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 10
INFORMATION TECHNOLOGY SYSTEMS

Prepared Supplemental, Consolidating, Superseding and Replacement Testimony of
DAWN WELCH

SAN DIEGO GAS & ELECTRIC COMPANY

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

March 28, 2006

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I. INTRODUCTION

The purpose of my testimony is to describe SDG&E's information technology (IT) systems development and integration activities and related cost estimates required for AMI deployment. My testimony is intended to provide context to the IT systems development and integration activities and describe the functional requirements SDG&E will satisfy with the IT Systems Development. The cost estimates are based on the higher of solution sets derived from the Request for Proposal (RFP) process described in Mr. Charles' testimony (Chapter 9). The total capital IT direct dollar request is approximately $90 million and the associated Operations & Maintenance (O&M) is approximately $148 million. The specific areas that I will be covering in my testimony are Meter Data Management System (MDMS) development and Systems Integration of AMI data into other legacy utility applications.

A. Purpose of the testimony:

1. Description of the scope of this testimony

The purpose of my testimony is to describe the Information Technology System costs and benefits associated with the rollout of AMI over the SDG&E service territory. More specifically, I will be testifying to the system and business impacts required to: 1) receive the AMI data in the back office from the AMI network and 2) validate, edit, estimate and store the data for distribution to SDG&E's legacy systems. SDG&E believes that the data retrieved from the AMI network will be the foundation needed to enhance a wide range of customer services including, but not limited to: time differentiated or dynamic rate options, demand response and outage management. SDG&E's business processes and IT systems capabilities to

collect and manage this data is an important and integral step to bringing the value of AMI to our customers.

2. General Assumptions:

a. AMI is an integral component for SDG&E's longer term operating vision.

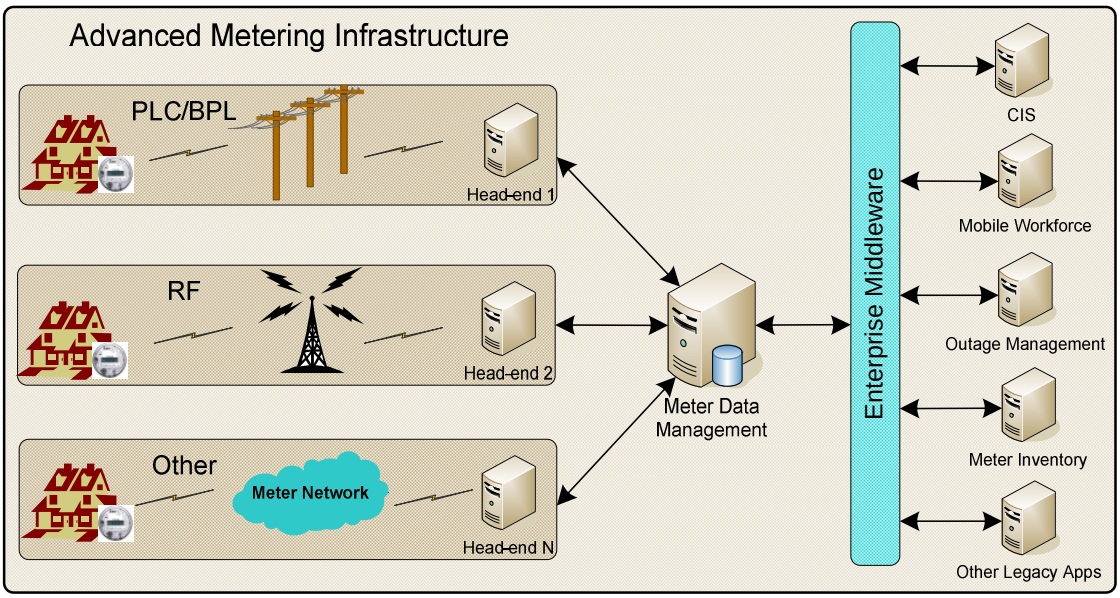
SDG&E believes, that over the next 10-15 years, significant advances will occur in the deployment of a smart grid. AMI IT uses the CEC goals to provide guiding principles. Leveraging the AMI technology, IT will empower the consumer by providing information and choices through the online data presentment and online rate analysis. Optimization of utility assets will also be supported through the integration of AMI data to existing utility systems supporting the SDG&E engineering and operational organizations such as usage data to the Engineering Data Warehouse and outage/restoration data to the Outage Management System.

b. Buy vs. Build

Another of SDG&E's guiding principles is the systematic completion of a "Buy vs. Build" analysis of IT systems. The systems acquisition decision will take advantage of vendor experience at prior utility implementation of similar systems. SDG&E selection of an experienced vendor will help mitigate the risks associated with IT development projects. The 'Buy vs. Build' analysis is a fundamental and early step in the SDG&E process. After evaluating responses from SDG&E's RFP process, SDG&E has determined that there are several third party packages that meet our requirements in the area of MDMS and data integration (i.e.: analysis resulted in the 'buy' decision). SDG&E plans to further question these MDMS companies about their solutions and determine the best fit for our legacy systems and the new AMI network.

3. Overview of the AMI Information Systems and their integration points

Figure DW 10-1



SDG&E's technology design for AMI is depicted in Figure DW 10-1. As shown in the above illustration, there may be multiple networks deployed to bring the interval data from the meter into the back office. SDG&E believes that, over time, technology will advance and newer, more cost effective communication technologies will be deployed throughout our service territory. These new communications technologies will not disrupt the existing network offering. SDG&E will have several options to achieve AMI functionality. These communication options are discussed in more detail in Mr. Pruschki's testimony (Chapter 11). My testimony describes the point at which the data arrives at the SDG&E back office, is processed through a communications systems "Head End" processor and stored in the Meter Data Management System (MDMS). The MDMS will then provide a central repository for meter data to be used throughout the rest of SDG&E's legacy systems. My testimony will also explain SDG&E's vision for deploying an Enterprise Middleware (EM) tool to act as a middle control agent that

provides data to the legacy systems in a more structured and flexible method. The EM is an important part of the System Integration plan and will create a platform for AMI data to be used quickly and effectively as future functionality provides more customer benefits.

II. METER DATA MANAGEMENT SYSTEM (MDMS)

A. Description

The MDMS is the focal point of the AMI data when it enters SDG&E's back office. The roots of the current Meter Data Management Packages are primarily from Large Commercial Billing systems that handle contract options and unique billing tariffs that CIS's have traditionally had difficulty processing. Historically, the number of accounts that a typical MDMS would have handled is far less than 1 percent of the total accounts. In a full deployment AMI environment, a MDMS will be required to collect, process and store data associated with over 1.4 million electric meters and 900,000 gas meters. During the RFP process, SDG&E focused on the capabilities of software products to scale to SDG&E's 2.3 million meters and collect, process and store interval data with functionality to support process including, but not limited to:

1. Multiple AMI technologies and associated systems.
2. Current Company tariffs.
3. Potential future tariffs that will include elements of hourly pricing and other time associated rates and discounts.
4. Device and Event Management.
5. Data Analysis and Data Processing.
6. Data Collection Interfaces.
7. Data Repository/Data Warehousing.
8. Network and Meter Installation support.
9. Service Management.
10. On-line Presentment.
11. Distribution Automation.

B. Support Multiple AMI Technologies and Associated Systems

A criteria for SDG&E is that a MDMS must have the ability to accommodate many different communications systems. SDG&E's rollout plan will start in 2008 (Systems) and finish in 2010. The MDMS should support multiple "head end" systems coming from various communication networks such as BPL, WiMax or other broadband technologies and act as the conduit between the AMI Network and the back office systems. Mr. Pruschki provides communication technology details in his testimony in Chapter 11.

C. Support Current Company Tariffs

The Information Systems RFP identified SDG&E's current tariffs that are required to be supported by the MDMS. Several products appeared capable of meeting SDG&E's requirements. More detailed scripting sessions will be conducted with each vendor as well as other utility site visits to familiarize SDG&E with the strengths and weaknesses of the MDMS products.

D. Support Future Company Tariffs

The MDMS system must support the requirements of the Peak Time Rebate Program and CPP rates as defined in Mr. Gaines' testimony (Chapter 5).

E. Device and Event Management

A new AMI Network will include many new and different types of equipment to install, track and monitor. Along with the equipment will come maintenance schedules, issue tracking and issue resolution. SDG&E sees the MDMS playing an integral role in the operations and maintenance of the AMI assets especially in the following areas:

1. Meter Diagnostics.
2. Scheduled Maintenance on Meters.
3. Meter Testing.
4. Network Preventative Maintenance (e.g., battery replacement).
5. Service History.
6. Warranties.
7. Service Contracts.

F. Data Analysis and Data Processing

Validation, Editing and Estimation (VEE) functions are key elements of any MDMS and are critical to SDG&E. Basic billing rules around data aggregation

and rating are critical to the primary use of meter reading data. SDG&E will continue to support tariffs like TOU and Interruptible rates as well as support major DR initiatives like Net and Bi-Directional Metering. Basic validations on zero consumption and daily usage are critical to perform normal customer inquiries on bills.

G. Data Collection Interfaces

The MDMS system is expected to interface with Head End systems as well as with other meter reading sources like Meter Data Management Agents (MDMA) and MV90, which is in use at SDG&E. SDG&E's AMI meter deployment and installation period is expected to last 2.5 years. During that period meters will continue to be read using current SDG&E methods and processes such as meter reading handheld devices, phone lines and wireless phones with data being integrated using existing interfaces as well.

H. Data Repository/ Data Warehousing

A single source of data for AMI related information is essential to the roadmap SDG&E is building to achieve SDG&E operational benefits. It is anticipated that a data warehouse will be a central feature of our new MDMS and act as the source for all other utility applications. Once the data is retrieved through our new AMI technology it will undergo a VEE process designed from SDG&E's business rules and then stored in the AMI repository. The repository will contain new, historical and changed information and act as the original source of meter reads for other utility legacy systems.

I. Network and Meter Installation

The MDMS should support elements of the network and meter rollout in the areas of Route Planning, Materials Forecasting and Exception Reporting. These functions will be supported through the network head end system and centralized for control activity in the MDMS.

J. Service Management

SDG&E believes the MDMS must act as the control center for Service Order generation for AMI Network Equipment. The system must coordinate actions with SDG&E's legacy Mobile Workforce Management System (SORT) from

order creation to closure. Another service the MDMS must perform is the manual meter read forecast and dispatch during cut-over. The system should evaluate the daily AMI reads with respect to billing cycles to forecast any necessary manual meter reading in the event of system issues, and produce daily reports for exception and resource management.

K. Online Data Presentment

A significant element of AMI is the ability to drive timely interval data to the customer and show them how their usage relates to their bill. The MDMS is expected to provide capabilities to quickly and easily display data on SDG&E's Customer Portal through a service or hosted web application. SDG&E will also provide tools such as online bill calculators to help customer easily understand their usage and the affect on their energy bills.

L. Distribution Automation

To the extent that SDG&E uses devices to track Distribution Operation activities, as described in Mr. Lee's testimony (Chapter 4), the MDMS would be the central reporting and control system. Operations like recloser activities, distributed generation, faulted circuit indications and capacitor bank controls are among the areas that the MDMS will be expected to report and coordinate activity. It is unknown to what degree SDG&E will deploy these types of devices but the MDMS will be expected to accommodate these devices and functionality.

III. SYSTEMS INTEGRATION

A. Description

As previously stated in the section on the Meter Data Management System, SDG&E believes AMI data must integrate with other utility legacy systems to fully realize AMI benefits. SDG&E's systems integration plan is to design an environment that will take advantage of the benefits now, and in the future, as communication technology changes. In order to better understand these benefits, SDG&E conducted Business Process Design (BPD) sessions with over 20 functional organizations. These sessions, as described in Mr. Charles' testimony (Chapter 9), were designed to identify business requirements that will ensure that SDG&E achieves the benefits stated in this business case.

The IT integration plan reflects the overall business requirements from the various functional teams and the potential leveraging of the new AMI data and systems.

B. Service Oriented Architecture/Enterprise Middleware (EM)

The future direction of SDG&E for enterprise integration is Service Oriented Architecture (SOA). SOA is an architectural style whose goal is to achieve loose coupling among interacting software agents, in our case the MDMS and the utilities legacy applications. The loose coupling of the interfaces provides SDG&E a more cost effective way to develop and maintain systems over a longer period of time. As systems change and are replaced, loose coupling allows exchange of information to translate into less impact between systems as the changes occur. SDG&E ultimately plans to use a product for its enterprise middleware (EM) that will manage integration between applications. Integration will be accomplished application-to-EM rather than the more traditional, application-to-application. The EM will be responsible for moving data between applications. The overall goals that SDG&E plans to accomplish with the EM are as follows:

1. Isolation from communications programming.
2. Robust middleware for high performance distributed application integration.
3. Network topology agnosticism.
4. Standard message queuing interface built for Company platforms.
5. Synchronous or asynchronous service.
6. End-to-end message auditing, logging and monitoring.

SDG&E believes that it is prudent to implement the EM during this project to reduce the future risk and costs of system change as new technologies emerge over the next 15-20 years and beyond.

C. Systems Affected Determined by Benefits

SDG&E took a benefits driven approach to identify the systems requiring change. This approach attempts to add as much value to the AMI system without adding unnecessary costs. At this time, SDG&E is considering replacing one

system, Interval Data System (IDS), simply because SDG&E believes that most of the functionality will be addressed in the new MDMS. All other affected utility systems would still utilize the new AMI data under their current, or slightly modified, architecture which provides the basis for the benefits identified in this filing. SDG&E will continue to look for benefits as technologies change throughout the project and; if warranted, we will perform another business case review to quantify the costs and benefits.

SDG&E notes there are several systems that may appear to be significantly impacted by AMI; however, after review of the benefits (BPD sessions), SDG&E has concluded that the following systems will require some modification. SDG&E discusses these systems to ensure we did not overlook their importance or impact:

1. **Customer Information System (CIS).** SDG&E's CIS was originally designed to support many different types of billing tariffs that were possible under the deregulated market for California, starting in 1998. Tariffs that are based around CPP, tiers or hourly pricing have proven to be challenging but not beyond the architecture and abilities of the current CIS. Although we have estimated some enhancements, it is not anticipated that any significant CIS changes would be required to support AMI based tariffs or functionality.
2. **Outage Management System (OMS).** SDG&E believes the MDMS will contain many of the features that are needed to enhance the quality of data around Outages and Restoration of service. SDG&E's OMS system will leverage the MDMS ability to communicate outage and restoration information faster and more accurately than was possible with the telephone trigger used for our current outage processing The changes needed to the OMS for this new process are not costly but the level of service we can provide our customers increases significantly. Again, when benefits can be derived from a new OMS, SDG&E will conduct a separate business case review.
3. **Customer Portal.** SDG&E recently completed a significant project to provide our customers with a web based portal to centralize many customer

functions such has viewing and paying bills. The work performed for that project will be utilized to support the presentment of customer AMI data.

D. Change Management

Change Management is a very important aspect of the integration of AMI into our company business processes and systems. The IT / SI RFP issued in October, 2005 required extensive work to be performed by the vendor in this area. Those areas include:

1. Change Management Plan. The change management plan will include expected business process changes, identification of stakeholders, change agents, communication and training plans, etc. The plan has to be sensitive to the overall culture of the company and the relationships between departments.

2. Employee Communication Plan. The Employee Communication Plan will address concerns and issues related to significant process change that impact various employee job duties and tasks, business processes and practices.

3. Business Process Redesign/Alignment. The Change Management plan will include to-be process redesign/optimization and technology alignment efforts to ensure end user acceptance and realization of maximum benefits from the AMI technology, information systems, and systems integration investments.

4. Help Tools and Training. Finally SDG&E will be investing in Help Tools and Training to ensure the business areas are well equipped with the knowledge and references to operate in the new business environment.

IV. SUMMARY OF THE AMI INFORMATION TECHNOLOGY SYSTEMS COSTS AND BENEFITS

Table DW 10-1

Information Technology Systems
Direct Dollars (Dollars in Thousands)

						Average Annual		
Costs	Total	2007	2008	2009	2010	2011-2026	2027-2029	2030-2038
Capital								
Total Enhance legacy systems and integrate with MDMS Capital Costs	18,751	6,066.90	8,503.90	3,929.00	250.9	0	0	0
Total Implement new MDMS Capital Costs	21,766	5,947.90	4,535.90	396.4	2.7	0	3,626.70	0.3
Total IT Infrastructure & Installation Capital Costs	11,124	10,352.60	341.1	430	0	0	0	0
Total License and Software Fees Capital Costs	5,529	4,662.30	792.6	74	0	0	0	0
Total Server Replacements Capital Costs	32,988	0	0	0	58.2	1,184.10	1,363.80	1,099.30
Total Capital Costs	*90,157*	*27,029.70*	*14,173.40*	*4,829.40*	*311.8*	*1,184.10*	*4,990.60*	*1,099.60*
O&M								
Total Labor O&M Costs	90,785	0	1,573.50	2,577.00	2,721.90	2,999.40	2,993.50	2,993.50
Total Non-Labor O&M Costs	57,178	944.6	1,428.40	1,962.70	1,692.30	1,837.90	1,864.60	1,794.40
Total O&M Costs	*147,962*	*944.6*	*3,001.90*	*4,539.80*	*4,414.20*	*4,837.30*	*4,858.10*	*4,787.90*
Total Costs	**238,119**	**27,974**	**17,175**	**9,369**	**4,726**	**6,021**	**9,849**	**5,887**
						Average Annual		
Benefits	Total	2007	2008	2009	2010	2011-2026	2027-2029	2030-2038
Capital								
Total Labor Capital Benefits	462	232.4	80.1	0	0	4.7	8.3	5.6
Total Non-Labor Capital Benefits	1,591	120	750.9	0	0	22.5	40	26.7
Total Capital Benefits	*2,053*	*352.4*	*831*	*0*	*0*	*27.2*	*48.3*	*32.2*
O&M								
Total Labor O&M Benefits	1,362	72.8	41.6	41.6	41.6	41.6	41.6	41.6
Total Non-Labor O&M Benefits	11,648	0	165.8	254.5	317.6	357.2	406.3	441.7
Total O&M Benefits	*13,010*	*72.8*	*207.4*	*296.1*	*359.2*	*398.8*	*447.9*	*483.3*
Total Benefits	**15,064**	**425**	**1,038**	**296**	**359**	**426**	**496**	**516**

A. Capital Costs

The IT capital costs shown in Table DW 10-1 include the implementation of the AMI Information Technology Systems (i.e. MDMS, Online Presentment and

Rate Analysis) along with the supporting infrastructure and tools. Modifications and integration of existing SDG&E information systems to support the AMI requirements are also included in the costs. Other capital costs include labor and non-labor for server replacements as well as other AMI infrastructure and software upgrades.

SDG&E has divided implementation of the AMI Information Technology Systems work into phases. As of March, 2006, the phases are as follows: Phase 1 implements all required systems and interfaces for installing the first meter in the field. Phase 2 implements all required systems and interfaces for billing our customers utilizing the rate structures / programs described in Mr. Gaines' testimony (Chapter 5). Phase 3 implements all other functionality not in the first two phases required to realize the benefits described in this application. Please note, after vendors are selected and a more detailed project plan is finalized, the scope and cost of each phase will likely change. However, as of March, 2006 SDG&E considers the listed capital and O&M costs in this area to be reasonable estimates.

B. O&M Costs

Ongoing O&M costs shown in Table DW 10-1 represent expected new incremental O&M workforce resources to support new applications, databases and other AMI-related systems assets. These incremental costs include ongoing software licensing and incremental charges to support hardware and software maintenance. In addition, several of the AMI systems and database projects directly support the higher volume of interval data transactions that will be processed daily. The introduction of new interval meters will also require additional resources to complete the daily interval data collection, processing, validation and exception handling.

C. Benefits

Information Technology benefits, capital and O&M, shown in Table DW 10-1 are the result of avoided systems work that would have been undertaken by SDG&E if no AMI implementation were planned. SDG&E had planned to implement a Route Stringing software tool to support a manual process of

changing and restringing meter reading routes. SDG&E had also planned an upgrade to the MV90 software which will not be performed due to the implementation of AMI.

V. AMI PROJECT RISKS AND SDG&E MITIGATION

SDG&E recognizes that the technical challenges that AMI presents to the back office and hardware infrastructure are significant. Processing volumes of interval data into billing determinants will be achieved by a robust Meter Data Management System (MDMS) highly integrated with the Customer Information System as well as the AMI Technology head-end software. Thus, some of the major IT risks introduced by wide scale AMI adoption include: the scalability of the MDMS, the throughput and complexity of the integration between systems, and potential security vulnerabilities at the integration points. Also, the labor estimates for processing interval data assume that the MDMS will automate many tasks. Some of this risk will be mitigated through the formal vendor selection process (demonstrations, site visits, reference checks, background checks, etc.), the selection of a standards-based integration tools, performance and security vulnerability tests, as well as an AMI network security zone. The remaining risk will be managed by SDG&E, its chosen Systems Integrator, as well as the vendor responsible for project management.

There are some risks associated with the schedule for implementation. The 18-30 month schedule and current tight skilled IT labor pool could make it difficult to hire and retain qualified, experienced IT and business systems support staff. To the extent possible, SDG&E will utilize existing staff on the AMI project and will backfill positions with contractors.

To balance the risks outlined above, SDG&E has included the following risk mitigation factors in the financial analysis. First, each IT deliverable was assessed and an average 20% contingency was added for capital labor costs, and a 10% contingency was added to hardware capital (there is no contingency on O&M). Second, IT hourly labor rates reflect the requirements for specialized skills. Third, SDG&E has a philosophy to

buy software rather than build it. Other applicable risk mitigation actions are included in Mr. Charles' testimony (Chapter 8) such as using contract terms and conditions to manage service agreements.

This concludes my testimony.

VI. QUALIFICATIONS OF DAWN WELCH

My name is Dawn Welch and I am employed by San Diego Gas & Electric Company (SDG&E). My business address is 8326 Century Park Court, CP62C, San Diego, CA 92123.

My present position is Software Development Manager for the AMI Project. I have been employed by a variety of Sempra Energy companies from 1997 to the present. Most of my experience has been implementing packaged software across multiple business units as well as across multiple functional areas within the company. From 1998 – 1999, I was the Manager of the SAP Systems Integration team for the Shared Services implementation at Sempra, SDG&E and SCG. In 2000, I managed the implementation of the CommerceOne product for Sempra, SDG&E and SCG, and recently I managed the implementation of the CGI-AMS Credit and Collections software for SDG&E. I also have experience with the Customer Care related systems at SDG&E having managed the CISCO Service Order and Customer Information team.

I have experience with IT process definition and deployment. At my previous company, Northrop Grumman, I led a team where we attained an SEI (Software Engineering Institute) Level 2 certification. In 2001-2002 at SDG&E, I was a Manager for the IT Process and Quality Improvement team. We focused on insuring deployment and compliance of consistent project management processes throughout the IT organization.

I received a Bachelor of Science degree in Computer Information Systems from Arizona State University in 1986. I have not previously testified before the California Public Utilities Commission.