DEVELOPMENT OM&A

1.0 INTRODUCTION

Development OM&A provides funds for the analysis needed to economically operate and develop the distribution system as necessary to meet existing and anticipated load and generation demands, while maintaining delivery system reliability. Development OM&A also ensures standards are in place to meet distribution construction and planning needs, as well as legal and regulatory requirements.

2.0 DISCUSSION

Development OM&A provides funding for the collection of feeder voltage and current (loading) data and the analysis required to support system expansions, reinforcement and protection requirements. As well, generation connection studies are undertaken to evaluate the impact of connecting new or modified generation projects to the Hydro One distribution system as per the requirements of the Distribution System Code.

The Standards and Technology OM&A program covers the development of new, and the review of existing technical distribution standards. Some revisions to existing standards or the development of new standards, are made in response to compliance requirements set by authorities outside Hydro One Distribution, such as the Electrical Safety Authority ("ESA"). The technology portion of the program encompasses Research and Development projects.

The funding for 2010 and 2011, along with the spending levels for the bridge and historic years are provided in Table 1 below.

Table 1
Summary of Development OM&A
($ Million)

Description	Historic (Actual)			Bridge	Test	
	2006	2007	2008	2009	2010	2011
Data Collection, Engineering and Technical Studies	2.8	5.2	4.1	6.7	6.8	6.9
Standards and Technology	1.3	2.8	3.8	2.7	4.9	5.0
Smart Grid Standards & Technology	0	0	0	5.0	10.0	10.0
TOTAL	**4.2**	**8.0**	**8.0**	**14.5**	**21.7**	**21.9**

The increase in overall spending for 2010 and 2011 relative to historic expenditures is attributed to the need to:

- Investment in smart grid standards and technology research to support smart grid investments.
- Conduct feeder technical studies on a cyclical basis and increase system modeling to identify load growth and load balancing issues that will impact safety, line losses, and conditions for generation connections;
- Address increasing needs to interface with generator connection proponents due to the forecasted increase in connection volumes driven by the feed-in-tariff ("FIT") program and government initiatives;
- Increased research and development to understand and address the complexities associated with generation connections and the development of new standards for generation connections;
- Continued efforts to document standards and provide technical review to manage field modifications in response to ESA requirements;

Additional details are provided further on in this Schedule.

2.1 Data Collection, Engineering and Technical Studies

To ensure that up to date and accurate information is available on the operating characteristics of the distribution system, data is routinely collected assessing the adequacy of equipment and supply lines to meet system, customer load, and generation connection needs. This data is collected through a series of studies and measurements and includes interfaces with generator proponents. The data is used to identify system capability and reinforcement needs, and thereby, investment levels in System Capability Reinforcement for lines and stations (Exhibit D1, Tab 3, Schedule 3) to ensure reliable operation of the electrical system.

Specific studies that are undertaken include power quality studies, system modeling for generation connections, and load flow studies. Historically, studies were conducted on a targeted basis in response to a reliability or power quality issue or as a result of a large customer or generation connection on a particular feeder. In recent years, Hydro One Distribution has moved towards a more proactive approach to conducting studies for various reasons.

One example of the proactive approach is the response to generation connections. Hydro One Distribution has increased efforts to interface with generator proponents to analyze potential connections and to model feeders in high wind areas. This modeling anticipates high volumes of wind generation connection projects in response to the government's Green Energy initiative and prepares Hydro One Distribution to efficiently address large volumes of generation connection requests. Funding for generation connection interfaces and studies amounts to $2.8 million annually for 2010 and 2011 and accounts for the increase in overall Data Collection, Engineering and Technical Studies expenditures over historic years.

A second example of a proactive approach is related to an increase in load flow studies. These studies entail the collection of feeder loading data along with analysis to identify situations of steady load growth due to the addition of many small services over time. The studies are focused on identifying feeders that are nearing their rated capacities or feeders that have other loading issues (e.g. phase imbalances, uncoordinated protections). Once issues are identified, alternative solutions are studied and preferred plan are implemented. This proactive approach adopts a cyclical basis for load flow studies that ensures compliance with the Distribution System Code and associated supply standards (e.g., voltages maintained within acceptable limits). Furthermore, it is effective for minimizing line losses and mitigating safety risks on the system. The cost for surveys and studies is $4.0 million in 2010 and $4.1 million in 2011.

The overall Data Collection, Engineering & Technical Study program includes work that is of a continuous and ongoing nature and is required to avoid deterioration of service. The 2010 and 2011 spending requirements for this program are $6.8 million and 6.9 million respectively. The increase over historic levels is primarily attributed to the need for increased engineering and technical support for the anticipated increase in generation connections, as well as the shift to cyclical studies to proactively identify load growth and load balancing issues

Reduced funding of this program would result in a lack of data available on which to base distribution system investment decisions, inability to properly analyze the needs of the system to meet existing customer and new connection requirements and manage the large volume of expected generator connections. More specifically, there would be an inability to meet expected time lines for processing and connecting new generators. In addition, there is an increased risk of electrically overloading system assets, possibly resulting in equipment damage, and allowing the delivery system performance to deteriorate, leading

to higher line losses, declining reliability for customers and service quality degradation (e.g. voltage degradation, increased frequency of outages, and increased outage duration).

2.2 Standards and Technology

Technical standards form a collection of comprehensive references used as templates and productivity tools to efficiently and effectively carry out operating, maintenance, and capital programs. Standards also incorporate company policies and requirements to ensure compliance with regulations such as the Electrical Safety Code. The collection of standards includes over 350 planning, design and maintenance specifications, 500 material specifications and 800 standards-related drawings.

The Standards program covers the development and maintenance of distribution standards, which are driven by public and worker safety, equipment obsolescence, evolving regulatory requirements, technological advancements and changes in work methods. Hydro One Distribution monitors and influences emerging industry standards and requirements for new standards mainly through its participation in Canadian Standards Association working groups.

The Technology program provides the funding to monitor, assess the benefits, and evaluate the feasibility of emerging technologies, as well as enabling the implementation of new tools and methods. Hydro One Distribution monitors emerging technologies mainly through its participation in industry interest groups that include CEA Technologies Inc. ("CEATI") and Electric Power Research Institute ("EPRI"). Where possible, the Technology program expenditures are leveraged through those interest groups by jointly funding projects with other utilities that have similar interests or challenges.

The 2010 and 2011 spending requirements for this program are $4.9 million and $5.0 million respectively. The increase over historical spending is primarily attributed to the following:

- Increased research and development to understand and address the complexities associated with generation connections
- Work associated with developing new standards for generation connections.
- Increased efforts to document and approve standards and provide technical review to manage field modifications in order to comply with ESA requirements.

Reduced funding would result in the unavailability of necessary standards to meet regulatory requirements, construction and planning needs and to effectively deal with technical issues associated with generation connections. Opportunities to utilize emerging technologies would be missed with the potential for increased longer term costs as a result.

2.3 Smart Grid Standards and Technology

Hydro One Distribution's Smart Grid plan builds on the foundations of an intelligent smart meter infrastructure. The telecommunications required for smart meters, along with visibility and control of the distribution system, will allow the integration of distributed generation ("DG") and allow customers to manage their electricity demand ("CDM"), both of which are driven by the Ontario Government's green initiatives. The main objective is to innovate, develop and field pilot new system(s), emerging technologies and business processes that will permit Hydro One Distribution to implement, and operate at scale, Smart Grid solutions in a proactive manner as asset solutions and replacement strategies are decided. For example, as part of these investments Hydro One will assess Wimax and GIS mapping, DG Technology trials and distribution system

reconfiguration. In addition, it will include assessment and revision/development of planning, engineering, procurement, standards and relevant operating procedures. In many cases the new procedures are a significant departure from the past, where much of the operation was via manual processes. With the magnitude of new devices on the systems (e.g. CDM, DG, monitoring and control), a new level of scalability and accompanying automation will be required. This will require effort in the design of new business process and systems integration. Hydro One also plans to field test a Plug In Hybrid Electric Vehicles ("PHEV") trial in the Smart Zone along with third party collaboration, as discussed in more detail at Exhibit D1, Tab 3, Schedule 3.

Hydro One Distribution's "Smart Zone" sandbox in Owen Sound is being implemented to develop and plan for testing new technologies and systems prior to recommending corporate-wide deployment. The work will be implemented through a combination of work performed within Hydro One and external service providers. For more information about the Owen Sound Smart Zone, please refer to Development Capital Exhibit D1, Tab 3, Schedule 3.

In order to better understand these new emerging technologies and possible implications to the power system, Hydro One has established and/or participates in an extensive information sharing network. Some of the key examples of such networks include Edison Electric Institute ("EEI"), Electric Power Research Institute ("EPRI"), Institute of Electrical and Electronics Engineers ("IEEE"), International Council on Large Electric Systems ("CIGRE"), International Electrotechnical Commission ("IEC"), Utilities Telecom Council ("UTC"), Utilimetrics, Utility Standards Board ("USB") and National Institute of Standards and Technology ("NSIT"). These collaborative networks are international in their reach and include utilities, academics, vendors and system integrators as members/participants. In these networks, we are participating to develop concepts and standards of smart grid and keep abreast with technology. For example,

NSIT is developing smart grid standards within United States in collaboration with EPRI; and IEEE, IEC and CIGRE are working on international guides and standards.

In addition Hydro One funds specific studies either through the above networks or directly to universities or consultants and commissions them to examine/test/study a specific aspect of smart grid as it impacts the utility system.

In 2010 and 2011, the OM&A investment plan will include work on key elements and system(s) that will enable the Company to meet the requirements of the *Green Energy and Green Economy Act, 2009* and develop a distribution system that is intelligent and flexible. It will fund a number of studies including dynamic reactive support (DVAR), energy storage, such as battery/compressed air energy storage ("CAES"), and PHEV. It will also include the development and implementation of business process changes in the Smart Zone, maintenance of new or modified hardware (e.g. Distribution Management Systems and Operational Data Store) as well as maintenance of the associated interfaces and event management software , project management, and the development and piloting of stakeholder communications.

The 2010 and 2011 spending requirements for this program are $10.0 million per year, of which $5.0 million per year is associated with the development OM&A spending in the Smart Zone and $5.0 million per year is for the studies referenced above.