

**Table 1:
Strategic Goals**

<u>Business Value</u>	<u>2010 Performance Target</u>
Safety Focus on cultural change to create and maintain an injury-free workplace.	Zero serious injuries and zero serious near misses
Customer Service Become a more customer-focused company. Improve customer satisfaction. Build relationships with large and mid-size customers that reflect their commercial requirements.	90% customer satisfaction in all major segments
Reliability Maintain or improve reliability and service standards in the distribution system while expanding the system to meet Ontario's future needs.	First quartile distribution reliability (like with like comparison)
Employees Manage the challenges of labour demographics, productivity improvement, development of skills And retention of critical staff.	Attract, develop and retain productive employees
Shareholder Maintain an effective borrowing capability through stable credit quality, and deliver stable financial returns.	Maintain "A" credit rating Allowed regulated return on equity Top quartile capital/operating efficiency Top quartile employee productivity

2.0 SYSTEM BACKGROUND

The Hydro One Distribution system has evolved over almost 100 years. At Dec. 31, 2006, Hydro One Distribution managed \$3.5 billion in fixed assets supplying electricity to customers across the province of Ontario. The assets consist of about 119,900 circuit

1 kilometers of distribution line and 1006 distributing and regulating stations. The system
2 delivers electricity at voltages below 50 kV from Ontario's transmission and generation
3 systems to 34 Local Distribution Companies, approximately 1.2 million Retail Customers
4 and 44 directly connected large users. The system is also likely to be used increasingly to
5 serve distributed generators. As of the end of June, 2007, the Ontario Power Authority's
6 (OPA's) Renewable Energy Standard Offer Program had resulted in about 1,000 projects
7 exploring the feasibility of developing new renewable generation up to 10 MW
8 connecting to Hydro One's distribution system. It is expected that many of these will go
9 forward and connect to the system.

10
11 The Hydro One Distribution system is mainly radial in design, with very little
12 redundancy in supply to customers, which is consistent with other rural systems.
13 Because of this configuration, most component failures require immediate repair to
14 restore service. To effectively manage the response to trouble calls from customers,
15 initial problem assessment and dispatching of a response is handled through the single
16 Ontario Grid Control Centre (OGCC).

17
18 The Hydro One Distribution system typically operates in a service territory characterized
19 by low customer densities. To cost-effectively provide operating, maintenance and
20 restoration services there are a number of Service Centers located throughout the
21 Province. These Service Centers provide base locations for field crews and related
22 materials, tools and equipment.

23 24 **3.0 DISTRIBUTION SYSTEM COMPONENTS**

25
26 The Hydro One Distribution system receives wholesale electricity from the transmission
27 system and delivers it to consumers at lower voltages through a series of radial assets. It
28 is also used to take electricity from smaller distributed generators connected directly to

1 the distribution system, or connected to load customer systems which are connected to
2 the distribution system. The system consists primarily of the following assets:

3

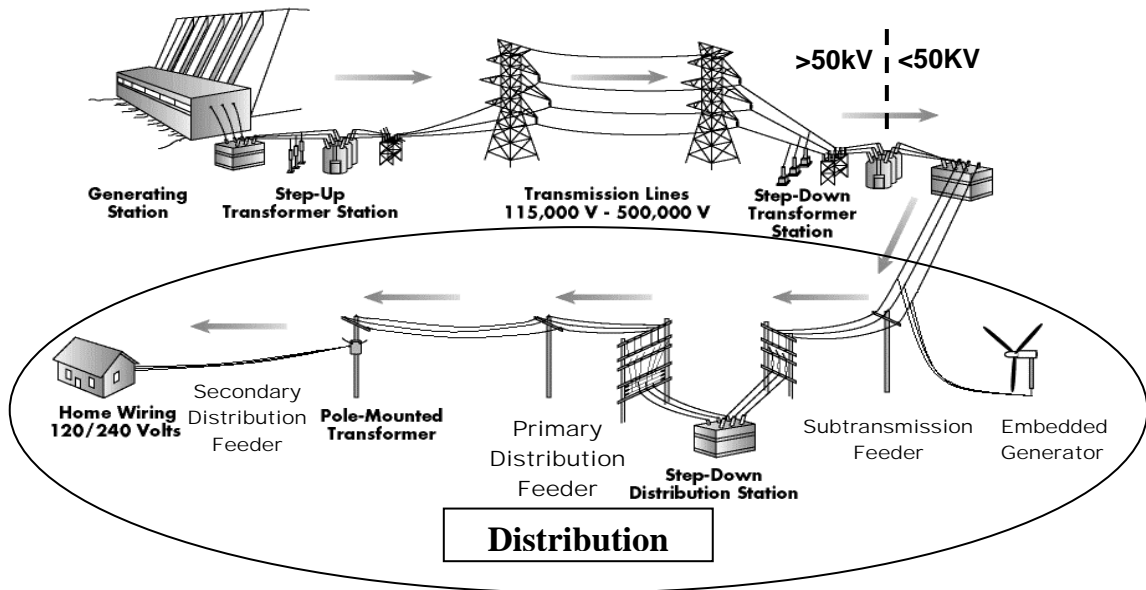
- 4 • Subtransmission feeders
- 5 • Distribution Stations
- 6 • Primary Distribution Feeders
- 7 • Pole top and pad mounted transformers
- 8 • Secondary distribution feeder

9

10 Figure 1 provides a simplified illustration of Hydro One Networks' distribution system.

Figure 1: Hydro One Networks' Distribution System ¹

11



12

¹ For illustrative purposes only, actual configuration may vary from case to case.

1 **3.1 Subtransmission Feeders**

2
3 Hydro One's 24,800 circuit kilometers of subtransmission feeders predominately
4 originate at transmission transformer stations and in some cases at distribution stations
5 and provide a link between Hydro One Networks' system and large distribution
6 connected customers, (e.g. generators, distribution LDCs) and other end use customers.
7 Typically, subtransmission feeders supply service at 44 kV, 27.6 kV, 25 kV, 22 kV and
8 13.8 kV directly to end-use customers or deliver service to distribution stations owned by
9 either LDCs or Hydro One Distribution where further voltage transformation takes place.

10
11 In some cases, regulating stations are used to maintain subtransmission feeder voltages
12 within the prescribed limits. This is needed because the line voltage increases or
13 decreases depending on the loading variations at the distribution stations supplied by the
14 sub-transmission feeders.

15
16 **3.2 Distribution Stations**

17
18 Distribution stations step down voltage from transmission or sub-transmission levels to
19 primary distribution voltage for distribution to commercial, industrial, farm, year-round
20 residential and seasonal residential customers. In future, where the output of distributed
21 generation served from a distribution station exceeds the demand of load customers
22 served by that station, the distribution station will also be required to step up voltages as
23 the flow reverses from the normal direction of serving load.

24
25 Distribution stations typically consist of one or two transformers, depending on the load
26 that needs to be supplied. A loss of any one element (such as a transformer or a feeder) at
27 a distribution station will normally result in the interruption of service to all customers

1 served from that station until the failed component is repaired or replaced, or until an
2 alternate service is enabled.

3 4 **3.3 Primary Distribution Feeders**

5
6 Hydro One Distribution has 95,100 circuit kilometers of primary distribution feeders
7 operating from 4 kV to 13.8 kV. These feeders are radial circuits that deliver power from
8 distribution stations to individual customers via pole top and pad mounted transformers
9 and include overhead circuits, underground cables and submarine cables. These feeders
10 are also likely to be used to serve increasing numbers of smaller new generators in future.

11 12 **3.4 Pole Top and Pad Mounted Transformers**

13
14 Hydro One Distribution's 435,000 pole top transformers are used to step down primary
15 distribution voltages to secondary voltage level, the voltage level used by residential and
16 small commercial customers. Hydro One's system also has 40,000 pad mounted
17 transformers which perform the same function when power is supplied by underground
18 feeders.

19
20 Depending on the proximity of adjacent customers, each single-phase pole top or pad
21 mounted transformer may supply several customers at 240/120 volts whereas a three-
22 phase pole top or pad mounted transformer supplies a single customer at 600/347 volts or
23 208/120 volts.

24 25 **3.5 Secondary Distribution Feeders**

26
27 Hydro One Distribution's system has approximately 48,000 kilometers of secondary
28 distribution feeders connect pole top or pad mounted transformers with individual

1 customers at the secondary voltage levels described in the previous section. These feeders
2 could be either underground or overhead when originating from a pole top transformer
3 and underground only when originating from a pad mounted transformer.

4 5 **4.0 WORK PLANNING AND SYSTEM OPERATIONS**

6
7 Hydro One Distribution's investment plans and work needs are based on a long-term
8 planning cycle which takes into account various factors such as asset condition
9 assessment studies, historical performance data, asset criticality, availability of spare
10 equipment and material, asset demographics, load growth and future capacity
11 requirements. Program and project needs are evaluated using the prioritization approach
12 described in Exhibit A, Tab 14, Schedule 5. The prioritization approach uses business
13 values reflecting Hydro One Distribution's mission and strategic objectives to develop a
14 ranked list of projects and programs. The annual work plan is then refined to a more
15 detailed level, scheduled and implemented. The work plan also includes provision for
16 unplanned work necessitated by storm damage, equipment failures and other
17 unforeseeable events.

18
19 The annual work plan is broadly grouped into Sustaining, Development and Operations
20 categories, as further described below.

21 22 **4.1 Sustaining**

23
24 Asset sustaining work is defined as the work required to maintain existing infrastructure
25 and facilities such that they operate at their required performance level. Hydro One
26 Distribution plans and executes asset sustainment work to maintain customer delivery
27 reliability system-wide while meeting applicable legislative, regulatory, safety and
28 environmental requirements. The capital component of sustaining work deals primarily

1 with refurbishment or replacement of end of life components or systems. The OM&A
2 component of sustaining work addresses preventive and breakdown (corrective)
3 maintenance within the useful life span of the asset.

4
5 The Sustainment OM&A and Capital components of the investment plan are described in
6 Exhibit C1, Tab 2, Schedule 2 and Exhibit D1, Tab 3, Schedule 2 respectively.

7 8 **4.2 Development**

9
10 Hydro One Distribution plans and executes development work on the distribution system
11 to connect new load customers and generators, and to ensure that the system has
12 sufficient capability to supply existing and forecast loads. Included in the Development
13 category is work to improve the reliability of service to customers, ensure that service is
14 within acceptable utility standards, and in some cases mitigate risks associated with
15 deteriorated assets, where a different network configuration is preferable to like-for-like
16 asset replacement. The work is largely driven by customer demand and involves both
17 short-term and long-term system reinforcement projects. Funding levels are based on
18 meeting requirements of the Distribution System Code and Hydro One Distribution's
19 Conditions of Service, and addressing the most critical system reinforcement needs.

20
21 The Development OM&A and Capital components of the investment plan are described
22 in Exhibit C1, Tab 2, Schedule 3 and Exhibit D1, Tab 3, Schedule 3 respectively.

23 24 **4.3 Operations**

25
26 The Operations category primarily includes work to operate the distribution system on a
27 day-to-day basis. As noted above, the distribution system is operated through a
28 combination of central control and dispatch via the OGCC, and local response by field

1 crews operating from service centers across Hydro One Distribution's service territory.
2 This approach allows for efficient problem-identification and dispatch of personnel as
3 well as timely customer notification. Currently the Hydro One Distribution system relies
4 on power-off calls by customers to identify interruptions except at locations where a sub-
5 transmission feeder originates at a transformer station. Real time monitoring exists at
6 these transformer stations, but not on other locations on the distribution system.

7
8 The Hydro One Distribution system covers an extensive geographic area and its customer
9 base is both urban and rural resulting in large density differences. The company's
10 response capability is dependent on service center location, fault location and terrain. In
11 general, high-density areas are served within 2 hours and in rural areas response times
12 can be up to 4 hours due to travel requirements. This scale and diversity in the
13 distribution system has a direct impact on Hydro One Distribution's costs and system-
14 average interruption measures for both frequency and duration.

15
16 The Operations OM&A and Capital components of the investment plan are described in
17 Exhibit C1, Tab 2, Schedule 4 and Exhibit D1, Tab 3, Schedule 4,

18 19 **5.0 ASSET MANAGEMENT MODEL**

20
21 Hydro One has adopted an Asset Management model in designing the processes used to
22 plan, approve and implement work. The key principles include having functions primarily
23 responsible for defining the work requirements (Asset Management functions) and
24 functions primarily responsible for delivering asset and customer based services in
25 accordance with the defined work (Work Execution functions). Primary responsibility for
26 planning and decision making associated with the management of distribution assets falls
27 under the Asset Management functions, whereas primary responsibility for providing

1 engineering, design, estimating, construction, maintenance, operating, and customer care
2 services falls under the Work Execution functions.

3
4 Both components of the business actively participate in all phases of work planning and
5 implementation. However, the focus created by this approach allows Hydro One
6 Distribution to better create the competencies and cost-efficiencies to effectively plan and
7 implement the work.

8 9 **5.1 Asset Management Functions**

10
11 Hydro One manages its distribution assets using two main processes, Strategy
12 Development and System Investment.

13 14 **5.1.1 Strategy Development**

15
16 The Strategy Development function provides a managed approach for developing
17 strategies, policies, and standards associated with the operation, maintenance and
18 expansion of the distribution system. This function is specifically responsible for
19 designing programs to:

- 20
- 21 • Ensure compliance with regulatory requirements;
 - 22 • Achieve business objectives such as public and employee safety, reliability,
23 productivity and customer service;
 - 24 • Provide feedback for continually improving process effectiveness and asset/business
25 performance; and
 - 26 • Incorporate new methodologies and refining existing methodologies to improve
27 effectiveness and productivity of processes in place.
- 28

1 The Strategy Development function provides the strategies and framework used by the
2 System Investment function to develop programs and investments for Hydro One's
3 distribution assets.

4
5 5.1.2 System Investment

6
7 Hydro One's distribution business strives to continually improve the efficiency and
8 effectiveness of the regulated wires assets. This involves asset management processes and
9 practices to ensure that the asset related decisions are consistent, cost-efficient and
10 effective. These decisions are aimed at developing a prioritized and rationalized
11 investment plan for the operation, maintenance and upgrade of existing assets, and the
12 addition of new assets.

13
14 Hydro One utilizes a Life Cycle Planning concept which recognizes that the distribution
15 business encompasses a portfolio of assets that must be managed over the long term and
16 reflects the fact that not all assets have the same life cycle characteristics or the same
17 criticality with respect to achieving business values and performance.

18
19 In preparing investment plans, the planning function utilizes Asset Condition Assessment
20 information (described in Exhibit D1, Tab 2, Schedule 1), historical performance data,
21 asset criticality, availability of spares and asset demographics to develop a detailed list of
22 specific work needs.

23
24 Each specific work need is evaluated against the business values, described in Exhibit A,
25 Tab 14, Schedule 5, to establish the benefit of the work and the associated risks of not
26 conducting it. Solutions are developed to mitigate these risks on a program-by-program
27 basis. For each program a prioritization index (cost versus benefit) is developed and all
28 investments are then prioritized in accordance with the process described in Exhibit A,

1 Tab 14, Schedule 5. This prioritized list of programs is then detailed, scheduled and
2 implemented by the work execution functions.

3
4 Substantial new generation appears likely to connect to Hydro One's distribution system
5 over the next few years. At present, generators are connected on a completely user pay
6 basis. As such, the distribution system is not being developed proactively to
7 accommodate potential new generation. However, there is a need to evolve the
8 distribution planning function to deal with issues related to such things as distribution
9 system limits on generation capacity, maintaining reliability and power quality for other
10 customers, and ensuring the necessary operational and planning flexibility to respond to
11 changing system needs. As a result, the addition of new generators will lead to an
12 expanded scope for distribution system planning going forward

13 14 **5.2 Work Execution Functions**

15
16 The work execution functions provide engineering, design, estimating, construction,
17 maintenance, and operating services. Customer relationship management and support
18 services and supporting research, environmental, and public/employee health and safety
19 programs are also provided by these functions. These activities are performed by a multi-
20 disciplined workforce capable of performing tasks related to operating, maintaining and
21 expanding the distribution business. There are three primary work execution functions
22 within Hydro One: Customer Operations, Grid Operations and Engineering and
23 Construction.

24 25 **5.2.1 Customer Operations**

26
27 The Customer Operations function is responsible for the design, estimating, scheduling
28 and completion of line construction and maintenance work for lines, including forestry

1 and customer care support services. As well, the Customer Operations function has
2 accountability for planning and connecting new retail customers to the distribution
3 system and to address local system planning issues. The work activities are managed
4 through the following core processes:

- 5
- 6 • Estimating Process,
 - 7 • Planning and Scheduling Process,
 - 8 • Project Management Process,
 - 9 • Customer Connection Process,
 - 10 • Condition Assessment, Line Maintenance, and Lines Sustaining Capital work
11 execution,
 - 12 • Lines Trouble Response and Correction Action Process,
 - 13 • Lines Development Capital work execution,
 - 14 • Work Program Management, and
 - 15 • Work Reporting Processes.
- 16

17 Lines and Forestry services provide for the maintenance of overhead and underground
18 distribution lines and for vegetation management. The vegetation management program
19 is necessary to ensure that clearances to energized equipment are maintained and that
20 these clearances provide a sustainable level of reliability.

21

22 Customer care services may be divided into the following high-level functions: meter
23 reading; billing; settlements; customer contact handling; and collections.

24

25 5.2.2 Grid Operations

26

27 The Grid Operations function provides maintenance and technical services for stations
28 and protection and control. This function also provides central operations and services for

1 distribution which includes distribution system operation from the OGCC. The work
2 activities are managed through the following core processes:

- 3
- 4 • Estimating Process,
 - 5 • Planning and Scheduling Processes,
 - 6 • Condition Assessment, Station Maintenance, and Station Sustaining Capital work
7 execution,
 - 8 • Trouble Response and Corrective Action Process,
 - 9 • Work Program Management, and
 - 10 • Work Reporting Processes.
- 11

12 The OGCC coordinates an extensive outage program with various internal stakeholders
13 and external customers to support Hydro One's distribution expansion and maintenance
14 programs. Required outages are assessed and coordinated to minimize their impact on
15 reliability and customer operation.

16

17 Grid Operations also maintains back-up operating facilities which serve as a fully
18 redundant back-up to the OGCC.

19

20 5.2.3 Engineering and Construction

21

22 The Engineering and Construction function provides services ranging from engineering
23 and design to the construction and commissioning of new or enhanced facilities. These
24 projects include the engineering, estimating, project management, and construction of
25 stations, system protection and control, as well as engineering services as required. The
26 work activities are managed through the following core processes:

27

- 1 • Estimating Process,
- 2 • Planning and Scheduling Process,
- 3 • Project Management Process, and
- 4 • Project/Program Controls Process.

6 6.0 RELIABILITY

7
8 The reliability of the distribution system and its ability to delivery power to customers
9 without interruption is measured using the following two industry standard metrics:

- 10
11 • System Average Interruption Duration Index (SAIDI)
- 12 • System Average Interruption Frequency Index (SAIFI)

13
14 SAIDI is a measure that indicates the amount of time without power that an average
15 customer on Hydro One Distribution's system experienced in a given year. SAIFI is a
16 measure that indicates the number of times that an average customer on Hydro One
17 Distribution's system was interrupted in a given year.

18
19 Reliability performance is affected by the level of equipment maintenance and
20 replacement programs, which ensure assets remain in good operating condition, and by
21 the level of vegetation management, which ensures that outages caused by tree contacts
22 are minimized. In addition, the time required to respond to a power interruption has a
23 direct impact on restoration time and therefore impacts the SAIDI measure.

24
25 Spending levels for vegetation management and other maintenance programs are
26 determined by balancing the benefits achieved through a reduction in the number of
27 incidents and reduced future costs (such as lower unit costs to remove less vegetation),
28 against the cost of additional spending to achieve the longer term reductions. Costs and

1 reliability are derived using life-cycle analysis and these are ranked against other
2 investment plans using the prioritization methodology described in Exhibit A, Tab 14,
3 Schedule 5 to arrive at the optimum spending levels.

4

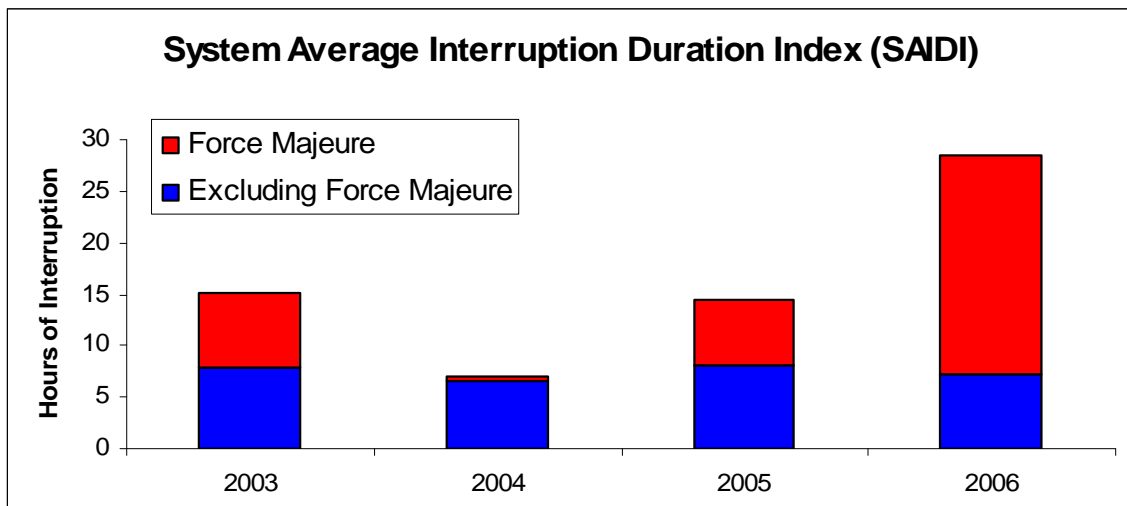
5 The following two figures illustrate Hydro One Distribution's reliability performance
6 over the 2003 to 2006 period. Note that an event is considered *force majeure* when it
7 impacts more than 10% of customers serviced by Hydro One Distribution.

8

9

Figure 2: Yearly SAIDI Performance

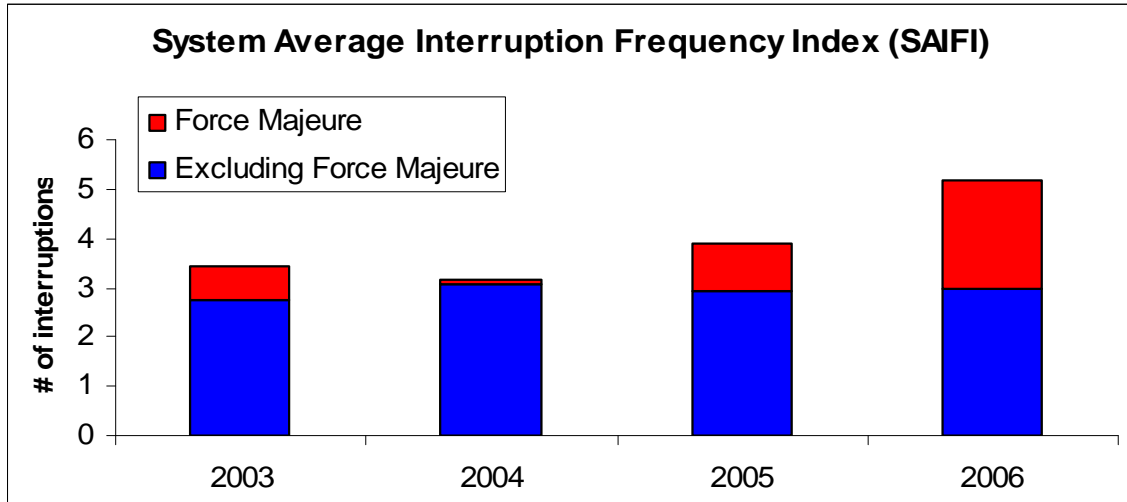
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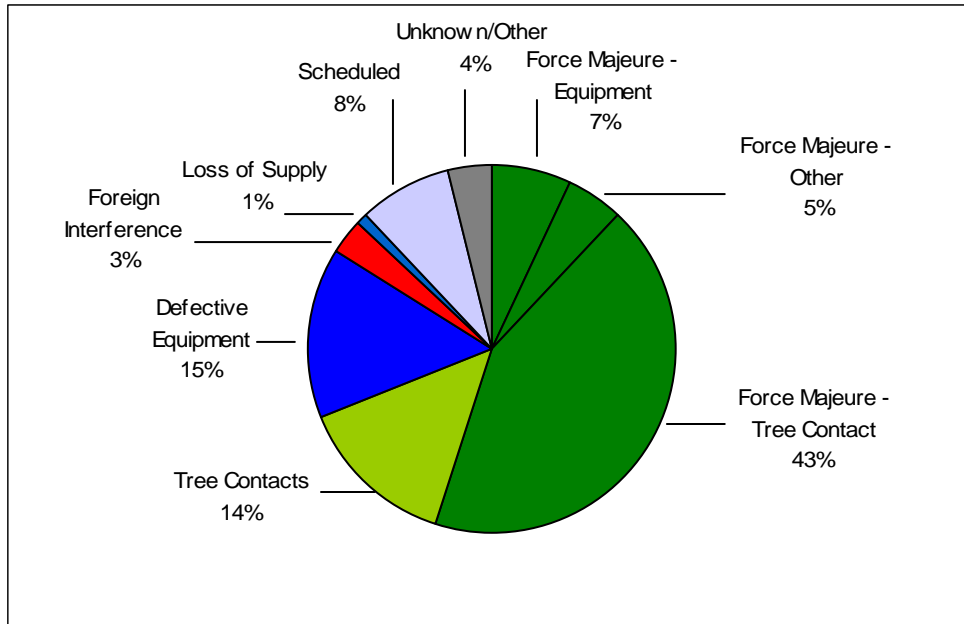
Figure 3: Yearly SAIFI Performance



Excluding *force majeure* events, performance for both SAIDI and SAIFI has remained relatively consistent during the 2003 to 2006 period, with performance in 2006 remaining stable or improving relative to 2005. Including *force majeure* events, performance has varied significantly from year to year due to variations in the number and severity of storms that have affected the Hydro One Distribution system in a given year.

Figure 4 below illustrates the factors that contributed to the SAIDI performance over the 2003 to 2006 period.

1 **Figure 4: Contributions to SAIDI - Four Year Average 2003 - 2006**
2



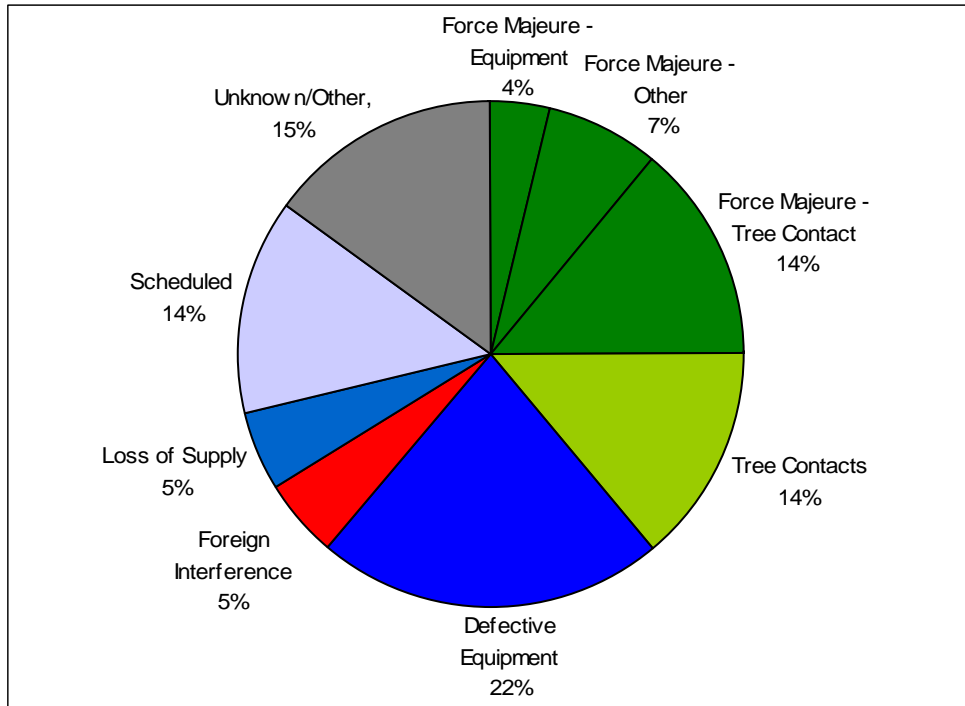
3 * Excludes Aug 14, 2003 blackout
4
5

6 Outages attributed to *Force majeure* events (e.g. high winds, ice or snow) contributed to
7 55% of SAIDI. With a focus on specific causes, it is noted that tree contacts account for
8 57% of total SAIDI (43% *force majeure* and a further 14% excluding *force majeure*).
9 The next largest contributor to SAIDI was defective equipment at 15%.

10
11 Figure 5 below illustrates the factors that contributed to the SAIFI performance over the
12 2003 to 2006 period.
13

1
2

Figure 5: Contributions to SAIFI - Four Year Average 2003 - 2006



3
4
5

* Excludes Aug 14, 2003 blackout

6
7
8
9

Tree contact was the main contributor to SAIFI totaling 28% (i.e. 14% *force majeure* and a further 14% excluding *force majeure*). The other significant contributor was defective equipment at 22%.