

Application of San Diego Gas & Electric Company
(U-902-E) for Adoption of an Advanced Metering
Infrastructure Deployment Scenario and Associated Cost
Recovery and Rate Design.

Application 05-03-015
Exhibit No.: _____

CHAPTER 12
GAS MODULES, METER & MODULE INSTALLATIONS

JULY 14, 2006 AMENDMENT

**Prepared Supplemental, Consolidating,
Superseding and Replacement Testimony
of
JOSE L. CARRANZA**

SAN DIEGO GAS & ELECTRIC COMPANY

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA**

July 14, 2006

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**Prepared Updated Supplemental, Consolidating,
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JOSE L. CARRANZA
SAN DIEGO GAS & ELECTRIC COMPANY

11 **I. INTRODUCTION**

12 The purpose of this *amended* testimony is to refresh my March 28, 2006
13 testimony to include material information which will impact my (Chapter 12) testimony
14 in which I describe the incremental costs and benefits related to (1) electric metering
15 costs and benefits, (2) gas modules and gas meters, (3) gas metering costs and benefits,
16 and (4) electric meter, gas module, and gas meter installation. Please refer to table JC 12-
17 1 for total costs and table JC 12-2 for benefits. The cost estimates are based on the higher
18 of solution sets derived from the Request for Proposal (RFP) process described in Mr.
19 Charles' testimony (Chapter 9). The total capital direct dollar request is approximately
20 \$221 million and the associated Operations & Maintenance (O&M) is approximately \$24
21 million. This updated testimony serves to correct an error made that omitted the labor
22 costs for the redeployment during the 2025 – 2027 time frame. Table JC 12-1 has been
23 updated to reflect the correction. This testimony consolidates, supersedes, and replaces
24 all previous direct and supplemental testimony filed by me or by any other SDG&E
25 witness testifying in this docket, on the topics covered herein.

26 **II. BACKGROUND**

27 My testimony focuses on the costs to install approximately 1.4 million electric
28 meters and 900,000 gas communication modules approximately over a two and one half
29 year deployment period, beginning in mid-2008. Additionally, it includes costs to
30 replace approximately 3% of the currently installed gas meters that are not suitable to be
31 retrofitted with communications modules due to their design.

32 SDG&E recognizes the magnitude of an AMI field deployment and is aware that
33 this project cannot be completed with current staffing levels, and must rely on contracted

1 labor to perform most of these functions. SDG&E completed an extensive and rigorous
2 Request for Proposal (RFP) process, as described in Chapter 8 and Chapter 9 by Mr.
3 Reguly and Mr. Charles, respectively. SDG&E has not yet selected an AMI installation
4 vendor. However, when an AMI installation vendor is selected and contracts are
5 finalized, SDG&E will file by advice letter with the California Public Utilities
6 Commission (CPUC) the executed contracts. The costs included in my testimony reflect
7 pricing received through the RFP bidding process, RFP reviews, and clarification
8 sessions with installation vendors. Anticipated internal SDG&E costs to perform duties
9 not covered by the installation vendor, such as ongoing operations and maintenance
10 (O&M) costs, were also included. Based on this information, SDG&E will not exceed
11 the stated costs to install the required metering equipment (i.e. these costs included herein
12 are ‘not to exceed’ costs as described in the ‘solution set’ selection process). For further
13 detail on all of these issues, please refer to the testimony of Mr. Charles (Chapter 9).
14 Furthermore, the estimated costs included here are representative of installation costs
15 required to implement AMI.

16 Benefits included in my testimony are avoided costs that would otherwise have
17 been incurred during the AMI business case analysis time horizon that are either
18 accelerated or enabled with the installation and deployment of AMI.

19 **III. BASE ASSUMPTIONS**

20 A. Contract Personnel and Union Labor. SDG&E assumes that vendors will
21 supply all contract personnel to complete the installations over the specified
22 deployment period. Moreover, vendors will be responsible for all facilities,
23 logistics, and resulting claims related to installation activities of contract
24 personnel and sub-contracted personnel. These requirements were included in the
25 RFP. The external costs included herein are based on the costs provided as part of
26 this RFP process.

27 SDG&E maintains a strong relationship with the International Brotherhood of
28 Electrical Workers (IBEW) Local Union 465. SDG&E reached an agreement
29 with the Union to require AMI installation vendors performing gas and electric
30 meter installations within SDG&E’s service territory, to use Union Local 465
31 members.

1 B. Customer Notification. SDG&E requested, through the RFP process, that the
2 vendor(s) bidding on electric meter, gas module and gas meter installations
3 assume responsibility for customer notification and scheduling, and customer
4 contact for access problems. Customer contact prior to and post meter installation
5 is discussed in Chapter 5 by Mr. Gaines. Additionally, during the deployment
6 period, SDG&E Account Executives will interact with the installation vendor to
7 facilitate meter installation schedules for large Commercial and Industrial
8 customers.

9 C. Risk Mitigation, Installation Project Management and Training. As a way to
10 mitigate risk associated with deploying a large number of meters, SDG&E
11 provides a field project management team. This team's responsibility is to partner
12 with the installation vendor and to assist in resolving operational issues, clarifying
13 operational policies, approving repairs, addressing potential energy theft issues,
14 verifying installation progress, and quality of the installations. This team is
15 exclusive of the PMO personnel described in Mr. Charles' testimony (Chapter 9).
16 SDG&E believes that installation project management is an important role that
17 will help facilitate meter installations, while maintaining deployment efficiencies.
18 SDG&E has also included internal costs for claims it may incur beyond what that
19 the vendor covers as a result of AMI meter deployment or as a result of SDG&E
20 employee actions.

21 SDG&E will provide policy and procedures to the selected vendor(s) and
22 expects that the installation vendor will satisfy the requirements contained within.
23 SDG&E also plans to provide training to its field and staff employees who install,
24 operate, and maintain gas and electric AMI-enabled metering equipment.
25 Therefore, costs to provide this training are included.

26 D. A-base Meter Costs, New Business and Redeployment. As part of the AMI
27 project, SDG&E has included costs : 1) to replace A-base electric meters with a
28 socket conversion and an AMI-enabled electric meter, and 2) to repair residential
29 meter sockets or panels that are damaged in the process of installing an AMI-
30 enabled electric meter to minimize customer inconvenience and improve
31 installation efficiencies. SDG&E estimates that approximately 0.5% of its

1 residential electric meter population will require socket or panel repairs. During
2 the deployment period, SDG&E will install AMI-enabled meters in new business
3 areas through our established internal process at no incremental cost.

4 Costs for deploying a second cycle of gas and electric metering technology are
5 included beginning in year 2025, to address the end of the metering equipment
6 service life. The cost of deploying a second cycle includes new gas metering
7 equipment and labor to install and maintain the gas and electric metering
8 equipment. Mr. Kyle's testimony (Chapter 13) addresses the financial philosophy
9 behind the second cycle of deployment.

10 **IV. SUMMARY OF COSTS & BENEFITS**

11 **A. Electric Metering Costs and Benefits**

12 **1. Operations and Maintenance Costs**

13 **a. Battery Replacement**

14 Costs include incremental labor and vehicles needed for
15 maintenance due to higher failure rates than we currently experience with
16 an electromechanical metering system, as referenced in Chapter 11 by
17 Mr. Pruschki. Poly-phase AMI-enabled electric meter battery replacement
18 is discussed in Chapter 11 by Mr. Pruschki. Field labor costs associated
19 with these replacements are included here.

20 **2. Benefits (Avoided Costs)**

21 **a. Electric Meter Reprogramming for Rate Changes**

22 Today, customer rate changes require a field visit to replace or
23 reprogram TOU electric meters. With an AMI-enabled meter, field visits
24 to reprogram meters for rate changes may not be necessary.

25 **b. Battery Replacement in Existing TOU Electric Meters**

26 Currently, SDG&E replaces batteries in approximately 1% of TOU
27 electric meters. SDG&E will avoid replacing batteries.

28 **c. Electric Meter Maintenance Testing**

29 SDG&E routinely performs tests on its electric meters. SDG&E is
30 installing pre-tested electric meters by the meter manufacturer,
31 accordingly, existing meters identified for replacement with an AMI-

1 enabled meter in the calendar year will not be tested in the field. SDG&E
2 will take advantage of this reduction in number of tests and derive an
3 avoided cost. Tests for these new electric meters will be deferred to the
4 following calendar year.

5 **d. Calendar Expiration Meter Replacement Project**

6 SDG&E is in the process of replacing several thousand TOU electric
7 meters with expiring calendars. The calendar for the majority of these
8 meters will expire by the end of 2009. SDG&E is proposing to stop this
9 “expiring calendar” project in 2007. Avoided cost estimates assume a
10 Commission decision by December 2006.

11 **B. Gas Metering Costs and Benefits**

12 **1. Description of the gas module and function**

13 The gas communication module is a one-way communication device that
14 is powered by a battery and transmits the following data via the AMI network
15 on a daily or more frequent basis: a unique identification number, meter
16 readings and various alarms. The gas module communicates wirelessly with
17 the AMI communication network, as discussed by Mr. Pruschki (Chapter 11)
18 regarding the AMI communication network.

19 The gas communications module will be either 1) directly mounted
20 between the existing meter body and the mechanical index of a diaphragm or
21 rotary gas meter or, 2) remotely mounted on the gas meter assembly and
22 connected to the meter’s index drive via a wire harness and pulse pick-up
23 device. In all cases, each meter will retain a mechanical index.

24 **2. Gas Meter Replacements**

25 **a. Assumptions**

26 SDG&E estimates 3% of existing installed gas meters are not suitable
27 to be retrofitted with a communications module due to their design, and
28 will require replacement. Costs associated with removing and replacing
29 these meters and attaching the communication module are included.

30 **b. Gas Outage Impact to Customers**

31 SDG&E anticipates replacing 3% of its existing gas meter population.

1 About 80% of these meter replacements will be completed without
2 requiring an interruption of gas service to the customer. SDG&E will
3 work closely with the installation vendor to minimize the number of
4 outages.

5 **3. K-type Regulator Replacements**

6 **a. Current K-type regulator replacement program overview**

7 Each year, SDG&E replaces approximately 5,000 American Meter
8 Company's Reliance K-type regulators, which do not provide over-
9 pressure protection, with an internal relief valve, as required by our
10 current standards. SDG&E manages a Reliance K-type regulator
11 replacement program that is coupled with our meter change policy. When
12 a field technician completes an order that requires changing a gas meter,
13 and a Reliance K-type regulator is identified, the regulator is replaced.

14 **b. AMI meter replacements provide opportunity to accelerate K-type 15 regulator replacements**

16 During deployment, SDG&E expects to change out 3% of the existing
17 gas meters. SDG&E anticipates Reliance K type regulators will be
18 identified and changed out during about 50% of these gas meter changes.
19 This provides SDG&E an opportunity to proactively accelerate the
20 removal of the Reliance K-type regulators from service over the existing
21 removal schedule.

22 **4. Gas Meter Growth**

23 Included herein are incremental costs for gas modules to account for
24 gas meter population growth in the years following AMI deployment. The
25 costs related to gas meter population growth is part of SDG&E's General
26 Rate Case and, therefore, excluded from costs.

27 **5. Operations and Maintenance Costs**

28 **a. Gas Module Replacement**

29 The service life of the gas module is quoted by metering vendors to be
30 15 to 20 years. Costs are not included for replacing batteries because the
31 meter vendors expect the battery to last as long as the gas module.
32 Incremental gas operations and maintenance costs include the labor,

1 materials and vehicle costs related to AMI communication module
2 failures, at a rate less than 1%, and pulser failures for remote AMI
3 communication devices with failure rates at 2%. This testimony includes
4 labor and material costs for performing corrective maintenance of
5 premature module failures. There are no incremental costs for gas meter
6 failures as a result of AMI-enabled gas modules.

7 **6. Benefits**

8 **a. Accelerated Gas Meter Replacements**

9 SDG&E will replace approximately 3% of existing gas meters. For
10 the reasons stated above, these meters cannot be retrofitted with an AMI
11 communication module. SDG&E will realize a benefit for accelerating
12 gas meter replacements.

13 **b. Accelerated K-type Regulator Replacements**

14 During AMI deployment, SDG&E anticipates replacing up to 5% of
15 the Reliance K-type regulators. SDG&E will benefit from the accelerated
16 replacement.

17 **C. Electric Meter, Gas Module, and Gas Meter Installation**

18 **1. Metering Equipment Installation**

19 **a. Work Scope and Timeline**

20 The AMI meter installation scope includes the replacement of
21 approximately 1.4 million electric meters and installation of
22 approximately 900,000 gas meter modules. SDG&E expects to replace up
23 to 3% of the currently installed gas meter population, which are not
24 suitable to be retrofitted with an AMI communications module due to their
25 design. SDG&E estimates that this work will take approximately two and
26 one half years, with a targeted start date in the second quarter of 2008.

27 **b. Contracted Workforce**

28 SDG&E will hire an installation vendor who will manage and
29 complete installation of all electric and gas metering equipment. This
30 vendor will provide installation management, work scheduling and
31 customer notification, appointments, issue resolution, a customer call

1 center, meter and module logistics, and installation labor. The installation
2 vendor will partner with International Brotherhood of Electric Workers
3 (IBEW) Local Union 465. The vendor and subcontractors will provide the
4 tools and vehicles necessary to complete meter deployment. The vendor
5 will provide a field workforce that has been drug-screened and
6 background checked. Furthermore, installers performing gas meter
7 replacements will be operator qualified per Department of Transportation
8 (DOT) Operator Qualification Program as required by Title 49 of the Code
9 of Federal Regulations part 192.801 through part 192.809.

10 The installation vendor will provide trained meter installers and will
11 have safety and quality assurance programs to make sure the workforce
12 operates safely and provides quality installations. SDG&E will provide
13 the installation vendor its policies and procedures related to working
14 around metering equipment.

15 **c. Logistics and Cross Docks**

16 Due to the magnitude of the project, SDG&E requires the vendor to
17 establish “cross docks” for receiving, warehousing, and tracking the
18 metering equipment until it is installed at an end point. It is expected that
19 the vendor will work with the manufacturers to control the supply of gas
20 and electric meters necessary to meet the installation schedule.

21 SDG&E anticipates that the vendor will use multiple cross docks, from
22 which the installation workforce will be dispatched, new meters will be
23 warehoused and distributed for installation, and the removed meters
24 returned for salvage. This approach helps to reduce drive time to
25 installation locations and helps maintain installation efficiencies.

26 **d. Contracted Customer Call Center**

27 To minimize impacts to SDG&E’s customer call center during the
28 meter deployment period, SDG&E requires the installation vendor to
29 provide a separate customer call center to manage customer notifications,
30 meter installation appointments, and customer inquiries. SDG&E
31 Customer Service Representatives will be advised by the vendor of meter

1 installation locations and will redirect AMI installation related calls to the
2 vendor's customer call center. This will keep SDG&E Customer Service
3 Representatives informed.

4 **e. Meter Installation Notification**

5 During the meter installation period, the vendor will work closely with
6 SDG&E to identify the installation areas and to set up customer
7 notifications. Communication after meter installations is discussed in
8 Chapter 5 by Mr. Gaines. Throughout the installation phase, the vendor
9 will be responsible for notifying customers through a mailer, that meter
10 installation crews will be in the area installing AMI-enabled metering
11 equipment. The mailer will provide contact information in case customers
12 have questions or concerns, or need to make an appointment. All
13 customer inquiries and appointments will be handled by the contracted
14 customer call center.

15 If no customer contact is made at the time of meter replacement, the
16 meter installer will leave a door hanger. The door hangers will inform
17 customers that the metering equipment has been replaced. The hanger
18 also will have contact information should customers have any questions or
19 concerns. All customer inquiries will be handled by vendor's call center.

20 **f. Field Installations**

21 The vendor will provide the meter installers with uniforms indicating
22 that they are a SDG&E contractor. SDG&E will also provide installers
23 with SDG&E contractor badges. Meter installers will follow established
24 safety, driving, installation, and quality assurance procedures. SDG&E
25 will perform audits to verify workmanship and quality. SDG&E
26 personnel will respond to operational, equipment, energy theft, and policy
27 issues encountered by meter installers.

28 SDG&E estimates 1% of its metering end points will be hard to
29 access. In these instances, the installation vendor will make three
30 installation attempts. The attempts may be a combination of premise
31 visits, telephone calls, and notifications via mail. After three unsuccessful

1 attempts to gain access to the gas and/or electric meter, the account will be
2 returned to SDG&E for further evaluation. SDG&E may decide to handle
3 the problem itself or ask the installation vendor to complete the meter
4 installation at an incremental cost.

5 In residential areas, the vendor will do a mass notification prior to
6 entering the area to install meters. The notification will indicate that the
7 vendor will be in the area installing AMI-enabled electric and gas
8 metering equipment. If no appointment is requested, the first premise visit
9 will be a “cold call”. The meter installer will complete the meter
10 installation if they can safely gain access and install the metering
11 equipment.

12 For commercial and industrial customers, the vendor will schedule an
13 appointment if an outage is required. SDG&E Account Executives will
14 act as liaisons between the installer and large commercial and industrial
15 customers, as discussed in Chapter 5 by Mr. Gaines.

16 **g. Electric Meter Installations**

17 **1. Electric Meter Replacement Service Interruptions**

18 All electric customers, whose equipment does not include test
19 blocks or test switches, will experience a service interruption for
20 the duration of the meter installation.

21 **2. Post Installation Testing of Instrument Rated Meters**

22 SDG&E will continue to perform post installation tests where
23 instrument rated metering equipment is replaced. The testimony
24 includes costs to perform these tests.

25 **h. Gas Module and Gas Meter Installations**

26 **1. Quality Assurance Sample Testing**

27 Costs are included to conduct quality assurance sample tests of
28 AMI gas modules.

29 **2. Gas Meter Replacement Service Interruptions**

30 SDG&E will replace approximately 3% of existing gas meters
31 that are not suitable to be retrofitted with AMI communication

modules due to their design. Approximately 80% of these gas meter replacements will be completed without a gas service interruption.

V. AMI COSTS IMPACTS BY FUNCTIONAL AREA-BY CAPITAL, BY O&M

Table JC 12-1

Gas Meters and Modules, Gas & Electric Meter Installation, Gas Maintenance Materials
Direct Dollars (Dollars in Thousands)

Costs	Total	2007	2008	2009	2010	Average Annual		
						2011-2024	2025-2027	2028-2038
Capital								
Total Deployment Labor and Contract Support Capital Costs	53,838	0	11,835.5	20,246.1	20,246.1	0	389.9	31
Total Electric Deployment Materials Capital Costs	6,283	0	480.7	907.6	913.4	73.4	277.9	192.7
Total Gas Deployment Materials Capital Costs	144,870	0	11,975.4	20,574.1	20,650.4	1,052.8	15,991.0	2,632.5
Total Gas Maintenance Materials Capital Costs	16,040	0	97.8	265.8	434	486.8	552.6	615.4
<i>Total Capital Costs</i>	<u>221,030</u>	<u>0</u>	<u>24,389.4</u>	<u>41,993.6</u>	<u>42,243.9</u>	<u>1,613.0</u>	<u>17,211.5</u>	<u>3,471.50</u>
O&M								
Total Claims O&M Costs	390	0	129.9	129.9	129.9	0	0	0
Total Gas Materials O&M Costs	631	0	3.9	10.5	17.2	19.2	21.7	24.1
Total Labor and Contract Support O&M Costs	23,291	145.5	1,591.3	2,630.6	2,784.2	467.5	1,073.2	579.5
<i>Total O&M Costs</i>	<u>24,312</u>	<u>145.5</u>	<u>1,725.1</u>	<u>2,771.0</u>	<u>2,931.3</u>	<u>486.7</u>	<u>1,094.9</u>	<u>603.6</u>
Total Costs	245,342	146	26,114	44,765	45,175	2,100	18,306	4,075

VI. AMI BENEFITS IMPACTS BY FUNCTIONAL AREA- BY CAPITAL, BY O&M

Table JC 12-2

Gas Meters and Modules, Gas & Electric Meter Installation, Gas Maintenance Materials
Direct Dollars (Dollars in Thousands)

Benefits	Total	2007	2008	2009	2010	Average Annual		
						2011-2024	2025-2027	2028-2038
Capital								
Total Electric Labor Capital Benefits	817	204.1	204.1	204.1	204.1	0	0	0
Total Gas Labor Capital Benefits	145	0	6.9	13.7	13.7	7.9	0	0
Total Gas Materials Capital Benefits	807	0	36.2	72.1	72.1	44.8	0	0
<i>Total Capital Benefits</i>	<u>1,769</u>	<u>204.1</u>	<u>247.2</u>	<u>290</u>	<u>290</u>	<u>52.7</u>	<u>0</u>	<u>0</u>
O&M								
Total Labor and Contract Support O&M Benefits	4,256	21.3	106.5	214.8	267.1	133.8	126.7	126.7
<i>Total O&M Benefits</i>	<u>4,256</u>	<u>21.3</u>	<u>106.5</u>	<u>214.8</u>	<u>267.1</u>	<u>133.8</u>	<u>126.7</u>	<u>126.7</u>
Total Benefits	6,025	225	354	505	557	186	127	127

1 **VII. AMI PROJECT RISK AND SDG&E MITIGATION**

2 The major risk of potential over run of installation costs is the inability to gain
3 safe access to customer premises to install AMI meter and equipment. Another risk is the
4 need to revisit meters due to installation errors or meter failures. To a significant degree,
5 these risks will be absorbed by the installation contractor.

6 As described above, the installation vendor will make three attempts to install the
7 equipment before turning the order back to SDG&E. In concert with these attempts, both
8 the installation vendor and SDG&E will be actively coordinating with customers. In
9 addition, SDG&E will be advertising/educating extensively about AMI as discussed
10 further in Mr. Gaines’ testimony (Chapter 5). Given these mitigating factors, SDG&E
11 has assumed that less than one percent of meters will not be installed after three attempts.
12 The business case costs for installation reflect this assumption.

13 Installation errors will be minimized through extensive audits. In addition to the
14 audits that the installation vendor will perform, SDG&E will verify installation of 100%
15 of transformer-rated meters and 5% the remaining meter population. SDG&E will also
16 perform QA reviews at meter and gas module manufacturing facilities.

17 The major risk associated with the gas meters and modules is that RFP bids
18 estimated retrofits of approximately 97% of its existing gas meter population. Since
19 retrofitting gas meters is cheaper than replacing the meters, replacing more than 3% of
20 SDG&E’s existing gas meters could negatively impact our business case costs. However,
21 SDG&E will contractually require the vendors to demonstrate their ability to retrofit gas
22 meters.

23 Meter and gas module failure rate assumptions, discussed above for gas meters
24 and in Mr. Pruschki’s testimony (Chapter 11) for electric meters, drive maintenance costs
25 after deployment. Installation errors discovered during the deployment period will be the
26 responsibility of the installation vendor.

27 **VIII. CONCLUSION**

28 My testimony has discussed both the costs and benefits related to installing
29 approximately 1.4 million electric meters, approximately 900,000 gas meter modules, and
30 replacing approximately 3% of the gas meter population. The most significant costs for
31 this aspect of the AMI project comes from purchasing gas metering equipment, installing

1 gas modules and meters, and installing electric meters with embedded AMI technology.
2 Additionally, my testimony discusses the various processes that must be implemented to
3 have a successful meter installation in the field. SDG&E determined, through the RFP
4 process, that installation vendors can partner with SDG&E to provide project
5 management, labor, facilities, and safe and quality meter installations necessary to
6 implement this project. Based on the 'not to exceed' costs included in this chapter, we
7 are confident that meter installations can be performed in approximately two and one-half
8 years to provide the functionality described in Chapter 8 by Mr. Reguly and, therefore, to
9 provide the benefits described throughout this filing.

10 This concludes my supplemental testimony.

1 **IX. QUALIFICATIONS OF JOSE L. CARRANZA**

2 My name is Jose Luis Carranza and I am employed by San Diego Gas and
3 Electric Company (SDG&E). My Business Address is 6875 Consolidated Way, San
4 Diego, CA 92121.

5 My current position is Electric Metering Operations Manager in the Customer
6 Operations Department of SDG&E. I have been employed by SDG&E since 1994. I
7 have held various positions of increasing responsibility in Electric Distribution and
8 Customer Operations. I assumed my current position in 2006.

9 I am a registered Electrical Engineer in the State of California. I received a
10 Bachelor of Science degree in Electrical Engineering from the San Diego State
11 University.

12 I have not previously testified before the California Public Utilities Commission.