most relevant 30-year history. The CAISO had predicted prior to summer 2006 that the state’s grid could accommodate demand in excess of 48,000 MW. However, the actual peak demand during the heat wave was 51,000 MW. CAISO did meet the demands during the heat wave; however, grid stability was a serious concern throughout this heat wave.

In August 2006, CAISO made recommendations to the Commission about how it could meet future demands during similar heat storms, assuming high growth in overall power demand (a situation particularly severe in Southern California).¹ Because there was no time to develop new large generation projects, CAISO recommended that the Commission direct investor-owned utilities to develop new generation with quick-start capability to meet peak load demands and to improve local grid stability during critical demand periods. In response, in an August 15, 2006 directive,² Commission President Michael Peevey directed SCE to develop five new Peakers to be operational by summer 2007. The full Commission approved and confirmed President Peevey’s directive on November 9, 2006 in Resolution E-4031.³ SCE proceeded with the engineering, procurement, and construction of the five Peakers. These five Peakers were designed to quickly start and have “black-start” capability. The Peakers are readily dispatchable and provide local voltage support⁴ to the power grid.

B. The Purpose Of Black-Start

Typically, when a power plant unit is in a start-up mode, the power grid supplies the electricity required to operate the plant’s auxiliary equipment to facilitate starting the generating unit. However, during a complete blackout, such as the Northeast Blackout of 1965, no external source of high voltage power is available to restart the affected power plants. Without external power for the fans, pumps, and

¹ See workpapers for the letter from Yakout Mansour, President and Chief Executive Officer of CAISO, to Michael R. Peevey, President of California Public Utilities Commission, dated August 9, 2006, which is attached to the August 15, 2006 Assigned Commissioner’s Ruling in R.05-12-013/R.06-02-013.
² Ibid.
³ A copy of Resolution E-4031 is in the workpapers.
⁴ Local voltage support is an ancillary service to maintain adequate voltage on the grid.
other power plant auxiliary equipment, most generating units are not able to start-up. As a result, the plants cannot begin to start producing electricity until an external power source becomes available.

The process of starting a generating unit without an external power source is commonly referred to as “black-starting.” Black-start capable generating stations typically receive their back-up electrical supply from an auxiliary generator located on-site. Such auxiliary generators are usually much smaller than the main power generating units at the generating station, and are typically fueled by natural gas or diesel fuel. Black-starting an electrical system occurs because: (1) all local generation has “tripped” offline; and (2) there is no means of accessing electricity from outside of the area. Black-start capable generating stations are re-started first, and then these running power generating stations are reconnected to the system grid. Power produced by the black-start capable plants (i.e., that are brought back on-line after black-starting) is then routed to other power plants that are not black-start capable to assist in their start-up. In this manner, CAISO can sequentially restore the grid to full power. As the generation capacity increases, load is systematically connected to the grid and power restored to all customers.

A utility grid will typically include a number of power plant units that have black-start capability. Some of SCE’s hydroelectric units are black-start capable. Prior to divestiture of the SCE gas-fired power plants in 1997 and 1998, SCE maintained four 130 MW Peaker units with black-start capability. SCE divested the older Peaker units along with all of its oil/gas fired generating units. The black-start capability of the older Peakers was not maintained by the new owners after divestiture and, therefore, new black-start sources needed to be developed for SCE’s local grid system. This need was identified in the Commission's Resolution E-4031.

C. **SCE Peaker Power Plant Locations and Technology**

Each of the five Peakers has a nominal capacity of 49 MW. Figure II-1 below shows the location of the Peakers. The Peaker Division of the Power Production Department is comprised of the five Peaker Units, their centralized control center and support facilities, and the employees who operate, maintain, and manage these assets. The first four Peakers, Barre, Center, Grapeland, and Mira Loma, began commercial operation in August 2007. Due to permitting delays the McGrath Peaker did not begin commercial operation until November 2012.

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² It takes an external source of electricity for a power plant to start-up, before that plant can begin producing its own electricity to meets its internal plant requirements.
Each Peaker Power Plant uses a state-of-the-art, simple-cycle combustion turbine generator set, operated with Selective Catalytic Reduction (SCR) for nitrogen oxide (NOx) air pollution reduction.\textsuperscript{6} Each Peaker includes one General Electric (GE) LM6000 SPRINT\textsuperscript{TM} (SPRay INTercooling)\textsuperscript{7} natural gas turbine generator set and associated auxiliary equipment.\textsuperscript{8}

Figure II-2 below illustrates the power plant package including many accessories that are required to provide efficient, safe, and reliable operation.

\textsuperscript{6} NOx are Nitrogen Oxide air pollutants.

\textsuperscript{7} General Electric's SPRINT option includes equipment which allows water to be injected directly into the combustion turbine HP or LP compressor sections, which increases the turbine’s power output.

\textsuperscript{8} See Figure II-2 for further discussion of the operational characteristics for the five Peakers.
The gas-fired combustion turbine drives an electrical generator, producing electricity. The turbine consumes natural gas, air, and water, each of which needs to be conditioned prior to use. The local gas pipeline provides natural gas, and an 800-hp electric gas compressor is used to increase gas pressure for injection into the combustion turbine. A portable demineralizer, consisting of water softening followed by ion exchange, treats water to a very high purity. Nitrous oxides (NOX) emission controls require treated water to be injected into the turbine. The Sprint System also increases the power output of the turbine. The combustion turbine inlet air conditioning also uses treated water and increases the power output of the turbine. A self-cleaning filter removes suspended matter from the inlet air prior to use to minimize the damage foreign matter can cause to the turbine blades.

Exhaust gases from the combustion turbine are routed to an 80-foot tall exhaust stack. Water injection into the turbine, a Selective Catalytic Reduction (SCR) system, and an additional layer of catalyst in the exhaust gas ducting for the control of organic compounds rigorously control air emissions. The SCR system reduces NOx emissions from 25 parts per million (PPM) down to 2.5 PPM by injecting ammonia into the exhaust gas, which is stored in a 10,000 gallon storage tank. A
Continuous Emissions Monitoring System (CEMS) measures and reports on the effectiveness of the air pollution control equipment to SCE and appropriate agencies.

Each Peaker has an electric motor-driven gas compressor to raise the natural gas pressure from the gas pipeline pressure to the required pressure for combustion turbine operation. Each Peaker has a 645 kW auxiliary electric generator driven by a natural gas-fired reciprocating engine. These auxiliary generators provide each Peaker with black-start capability by generating the initial power to operate turbine start-up related equipment and other auxiliary equipment required for black-starting.

D. Expected Peaker Dispatch, Service Conditions, and Operational Limits

Peakers serve the electrical grid by starting and ramping to full load very rapidly, including starting and stopping more than once in a day if needed. From off-line status, each Peaker can attain full load within 10 minutes of a start instruction. The Peakers also have relatively low start-up costs. Utilization is based on each Peakers start-up and operating costs as compared to other resource options and contemporary market prices, and system needs. Because of their fast-start capability, the Peakers can also fulfill off-line operating reserve requirements, standing ready to meet additional generation needs caused by a sudden unanticipated loss of generating capacity elsewhere in the system, unexpected demand, or the power output variability of renewable resources such as solar and wind.

The Peakers averaged approximately 20,000 total gross MWh per year, from 2008 through 2011. Production levels then increased, as a result of market conditions and system needs. In 2012 the Peakers (excluding McGrath, which began commercial operation in November 2012) produced 96,494 gross megawatt hours. During 2013, Peaker dispatch has continued to trend upward and future annual operating levels are expected to exceed that recorded in 2012.

Renewable energy resources, such as solar and wind generation, are susceptible to large variations in generation output. Local wind velocities peak and ebb unpredictably during the course of the day. Likewise, solar power output varies depending on cloud cover and other weather conditions. With their fast-start capability, the Peakers can be used to assist in leveling grid generation output when renewable generation resources experience unpredictable variations in generation output.

The first four Peakers located in Los Angeles, Orange, and San Bernardino Counties operate under air permits granted by the South Coast Air Quality Management District (SCAQMD). The strict emission limitation effectively limits the allowable run hours during a 12-month period. Also the annual number of fired starts is limited to 200. There are many emission criteria that influence the maximum allowable run hours, which result in a maximum annual operating level that varies from approximately
700 hours to 1,096 hours per site during a 12-month period. There are daily, monthly, and annual
emission limits for NOX, as well as monthly and annual limits for sulfur oxides (SOX). The emission
limit for SOX, which varies for each site, is the criteria that generally limit the number of allowable
operation hours. The hours indicated are estimated according to the pounds per year of SOX expected to
be produced at each site. The actual maximum permissible run hours at each site is determined through
measurement throughout the year of the pollutants produced, which must be kept below maximum
permissible levels.

Inherent in the Peaker’s design, air emissions produced during the start-up of a Peaker will
account for an appreciable percentage of total annual emissions. The quantity of 200 starts per year is
the maximum allowable according to the operation permits for the first four Peakers. Prior to 2012 the
starts per year did not appear to be a significant constraint. However, during 2012 market conditions
resulted in the Peakers starting more frequently, but having less run hours per start. Therefore, SCE is
working on additional flexibility within the existing permit constraints with SCAQMD. SCE expects a
response during 2013 and, if approved, may gain an increased number of allowed starts per year.
Because the total annual emissions from a given unit will not be increased, an increase in the number of
starts will cause a reduction to the maximum allowable run hours. The Peakers will continue to be
dispatched in a manner that ensures the combination of generation, starts, and service hours in any given
year will not result in any exceedences of the air permit limits.

The McGrath Peaker in Ventura County operates under an air permit granted by the Ventura
County Air Pollution Control District (VCAPCD). Like the permits granted by SCAQMD, the
VCAPCD granted a permit to operate under strict emission limits. This air permit allows for unlimited
starts, but limits the run hours to 2,000 hours per year.
III.

PEAKER POWER PLANT O&M EXPENSE FORECAST

Labor expenses consist of labor for all Peaker Division employees plus overtime labor for certain Peaker staff, as well as the labor for certain support activities provided by other SCE work groups. Non-labor expenses consist of all other costs, including repair parts, materials, chemicals, lubricants and other expendables, contractor support, rental equipment, utilities, waste water treatment, information technology support, vehicles, and O&M support provided to the Peakers by other SCE divisions.

The first four Peakers entered into commercial service in August 2007. The McGrath Peaker began commercial service on November 1, 2012. SCE analyzed recorded costs for 2008-2012 to develop a forecast for labor and non-labor O&M expense for 2015. The 2008 through 2012 recorded O&M expense, the 2013 and 2014 forecasts, and the 2015 Test Year forecast are summarized by labor and non-labor expenses in Figure III-3 below.

Figure III-3
Recorded And Adjusted 2008-2012/Forecast 2013-2015
($000 Constant 2012$)
A. O&M Expense Increases Resulting From The McGrath Peaker

SCE experienced significant delays in obtaining ministerial permits for construction of the McGrath Peaker. As discussed previously, the first four Peakers began commercial operation in August 2007, and McGrath became operational in November 2012. The addition of the McGrath Peaker will cause an increase to the Peaker organization O&M expenses as compared to 2012 recorded expense. Increased expenses include labor costs to perform operations and maintenance of the McGrath Peaker. The McGrath Peaker is much farther away from the Peaker Control Centers than the other four Peakers, and as a result, the McGrath Peaker incurs higher costs than the other four units given the additional time spent transporting staff and materials to the site. Increased non-labor expenses that result from McGrath becoming operational include permit fees, air quality monitoring expenses, reporting and testing expenses, chemicals and other consumables, water, water treatment and waste water disposal, repair parts, and other items.

As discussed above in Chapter II, the McGrath Peaker encountered permitting delays and did not begin commercial service until November 1, 2012. The McGrath Peaker construction began in December 2011 and continued through September 2012. Throughout most of 2012 the McGrath costs were assigned to a capital work order for construction of the peaker project. In September the Peaker began operation and during September and October 2012 it operated primarily for testing purposes. Therefore, 2012 recorded expense reflects only a fraction of the annual incremental cost for McGrath O&M.

To forecast the incremental cost of a full year of McGrath O&M expense, we reviewed the McGrath recorded expenses during 2012. The majority of O&M expense for McGrath occurred when the peaker began operation in October, and commercial operation on November 1, 2012. Therefore we attribute the McGrath recorded O&M expenses in 2012 to the equivalent of three months of expense. As such, the appropriate adjustment to the 2012 recorded expense that is needed to account for a full year of operation is the addition of nine months of equivalent expense. The recorded labor expense for three months was $99,148 with 30 percent of that total being for operation expense and 70 percent for maintenance expense. The recorded non-labor expense for three months was $302,786, with 50 percent for operation expense and 50 percent for maintenance expense. These expenses were multiplied by three to produce a forecast adjustment for the 2015 Test Year forecast (i.e., three times the three months of recorded expense yields an adjustment of nine months of additional O&M).
This results in a total upward adjustment of $1.206 million to account for a full year of McGrath O&M in our 2015 Test Year forecast as discussed in further detail below. See workpapers for adjustments made to the operations and maintenance accounts for the 2015 Test Year.
IV. PEAKER O&M EXPENSE BY FERC ACCOUNT

A. Introduction

This chapter forecasts Peaker O&M expenses for Test Year 2015 by FERC account. SCE records Peaker O&M expenses in FERC accounts 546 through 554, with the exception of FERC accounts 547 and 552. We have summarized the operations accounts 546, 548, 549, and 550 into FERC account 549, Miscellaneous Other Power Generation Expenses. We have summarized the maintenance accounts 551, 552, 553, and 554 into FERC account 554, Maintenance of Miscellaneous Other Power Generation Plant.

B. Peaker Power Plants O&M Expense FERC Account Analysis

1. FERC Account 549 – Miscellaneous Other Power Generation Expenses

This account includes a summary of FERC accounts 546, 548, 549, and 550, as mentioned above. Following are detailed descriptions of those accounts. It is reasonable to combine these four accounts due to their similar operational expenses.

a) Account 546 - Operation Supervision and Engineering

This account includes labor and non-labor expenses incurred in the general supervision of power generating stations. Labor expenses include the O&M manager and the O&M supervisor, who supervises the control operators, and operator mechanics, who oversee the daily plant operation. Labor expenses also include a portion of the salaries of the PPD home office employees who support the Peakers and other SCE power plants. The PPD home office staff provides support for budgets, accounting, administrative activities, environmental health & safety compliance, regulatory compliance, long-range planning, and other activities. Non-labor expenses include reimbursed employee expenses, SCE corporate support for various air, water, hazardous waste, and similar regulatory activities, and miscellaneous fees. This account also includes expenses for preliminary engineering studies, water quality and waste water laboratory analyses, and other general engineering support.

b) Account 548 – Generation Expenses

This account includes the cost of labor, materials and expenses incurred in operating prime movers, generators and electric equipment at power generating stations up to the point where electricity is delivered to the distribution system. It includes the labor costs of the control operators and operator mechanics that directly operate and control station equipment, as well as that of
the Chemical Technicians who work throughout PPD, monitoring and resolving water chemistry
problems. This account also records the costs of chemicals, as well as for water used for turbine
injection and turbine inlet air cooling, including costs to purify and treat that water prior to usage. It
also includes the costs of air emissions control, other expenses for environmental monitoring and
reporting, and environmental permits and fees.

   c)  Account 549 – Miscellaneous Other Power Generation Expenses

   This account includes labor and non-labor costs that are not readily assignable to
other operating accounts. This includes the Peaker Division management, communications and
computing equipment expenses, office supplies, labor relations expenses, reimbursable employee
expenses, safety and training costs, and Peaker facilities’ janitorial, and PPD home office support.

   d)  Account 550 - Rents

   This account includes the cost of rents of property used in connection with other
power generation.

2.  Development Of Test Year Estimate for Account 549

   The 2015 forecast for this account is $6.390 million, including $3.689 million for labor
expense and $2.701 million for non-labor expense. As discussed below, we use last recorded year to
forecast labor and non-labor, plus adjustments due to the start-up of the new McGrath Peaker in late
2012. The 2008 through 2012 recorded expense history and our forecasts for 2013 through 2015 for this
account are summarized in Figure IV-4 below.
a) Analysis Of Recorded and Forecast Labor Expense

From 2008 to 2012, labor expense increased by approximately 39 percent. The first several years of Peaker operation led to the conclusion that additional staff was needed to promote safe and reliable Peaker operations. In particular, the additional staff was needed to assist in complying with the Peakers’ environmental permits and other regulatory requirements, including the first set of newly-adopted NERC Reliability Standards. Existing staffing levels in 2012 most closely match those required for future operation of the Peakers, other than the adjustment needed to forecast a full year of O&M for the McGrath Peaker. Also, in D.04-07-022 and D.89-12-057, the CPUC stated that if costs have shown a trend in a certain direction over three or more years, the last year recorded is an appropriate base estimate. The 2008-2012 years indicate an increasing trend for labor, suggesting use of last recorded year. Also for this account, labor costs for 2010-2012 have been relatively stable, so the last recorded year expense of $3.598 million provides our base for estimating Test Year 2015. To that
base we add a forecast adjustment of $0.091 million labor expense for the McGrath Peaker addition as discussed in Chapter III above.

b) Analysis Of Recorded and Forecast Non-Labor Expense

From 2008 to 2012, non-labor expense decreased by approximately 37 percent. The expense in 2008 was over $1 million higher than the following years due to higher costs encountered for startup expenses for the first four peakers. Following a slight decrease from 2009, the expenses were stable from 2010 through 2012. In D.04-07-022 and D.89-12-057, the CPUC stated that if recorded expenses in an account have been relatively stable for three or more years, the last recorded year is an appropriate base estimate. For this account, non-labor expenses for 2010-2012 have been relatively stable, so the last recorded year expense of $2.248 million provides our base for estimating Test Year 2015. To that base we add a forecast adjustment of $0.453 million non-labor expense for the McGrath Peaker addition as discussed in Chapter III above.

3. FERC Account 554 – Maintenance Of Miscellaneous Other Power Generation

This account includes a summary of FERC Accounts 551, 552, 553, and 554, as mentioned above. Following are detailed descriptions of those accounts. It is reasonable to combine these four accounts due to their similar maintenance expenses.

a) Description Of Account 551

This account includes labor and non-labor expenses incurred in the general supervision, direction, and engineering needed to support Peaker maintenance activities. Non-labor costs that record to this account include maintenance of certain Peaker auxiliary equipment, including security monitoring equipment required for NERC-CIP compliance. The account also includes the management and control of hazardous materials, such as the ammonia used by the Peakers for emissions control.

b) Description Of Account 552

This account includes the cost of labor, material, contractor services, and other expenses necessary to maintain and repair facilities used in power generation.

c) Description Of Account 553

FERC Account 553 includes the cost of labor, material, contractor services, and other expenses necessary to maintain and repair the combustion turbine, generator, and accessory electric equipment. This includes most of the labor costs of the maintenance journeymen employed in the Peaker Division.
d) **Description Of Account**

Account 554 includes the labor and non-labor expenses incurred to maintain and repair the compressed air system, the fire suppression equipment, and certain other plant systems, as well as station maintenance equipment such as lathes, drill presses, and other shop equipment. This account also includes maintenance training expense, vehicle expense (i.e., work trucks and small cranes) and consumable supplies.

4. **Development Of Test Year Estimate for Account 554**

The 2015 forecast for this account is $4.060 million, including $1.644 million for labor expense and $2.416 million for non-labor expense. As discussed below, we use a 4-year average to forecast labor and last recorded year to forecast non-labor, plus adjustments due to the start-up of the new McGrath Peaker in late 2012. The 2008 through 2012 recorded expense history and our forecasts for 2013 through 2015 for this account are summarized as Figure IV-5 below.

**Figure IV-5**

*FERC Account 554 – Peakers*

*Maintenance of Miscellaneous Other Power Generation Plant*

*Recorded and Adjusted 2008-2012/Forecast 2013-2015*

($000 Constant 2012$)
a) Analysis Of Recorded and Forecast Labor Expense

The recorded labor expense increased in 2009 due to filling positions for a maintenance supervisor and a technical specialist. Labor expenses increased in 2009 due to engineering and project activities relating to improvements done to the Peaker sites. Labor expense in 2010 remained relatively flat as in 2009, and then slightly increased in 2011 with the addition of a Peaker Technical Manager. Labor expenses were lower in 2012 due to construction and start-up activities at the McGrath site, which required some labor to record to capital accounts. Maintenance labor, including overtime costs, also fluctuated from year to year depending on equipment repair work load. In D.04-07-022 and D.89-12-057, the CPUC stated that for those accounts which have significant fluctuations in recorded expenses from year to year, an average of recorded expenses is appropriate. Recorded labor costs in this account have fluctuated from year-to-year from 2008-2012, so an average is an appropriate base forecast. We eliminate 2008 from the average because that year did not employ the level of personnel required for maintenance, and therefore we use a 4-year average of 2009-2012 for forecasting the 2015 Test Year base forecast. To the $1.437 million base we add an adjustment of $0.207 million labor expense for the McGrath Peaker addition as discussed in Chapter III above.

b) Analysis Of Recorded and Forecast Non-Labor Expense

Non-labor costs recorded to this account increased significantly in 2009 due primarily to increased contract costs related to facilities upgrades, mechanical services, and improvements to the Peaker information systems. Non-labor remained consistent from 2010 through 2012. In D.04-07-022 and D.89-12-057, the CPUC stated that if recorded expenses in an account have been relatively stable for three or more years, the last recorded year is an appropriate base estimate. For this account, non-labor expenses for 2010-2012 have been relatively stable, so the last recorded year expense of $1.961 million is an appropriate base forecast. To that base we add an adjustment of $0.455 million non-labor expense for the McGrath Peaker addition as discussed in Chapter III above.
V.
PEAKER POWER PLANTS CAPITAL EXPENDITURE FORECAST

A. Forecast Peaker Capital Expenditures

The capital expenditure forecast for Peakers for 2013-2017 is $13.755 million. The first several years of operating experience with the Peakers indicated that further capital improvements would be beneficial for SCE customers. These beneficial projects have largely been completed at the Barre, Center, Grapeland, and Mira Loma sites. The McGrath peaker site, completed in 2012, has yet to receive these improvement projects, and therefore, the 2013-2017 forecast includes these McGrath improvements. In addition, the forecast includes funding for a few additional improvements at all five Peakers, as well as funding for an assumed overhaul of one of the Peaker turbines. All of these Peaker capital projects are summarized below in Figure V-6.

Figure V-6
Peaker Forecast Capital Expenditures 2013-2017
($000 Nominal)

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>McGrath Spare Gas Compressor</td>
<td>CGO-114</td>
<td>1,000</td>
<td>2,500</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3,500</td>
</tr>
<tr>
<td>McGrath Multipurpose Building</td>
<td>CGO-115</td>
<td>-</td>
<td>-</td>
<td>2,600</td>
<td>-</td>
<td>-</td>
<td>2,600</td>
</tr>
<tr>
<td>Turbine Overhaul</td>
<td>CGO-124</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2,600</td>
<td>2,600</td>
</tr>
<tr>
<td>Variable IGV Upgrade</td>
<td>CGO-123</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2,000</td>
<td>600</td>
<td>2,600</td>
</tr>
<tr>
<td>Various Projects less than $1MM</td>
<td>CGO-103</td>
<td>46</td>
<td>426</td>
<td>415</td>
<td>1,146</td>
<td>150</td>
<td>2,183</td>
</tr>
<tr>
<td>Blanket Work Orders</td>
<td>Various</td>
<td>28</td>
<td>28</td>
<td>28</td>
<td>94</td>
<td>94</td>
<td>272</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>1,074</strong></td>
<td><strong>2,954</strong></td>
<td><strong>3,043</strong></td>
<td><strong>3,240</strong></td>
<td><strong>3,444</strong></td>
<td><strong>13,755</strong></td>
<td></td>
</tr>
</tbody>
</table>

Capital expenditures are assessed by Peaker management based on business needs. These expenditures are reviewed by Power Production Department management, and if approved, are submitted as part of the department’s annual budget request. See Hydro testimony in SCE-2, Vol. 7, Part 2 for further discussion of SCE’s capital budgeting process.
1. **Installation Of Back-Up Gas Compressors At McGrath Peaker Site**

   In order to promote reliability for both emergency and non-emergency load requirements, a second Gas Compressor was installed at the other four Peaker locations and is now planned for the McGrath Peaker. As part of original construction, each Peaker location only included a single, reciprocating type gas compressor. Whenever that compressor requires overhaul or repair, Peaker generation is unavailable at that site. It has been the Industry’s experience that reciprocating compressors require frequent maintenance, including overhauls, and experience a higher rate of in-service failures than rotary-screw compressors. However, the reciprocating type was selected by General Electric as a part of GE’s standard Peaker plant design as it is readily available at a relative low purchase price. As explained in Chapter I, the Commission directive to SCE to install the Peakers required the SCE Peaker plants to be procured, designed, and constructed within an extremely compressed project schedule. Therefore, SCE procured GE’s standard design.

   The compressor funded by this capital project is that same as that installed at the other four Peakers. It is of the rotary screw design, which has higher reliability and lower maintenance cost than the existing reciprocating compressor. Once installed, the new compressor will be used as the primary compressor, and the existing reciprocating compressor will become the back-up or stand-by compressor for McGrath. The rotary compressor will improve peaker reliability as the stand-by compressor will be available for immediate service should the primary compressor require routine maintenance or experience a failure. Having a redundant compressor at McGrath ready for service will facilitate availability during routine compressor maintenance so that the peaker can continue to provide a high level of reliability in its grid support, rapid start, and black-start roles. An economic benefit to cost analysis was performed demonstrating the economic viability of this project with a B/C ratio of 1.1. For further information and details of the analyses, refer to the workpapers that accompany this section. The forecast cost of this project is $3.5 million, with $1.0 million in 2013, and $2.5 million in 2014.

2. **Construct Multi-Purpose Building At McGrath Peaker Site**

   To facilitate outage maintenance, parts storage, and routine O&M functions, a multipurpose building was constructed at the four original Peaker sites. The basis for this cost estimate is the amount of the Purchase Order awarded to the architect and construction contractors supporting this work, plus SCE’s estimate for other related work and materials. The McGrath Peaker building construction is planned after the building permit has been received. The multi-purpose building includes a small instrument test shop and a maintenance bay for inspection and repair of plant equipment. The
building also provides a modest lunchroom, a restroom facility, and a small parts storage room. The forecast cost of this project is $2.600 million, with construction planned in 2015.

3. Major Overhaul Of One Combustion Turbine

The Peaker capital forecast predicts that one major turbine overhaul will be needed for the five Peakers within the next five years. Major turbine replacement parts are recorded as capital expenditures in accordance with SCE’s accounting procedures. For purposes of the forecast, this expenditure is assumed to occur in 2017. The forecast cost of the overhaul is $2.600 million, based on information furnished by General Electric. To reduce outage time, SCE’s Peaker spare combustion turbine, purchased in 2007, would be installed while the combustion turbine needing repair is being overhauled. With a fleet of five Peakers, four of them having entered service in 2007, SCE concludes it is reasonable to assume that at least one Peaker will require a major overhaul by 2017 year end.

4. Install Variable Inlet Guide Vanes On Four Peakers

This project funds the upgrade for four of the Peaker combustion turbines. The upgrades consist of the installation of variable inlet guide vanes (VIGV) to better control inlet air flow to the turbine. Such an upgrade will allow the Peakers to be operated at lower MW power output loads with greater efficiency than currently capable (General Electric estimates an efficiency increase of 2 percent). The turbine upgrades would be installed beginning in 2016. The forecast includes the cost of upgrading four Peakers for a total expenditure of $2.600 million. This cost is based on information provided by General Electric.

The VIGV will be installed in the air intake of the gas turbine to direct and control airflow into the engine. These vanes act like a throttle to control the fuel-to-air ratio into the gas turbine, much like the function of a carburetor on a car engine. The modulation of the fuel-to-air ratio results in increased efficiency and provides for more efficient operation at lower loads, thereby resulting in a generating resource that functions over a wider load range. This enhanced operating range improves Peaker dispatch and provides for more flexibility in grid generation resource planning.

With the installation of Variable IGVs, the Peakers can be more readily dispatched because of greater flexibility of operations. The Peaker MW output can be quickly and remotely modulated to better support bulk generation planning and dispatch, local grid voltage support, and black-start operations.

The precise benefit of such improvements is hard to quantify at this time because of the inherent difficulty of quantifying small incremental improvements to unit dispatchability and
controllability. However, SCE’s assessment is that the improvements noted above will become increasingly valuable as additional renewable resources are added to the grid. SCE plans to install the upgrade on the first turbine in 2016. SCE will then test and continue to evaluate the benefits and performance demonstrated by this first installation, in order to determine the value of proceeding with the upgrade on additional units. If the evaluation yields positive results, then three additional units will be upgraded.

5. **Peaker Various Small Projects**

This category of projects funds numerous small capital projects, each of which cost less than $1.0 million. Forecast projects include a back-up air compressor for McGrath ($0.250 million), spare transformers ($1.015 million), and other small projects ($0.918 million) with a total cumulative forecast of $2.183 million for 2013-2017. The capital cost estimate for each item is based on a variety of factors, including vendor estimates of equipment costs and SCE’s experience with prior similar projects. The larger individual projects are briefly discussed below.

a) **Back-Up Air Compressor for McGrath Peaker**

General Electric's standard Peaker design included a single air compressor for each Peaker. However, operating experience with the first four Peakers highlighted the need to install a second air compressor at each site so that the Peaker could still be operated whenever the compressor was undergoing routine preventative or repair maintenance. Redundant air compressors were then installed at the four original peaker sites. This capital forecast is to install an identical unit at McGrath. The capital forecast for the project is $0.250 million. An economic benefit to cost analysis was performed demonstrating the viability of this project with a B/C ratio of 6.4. For further information and details of the analyses, refer to the workpapers that accompany this section.

b) **Spare Transformers for Back-Up Reliability Of All Five Peakers**

With the completion of the fifth Peaker in 2012, SCE reassessed its Peaker spare part inventory, and concluded that spare transformers should be purchased for the Peaker fleet. Historically, SCE PPD maintains common spare transformers for generating units in case of a failure. If any of the three transformers located at each Peaker site were to fault, that Peaker would be out of service until repairs were completed or another transformer was purchased and installed. Typically, transformer lead times run 6 to 24 months. The reliability of the Peakers will be enhanced by purchasing one each of a spare 66kV/13.8kV Step-Up Transformer, a spare 13.8kV/4.16kV Auxiliary Transformer, and a spare 13.8kV/0.48kV Auxiliary Transformer. The capital forecast for purchasing the
three transformers is $1.015 million. An economic benefit to cost analysis was performed
demonstrating the viability of this project with a B/C ratio of 1.8.

6. **Blanket Work Orders (Spare Parts, Tools, & Furniture)**

   Blanket Work Orders are established capital expenditure accounts to record costs for
   annually recurring additions and replacements of office furniture, equipment such as tools, and capital
   spare parts. The capital expenditure forecast for 2013-2017 for Peaker Blanket Work Orders is $0.272
   million. This forecast is based on the experience gained during the prior years of Peaker operation.
VI.

PEAKER POWER PLANTS 2008 TO 2012 RECORDED CAPITAL EXPENDITURES

Figure VI-7 below summarizes Peaker recorded capital expenditures during 2008 through 2012, including McGrath construction. This figure also shows forecast expenditures for 2013 through 2017, and the 2009 and 2012 forecasts adopted by the Commission in our 2009 GRC and 2012 GRC.

Figure VI-7

Peaker Recorded And Authorized Capital And Forecast Expenditures
($000 Nominal)

<table>
<thead>
<tr>
<th>Description</th>
<th>Recorded and Authorized Capital Expenditures</th>
<th>Forecast Capital Expenditures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authorized Expenditures</td>
<td>20,000</td>
<td>22,040</td>
</tr>
<tr>
<td>Recorded &amp; Forecast Expenditures</td>
<td>10,370</td>
<td>18,844</td>
</tr>
<tr>
<td>Total Expenditures</td>
<td>79,758</td>
<td></td>
</tr>
</tbody>
</table>

As shown above in Figure VI-7, our total forecast for 2013-2017 is substantially less than recorded expenditures during 2008-2012. This is primarily because McGrath construction is now complete. Also, this reflects necessary enhancements that were not addressed during the initial expedited construction of Peakers. These enhancements have now been completed, except for the McGrath Peaker. The enhancements include installing a second gas compressor for improving reliability and constructing a multipurpose building at each Peaker site for facilitating future O&M, as discussed in section V, sub-paragraph A.2.
SCE recorded 2009 expenditures are slightly lower than adopted in the 2009 GRC, largely because of the delays in constructing McGrath as discussed in section III, sub-paragraph A. However, this was partially offset by accelerating other capital work on the other four Peakers during 2009.

SCE recorded 2012 expenditures higher than adopted in the 2012 GRC, primarily due to the McGrath project. McGrath Peaker 2012 expenditures were higher than forecasted because of additional legal fees associated with the city of Oxnard’s challenge of the McGrath Peaker construction, and project delay costs experienced because of these challenges. The Commission is currently reviewing the reasonableness of McGrath's construction cost in A.12-12-028. Our 2012 expenditures for the other four Peakers has also slightly exceeded the adopted amount due to emerging issues. These issues include the Grapeland Peaker Back-Up Power Supply, Westminster Emergency Generator, Control Room Upgrades, and the McGrath Peaker Radio Base.
Appendix A
Witness Qualifications
SOUTHERN CALIFORNIA EDISON COMPANY
QUALIFICATIONS AND PREPARED TESTIMONY
OF ANTHONY KURPAKUS

Q. Please state your name and business address for the record.
A. My name is Anthony Kurpakus, and my business address is 300 N. Lone Hill in San Dimas, CA 91773.

Q. Briefly describe your present responsibilities at the Southern California Edison Company (SCE).
A. I am a Manager in the Power Production Division. My responsibilities include supervision of staff for preparation of information and documentation to support regulatory filings, data requests, and business analyses.

Q. Briefly describe your educational and professional background.
A. I received my Bachelor of Science degree in Engineering Cal State Long Beach in 1975. In 2000 I received my Masters Degree in Project Management from Keller Graduate School of Management. I joined SCE in 1998 in the Hydroelectric Division staff department. In my initial position as a Business Analyst, I provided decision support information for economic analyses, business improvement, capital project justification, and regulatory filings. I acquired a position as a Project Manager in August of 2002. I transferred from the Hydro Division to the Power Production staff of Operations Support & Performance Improvement (OS&PI) in February of 2004. In February of 2012 I acquired a Manager position within the OS&PI department.

Q. What is the purpose of your testimony in this proceeding?
A. The purpose of my testimony in this proceeding is to sponsor Exhibit SCE-02, Volume 7, Part 1, entitled Generation - Hydro Operations & Maintenance Expense, portions of Volume 8, entitled Generation – Mountainview and portions of Volume 9, entitled Generation – Peakers as identified in the Table of Contents thereto.

Q. Was this material prepared by you or under your supervision?
A. Yes, it was.

Q. Insofar as this material is factual in nature, do you believe it to be correct?
A. Yes, I do.

Q. Insofar as this material is in the nature of opinion or judgment, does it represent your best judgment?

A. Yes, it does.

Q. Does this conclude your qualifications and prepared testimony?

A. Yes, it does.
Q. Please state your name and business address for the record.
A. My name is Scott Messer, and my business address is 300 N. Lone Hill in San Dimas, CA 91773.

Q. Briefly describe your present responsibilities at the Southern California Edison Company (SCE).
A. I am a Project Manager II in the Operations Support & Performance Improvement section of the Power Production Department. My main responsibility is SCE oversight for the Four Corners Power Plant. My other duties include preparation of information and documentation to support regulatory filings, data requests, and business analyses within the Department.

Q. Briefly describe your educational and professional background.
A. I joined SCE in 1985. From February of 1986 until November of 2007 I worked numerous positions in the Operations Department at Mohave Generating Station, my final position being a Shift Supervisor. In November of 2007, I transferred to my current position as a Project Manager II in Power Production Department.

Q. What is the purpose of your testimony in this proceeding?
A. The purpose of my testimony in this proceeding is to sponsor portions of Exhibit SCE-02, Volume 8, entitled Generation – Mountainview and portions of Volume 9, entitled Generation – Peakers as identified in the Table of Contents thereto.

Q. Was this material prepared by you or under your supervision?
A. Yes, it was.

Q. Insofar as this material is factual in nature, do you believe it to be correct?
A. Yes, I do.

Q. Insofar as this material is in the nature of opinion or judgment, does it represent your best judgment?
A. Yes, it does.
Q. Does this conclude your qualifications and prepared testimony?

A. Yes, it does.