

Strategy Proposal – Summary
Asset Management Strategy
Electricity Distribution

A Strategy paper by Jeff Smith/Pat Hogan – 07/02/08

Description

The existing Asset Management Strategy for Electricity Distribution was approved by the Distribution Capital Investment Group on January 3, 2008. This Asset Management Strategy is a revision to reflect objectives which align with the Electricity Distribution Operations Strategic Plan and the Approved Asset Management Policy. The Distribution Capital Investment Group is invited to APPROVE this revised Asset Management Strategy.

The Asset Management Strategy is attached as an Appendix to this paper.

Category: **NA**

BIT score: **NA**

Finance

Sanction Cost **NA**

Probability that project cost will exceed 10% tolerance: **NA**

Project included in approved Business Plan? **NA**

Project cost relative to approved Business Plan **NA**

If cost > approved B Plan how will this be funded? **NA**

Other financial issues: None

£/\$m	Current planning horizon							Total	
	Prior YR'S	Yr 1 08/9	Yr 2 09/10	Yr 3 10/11	Yr 4 11/12	Yr 5 12/13	Yr 6+		
Proposed investment									

Resources

Availability of internal resources to deliver project: **NA**

Availability of external resources to deliver project: **NA**

Operational impact on network system: **NA**

Key issues

- Initial Asset Management Strategy approved January 3, 2008, prior to final development of Strategic Plan/Objectives for Electricity Distribution Operations.
- Revised Asset Management Policy approved June 4, 2008.
- PAS 55 Gap Analysis showed the existing Asset Management Policy and Strategy were not completely in alignment with the categories of objectives within the overall Distribution Strategic Plan.

Key milestones

- NA

Climate change
Contribution to National Grid's 2050 80% emissions reduction target: **NA**
Impact on adaptability of network for future climate change: **NA**
Are financial incentives (e.g. carbon credits) available? **NA**

Prior sanctioning history including relevant approved Strategies

- 01/03/08 – Distribution Capital Investment Group
Asset Management Strategy
- 06/04/08 – Distribution Capital Investment Group
Asset Management Policy

Recommendations
The Distribution Capital Investment Group is invited to:
(a) **APPROVE** the Asset Management Strategy revision

Decision of the Sanctioning Authority
I hereby approve the recommendations made in this paper.

Signature..... Date.....
[Name and title of sanctioning authority]

Supporting signatures (not required if DCIG minutes reflect approval of paper)

Investment planning

Signed _____ Date _____
Christian Brouillard, Director, Investment Management

On behalf of Regulation by

Signed _____ Date _____
Peter Zschokke, VP US Regulatory Strategy & Research

On behalf of Procurement by

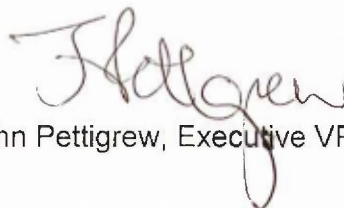
Signed _____ Date _____
Jeffrey Way, VP Procurement

Sponsor's Signature

(Required)  Date *7/24/08*
Signed _____ Date _____
Patrick Hogan, Sr. VP Network Strategy

**Decision of the DCIG Sanctioning Authority
(Required)**

I hereby approve the recommendations made in this paper

Signed  Date *7/28/08*
John Pettigrew, Executive VP Electricity Distribution, National Grid

Distribution Line Overarching Strategy

Table of Contents

Amendments Record	2
Strategy Justification.....	3
1.0 Purpose and Scope	3
2.0 Asset Management Objectives	3
2.1 Sustainable Network.....	4
2.2 Adjacent Assets	4
2.3 Individual Asset Strategy Objectives.....	4
3.0 Asset Management Strategy Framework.....	5
3.1 Asset Strategy Types	5
3.2 Reliability Focused Strategies	6
3.3 Sustainability Focused Strategies	6
3.4 Other Asset Strategy Types	6
4.0 Asset Strategy	6
5.0 Asset Management Tools.....	6
5.1 Asset Inspection Programs.....	7
5.2 Asset Register Systems.....	8
5.3 Reliability Data.....	9
5.4 Asset Condition Data.....	9
5.5 Risk Register and Risk Assessment.....	9
6.0 State of the System	10
6.1 Assets by State.....	10
6.2 Service Territory Graphics.....	11
6.3 Load Data by Company	12
6.4 Replacement Value of Assets	13
6.5 Asset Age Profiles by Asset Class.....	14
7.0 Ability to Deliver	16

Amendments Record

Issue	Date	Summary of Changes	Author(s)	Approved By (Inc. Job Title)
2	07/02/2008	Deleted Strategy Statement (redundant) Deleted Substation references due to separate strategy document Updated Section 2 (AM Objectives) to align with updated OSP objectives Updated Section 3 (AM Strategy Framework) with graphic and revised text Updated Section 4 (Existing Asset Strategy) with summary of approved documents Updated Section 5 (AM Tools) with progress on inspection program and SubT flyover. General editing for terminology, company/department name changes and data table updating	Jeffrey H. Smith Distribution Asset Strategy	John Pettigrew Executive Vice President, Electric Distribution Operations Chairman of DCIG
1	01/03/2008	Initial Issue	Jeffrey H. Smith – Asset Strategy Dev. John M. Teixeira – Asset Strategy Dev. Anthony J. McGrail – Sub. Eng. Services	John Pettigrew Executive Vice President, Electric Distribution Operations

Strategy Justification

1.0 Purpose and Scope

This paper outlines National Grid US Electric Distribution Operations' (US EDO) strategy objectives and processes. This paper is meant to be revised as the company's strategies, processes, and organization evolve over time.

This document is subject to annual review and continuous improvement and is a controlled document. This document is approved and endorsed by senior leadership.

It is the intent that this strategy be:

- Consistent with the company's organizational plan,
- Consistent with all organizational policies,
- Provide the framework for developing and enabling specific asset management strategies, and
- Be consistent with the company's overall risk management objectives.

The purpose of this document is not to lay strategies for individual asset classes. This is done in the individual asset management strategies. This document details the overall asset management strategy and philosophy within which the individual asset class strategies lie.

This document describes how National Grid US EDO will meet stated levels of service, reliability and business performance through the efficient and effective management of its electric distribution assets within the framework of responsible corporate governance and the regulatory environment.

The distribution substation overarching strategy is covered under a separate document due to the more specific nature of the assets.

2.0 Asset Management Objectives

US EDO has set specific asset management objectives in four areas. These objectives are subject to review and change on a continuing basis. The current objectives are:

➤ Safety

- Achieve zero injuries every day
- Continue to work on processes, systems and designs that improve safety, and to reinvigorate our safety culture to bring fresh effort to improving performance
- Design for safety

➤ Reliability

- Meet service quality requirements for all states by calendar year 2008
- Achieve first quartile performance (excluding regional IEEE 1366 major event days) compared to a selected group of peers in SAIDI, SAIFI and CAIDI by calendar year 2012
- Achieving this objective, and making it sustainable, will require a significant investment in the replacement of our aging infrastructure
- Building relationships with our regulatory bodies is required to achieve mutual understanding for the need to support long-term investment in a sustainable distribution network

➤ **Customer Service**

- Meet regulatory targets for customer satisfaction scores in all states in calendar year 2008
- Achieve first quartile performance (as measured by JD Power & Associates Electric Utility Satisfaction Surveys) compared to a selected group of peers in residential and business customer satisfaction across all service territories by end of calendar year 2012

➤ **Efficiency**

- Achieve first quartile performance compared to a select group of peers in O&M spending per customer by end of calendar year 2012
- National Grid will constantly strive to be more efficient in the service we provide to our customers by improving annual O&M cost efficiency and improving capital efficiency

2.1 Sustainable Network

In addition to meeting the specific and general objectives in the broad areas listed above, asset management strategies are specifically intended to create and maintain a sustainable network. A sustainable network is one which receives the attention necessary to meet stated network performance targets (reliability, safety, stakeholder expectations, etc.) both at present and into the foreseeable future.

Management of a sustainable network requires an understanding of the health, reliability, lifecycle and capability of the assets to perform their function within the network. Investment decisions (maintenance, repair, replace etc.) must be supported by appropriate data and capable of robust defense.

It should be noted explicitly that a sustainable network requires investment to allow both:

- reactive response to environmental pressures (be they weather, regulatory or statutory) , and
- proactive preparation of the network for the future (load growth, new technology, etc.).

2.2 Adjacent Assets

Adjacent assets are not a core driver in the asset management process but play a role when specific assets or asset groups are reviewed. Adjacent assets must be considered as part of a holistic approach to asset management which will address both the asset itself and the role of the asset in the network. Adjacency is one differentiator between otherwise similarly scored assets.

2.3 Individual Asset Strategy Objectives

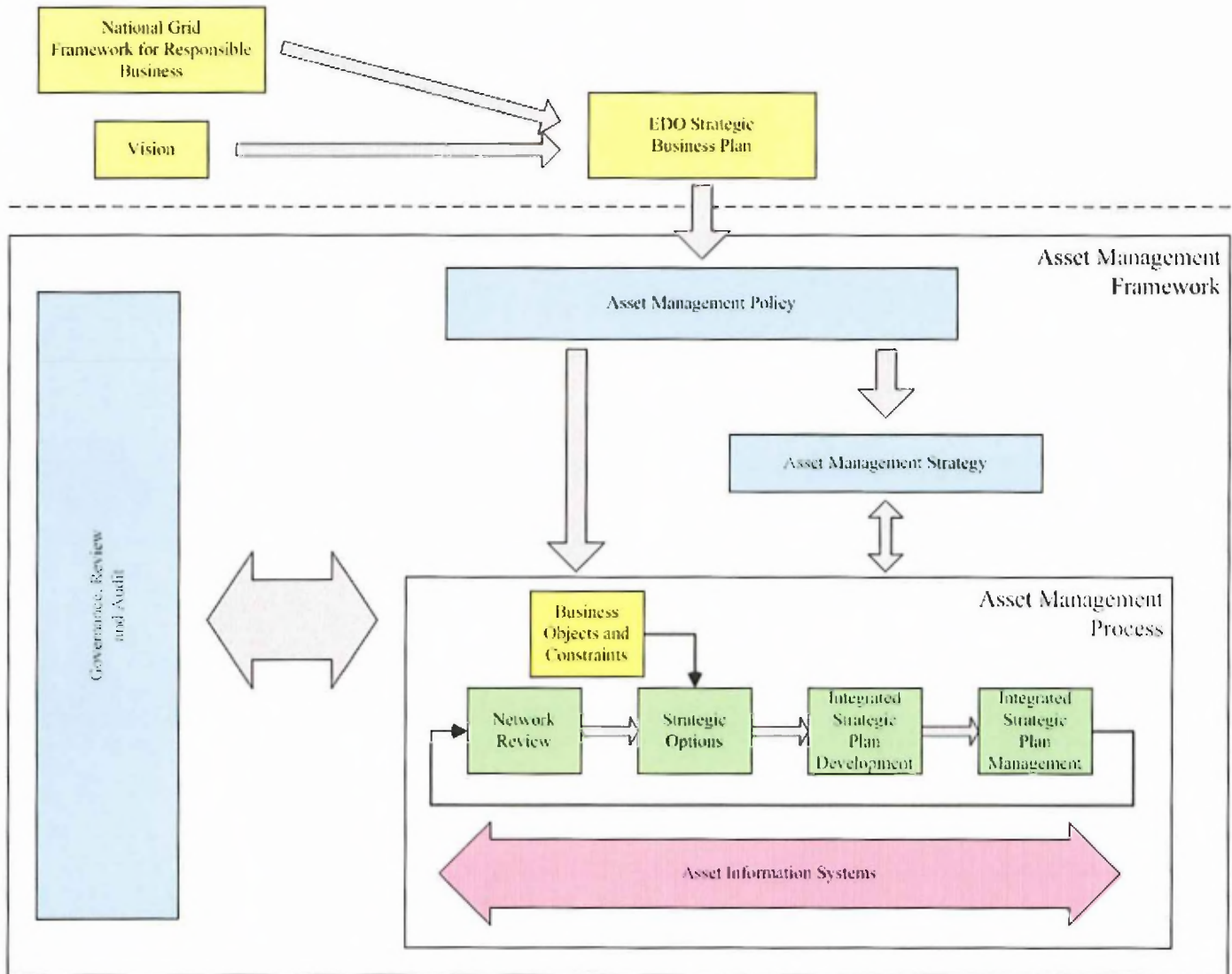
US EDO's asset strategies deal with the management of physical distribution assets throughout their lifecycle. The management of physical assets is inextricably linked to the management of all other aspects of the electric distribution business. These other aspects of the business are only considered when they have a direct impact on the management of the physical infrastructure assets.

Individual asset strategies are developed in order to meet overall business objectives and address risk in the following broad areas:

- Safety and Environmental
- Reliability
- Customer/Regulatory/Reputation
- Efficiency

3.0 Asset Management Strategy Framework

The Asset Management process is what links asset management across the business segments of National Grid. This process allows for the uniform analysis of assets with respect to performance, costs, business risks and initiative benefits. The process develops, optimizes and implements the whole life asset management plans for all assets and asset systems. The process also reflects the requirement of business and strategic planning, resource allocation and on-going program management. The figure below is a high level view of US EDO’s Asset Management process:



3.1 Asset Strategy Types

In general, most asset strategies will fit in one of two classifications, those focused on reliability performance and those focused on sustainability (long term reliability). A smaller number of strategies will fall under other types; for example, those designed to address specific safety, environmental, reputation, or other issues. Many strategies, while primarily addressing one specific area, have elements that address other areas. All strategies consider the company’s business objectives as outlined above.

3.2 Reliability Focused Strategies

These strategies are designed to improve both the overall and retail-company specific reliability performance. Their main focus is on SAIDI and SAIFI improvements but also address CAIDI. These strategies are in place to manage the company's reliability objectives stated above.

Examples of reliability focused strategies are listed below. These are not the only strategies that address reliability. As the company's asset management evolves and the company's goals change, it can be expected that additional strategies will be developed.

- Distribution Feeder Hardening Strategy
- Distribution Automation Strategy
- Subtransmission Hardening Strategy
- Recloser Application Strategy

3.3 Sustainability Focused Strategies

These strategies are designed to create a sustainable distribution system to serve our customers. These strategies call for the appropriate level of investment (maintenance and/or replacement) to meet the stated network performance targets and assure sustainability. In general, these strategies are condition-based replacement strategies. Where condition data is lacking or insufficient, age data is sometimes used.

The following is a partial list of typical sustainability focused strategies.

- Pole Strategy
- Tower Strategy
- Distribution Line Transformer Strategy
- Manhole Strategy
- URD Cable Strategy
- Stepdown Transformer Strategy
- Voltage Regulator Strategy
- Overhead Secondary Strategy

3.4 Other Asset Strategy Types

Several strategies address other areas such as safety and customer service. The following are examples of those:

- Oil-Fused Cutout Strategy
- Potted Porcelain Cutout Strategy
- Pockets of Poor Performance Strategy

4.0 **Asset Strategy**

Currently documentation and approval of specific asset strategies has completed its first cycle in January 2008. Thirty distribution line asset strategies have been developed since July 2007. Twenty-one of these strategies are fully developed and received approval in January 2008. The remaining nine have been approved as initial strategies and require further data collection and analysis prior to acceptance as fully developed strategies. A communication plan is being developed to inform the appropriate groups within the organization.

In practice, most distribution asset strategies involve fix or repair on failure scenarios. It is important to note, however, that relatively few distribution assets actually run to failure. The majority of distribution assets are replaced before failure due to a number of reasons including, load growth, circuit re-configuration, road re-building, etc.

5.0 **Asset Management Tools**

The recommendations within this section will be reviewed by the newly formed Asset Management Information department. Based on their review and the input from appropriate stakeholders, additional detail will be added to support

the execution of the recommendations. In most cases the recommendations are being incorporated into data collection projects under development as part of the Transformation effort.

5.1 Asset Inspection Programs

Overhead and Underground

The existing overhead and underground inspection program (described in EOP D004 and UG006) has been updated with the following goals:

- Improve the consistency of the equipment condition reporting
- Inspect all assets across the system on a five-year cycle (by state)
- Identify and address all problems found based on the following priority system:
 - Priority 1 – One week to replace
 - Priority 2 – Six months to replace
 - Priority 3 – Two years to replace
 - Priority 4 – Information Only, replace based on engineering judgment and budget
- Link to work management system for streamlined work order creation, execution, completion, closeout and tracking

Enhanced pole inspection is included in the program which includes both a visual and rudimentary structural (using a hammer and screwdriver) review of all poles. This updated program began in 2008.

The visual overhead and underground inspections are designed to meet regulatory requirements in their various jurisdictions. These visual inspections cover both the distribution system and the subtransmission system.

In addition to the overhead and underground visual inspections, a number of other inspections are conducted on the overhead and underground system. These inspections are less well documented as to schedule, requirements and results. The results of these inspections are generally not centrally available. Oftentimes these are ad hoc inspections that are carried out on a district level. These inspections include such things as:

- Infrared inspections of overhead lines,
- Infrared inspections of certain underground work (EOP UG001),
- Helicopter inspections of parts of the subtransmission system (EOP T007), and
- Elevated/Stray voltage inspections of the overhead and underground system (EOP G016)

Subtransmission Fly-Over

A subtransmission fly-over is currently underway. Data collection began in October, 2007 and the results are expected to be delivered by September, 2008. The results consist of:

- Asset attribute data for inclusion in Smallworld GIS for New York including:
 - Line Name
 - Structure Type & Configuration data
 - GPS coordinate data
- Condition data for entire system including:
 - Geo-referenced, low level oblique Right-of-Way (ROW) video

- Geo-referenced, high resolution oblique still images of individual structures
- Line Patrol condition report, one report per structure as required
- ROW vegetation condition report, one report per condition/structure as required

Future Recommendations – Inspections

Asset inspection programs are a vital tool in accumulating asset condition data. In the absence of credible condition data, age data can serve as a substitute.

The following specific recommendations will be considered as US EDO's asset management program matures:

➤ Pole inspections

The company will evaluate a pole inspection program that goes beyond a simple visual inspection and evaluates the structural integrity and the required strength for each specific pole. This type of inspection is common in the industry and has been conducted in the past across US EDO's service territory.

5.2 Asset Register Systems

Smallworld GIS/ArcSDE

The principal asset register system for distribution lines is the Smallworld GIS. All distribution overhead and underground equipment, along with limited substation data, is contained in the GIS. Subtransmission equipment data (overhead and underground) in New England is also contained in Smallworld. Subtransmission data in New York is not currently contained in Smallworld. As noted in Section 5.1, a helicopter flyover is in progress to gather required New York overhead subtransmission data for integration into the GIS. Plans are being developed to add New York underground subtransmission data to Smallworld.

The ArcSDE/ArcGIS application receives periodic data extracts from Smallworld to support the tabular and spatial analysis of the distribution data. The accuracy of the data within the Smallworld GIS is integral to the asset management process. An ongoing effort is underway to survey the New England portion of the GIS to update the existing data and add key data (mainly pole locations and overhead secondary data).

Future Recommendations – Asset Registers

➤ Smallworld GIS/ArcSDE

Currently there are two separate GIS, one in New York and one in New England. The configuration of these systems is very similar, maintaining and improving this similarity is critical to performing accurate analysis of the data across US EDO.

The New York subtransmission line data, overhead and underground, will be added to Smallworld. As this data is currently being collected, integration into the GIS will occur in the near future. A plan to collect and enter underground subtransmission data in New York needs to be developed. Additionally, virtually no credible cable age or cable type data exists in any centralized database. A plan to collect (or estimate) underground cable age/type data is also being developed for both New England and New York.

A review of the data flow into the GIS is recommended. This review will ensure that the work being designed is being added to the GIS properly as well as to our plant accounting system (PowerPlant). A list of key fields needed to manage our assets will be created for each GIS object. The need for a significant number of additional data fields is not expected but a few may be required, specifically a field associated with each object linking it to a unique feeder ID is expected.

The focus of the review is to validate the accuracy of the new assets being added to the system, not address past issues due to data conversion or incomplete source data. This review will confirm the ability of the system to accurately capture our assets as we move forward. Additionally, reviewing the design process presents an opportunity to streamline this potential bottleneck. If the anticipated increase in construction begins, an efficient work management system is essential.

5.3 Reliability Data

IDS (Interruption and Disturbance System)

The IDS application stores reliability data in both New York and New England. This system has been in place in New England for more than a decade. New York data has recently (Fall 2006) been stored in IDS and the full cutover is not yet complete for regulatory reporting purposes. Prior to the adoption of IDS, reliability data in New York was stored in the System Interruption Reporting (SIR) application. For some years going forward, historic reliability analysis in New York will require using data in the SIR application.

Presently, data is fed to the IDS application from the PowerOn outage management system in both New York and New England. Previously data was fed to IDS in New England from the ASRS outage management system. Data to the New York SIR system was entered manually (without an outage management system) requiring estimation of the time an interruption began and the number of customers involved. The transition to the PowerOn outage management system and the integration of the IDS and PowerOn systems will improve the accuracy of the reliability data.

Future Recommendations – Reliability Reporting

➤ **IDS**

In an effort to better capture outage information, a streamlining of the data entry is recommended. Fewer, more distinct selections are suggested. Modifying the data entry form design to limit the selections based on previous selections (starting at a high level and working down to the more specific) should be considered. As more technology is deployed in the field, the IDS data collection may soon be taking place in the truck repairing the outage. A simplified, interactive form provides an opportunity to capture the outage data more accurately. This will lead to the improved ability to analyze the data and create effective reliability strategies.

5.4 Asset Condition Data

Asset condition data is stored in a number of places including several independent databases. Additionally, limited condition data is stored in the company's asset registers. Consideration should be given to consolidating these databases into a more homogenous entity and linking this data to the asset registers and work order systems.

5.5 Risk Register and Risk Assessment

The existing National Grid Risk Register is in the process on being updated to reflect the planned change from a regional focus to line of business focus. Additional detail is being added to address the risk and criticality, as well as the likelihood of occurrence, of all asset types covered by the strategies. This will support consistent risk analysis of the strategies once a common tool has been developed. Until this tool is available the current tools will be used.

National Grid currently uses multiple risk assessment tools. Many of these tools use a combination of the likelihood of event occurrence and the potential consequence to create a matrix of risk scores. These tools also consider multiple factors (e.g., economic, safety, reputation, reliability, environmental, etc.).

The Global Asset Management Team is currently evaluating a common scoring model and risk assessment tool to be used by all lines of business to rank individual proposed actions against one another.

The expected output of this tool will be an optimized list of programs/strategies combined with other specific and blanket projects which will feed the integrated strategic planning process.

6.0 State of the System

6.1 Assets by State

US EDO's electric distribution and subtransmission assets are extensive. The five US EDO distribution companies collectively serve approximately 3.3 million customers in four states: Massachusetts, New Hampshire, New York and Rhode Island. A breakdown of assets by state is listed in the following table:

National Grid Electric Distribution/Subtransmission Line and Service Area Statistics

	<u>Massachusetts</u>	<u>New Hampshire</u>	<u>New York</u>	<u>Rhode Island</u>	<u>Total</u>
Square Miles	3,870	740	25,260	1,070	30,940
Cities and Towns	169	21	479	38	707
Customers	1,235,400	40,300	1,583,000	470,800	3,329,500
Poles	750,600	38,000	1,229,400	298,000	2,316,000
Manholes	18,790	220	23,570	4,520	47,100
Distribution Feeders	1,070	40	2,290	370	3,770
Overhead Distribution Circuit Miles	12,800	840	35,600	4,900	54,140
Underground Distribution Circuit Miles	4,100	200	6,200	900	11,400
Distribution Transformers	192,100	9,300	442,100	75,800	719,300
Subtransmission Lines, < 69 kV	270	13	510	110	903
Overhead Subtransmission Miles, < 69 kV	570	45	3,680	310	4,605
Underground Subtransmission Miles, < 69 kV	530	5	Unknown	140	675
Subtransmission Lines, 69 kV (NY only)	----	----	30	----	30
Overhead Subtransmission Miles, 69 kV (NY only)	----	----	320	----	320
Underground Subtransmission Miles, 69 kV (NY only)	----	----	Unknown	----	Unknown
Substations*	162	14	441	64	681
Power Transformers*	477	46	861	145	1,529
Circuit Breakers*	2,317	92	4,043	912	7,364

These numbers represent the approximate quantities (+/- 10%) of each item making up the subtransmission/distribution system in the National Grid service territory (excluding Long Island).

All the information was obtained from the SDE database (as of 12/2007) with the following exceptions:

Customers - IDS

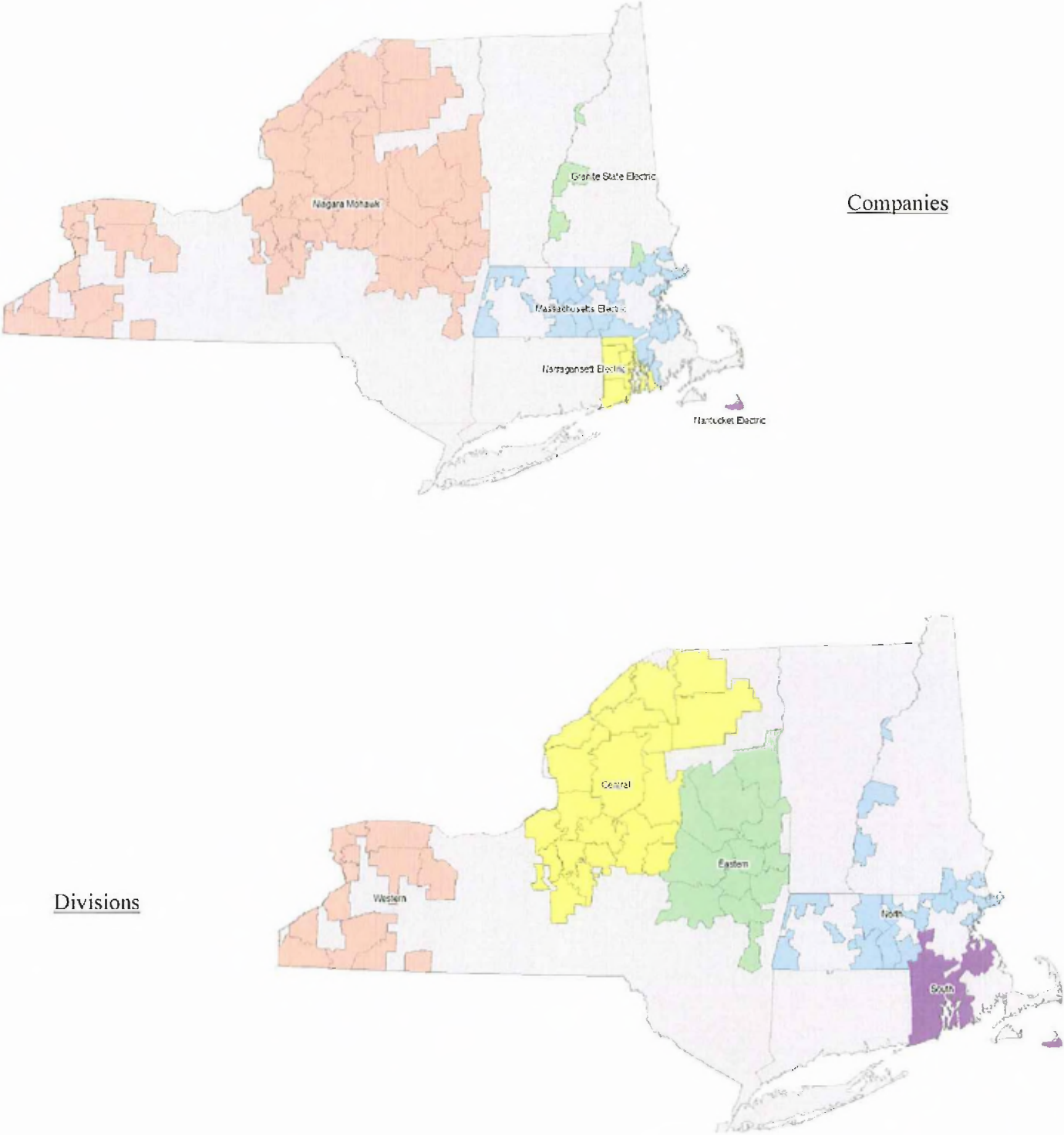
NY Subtransmission - MapInfo and Historic Estimates

Substation Data - AIMMS

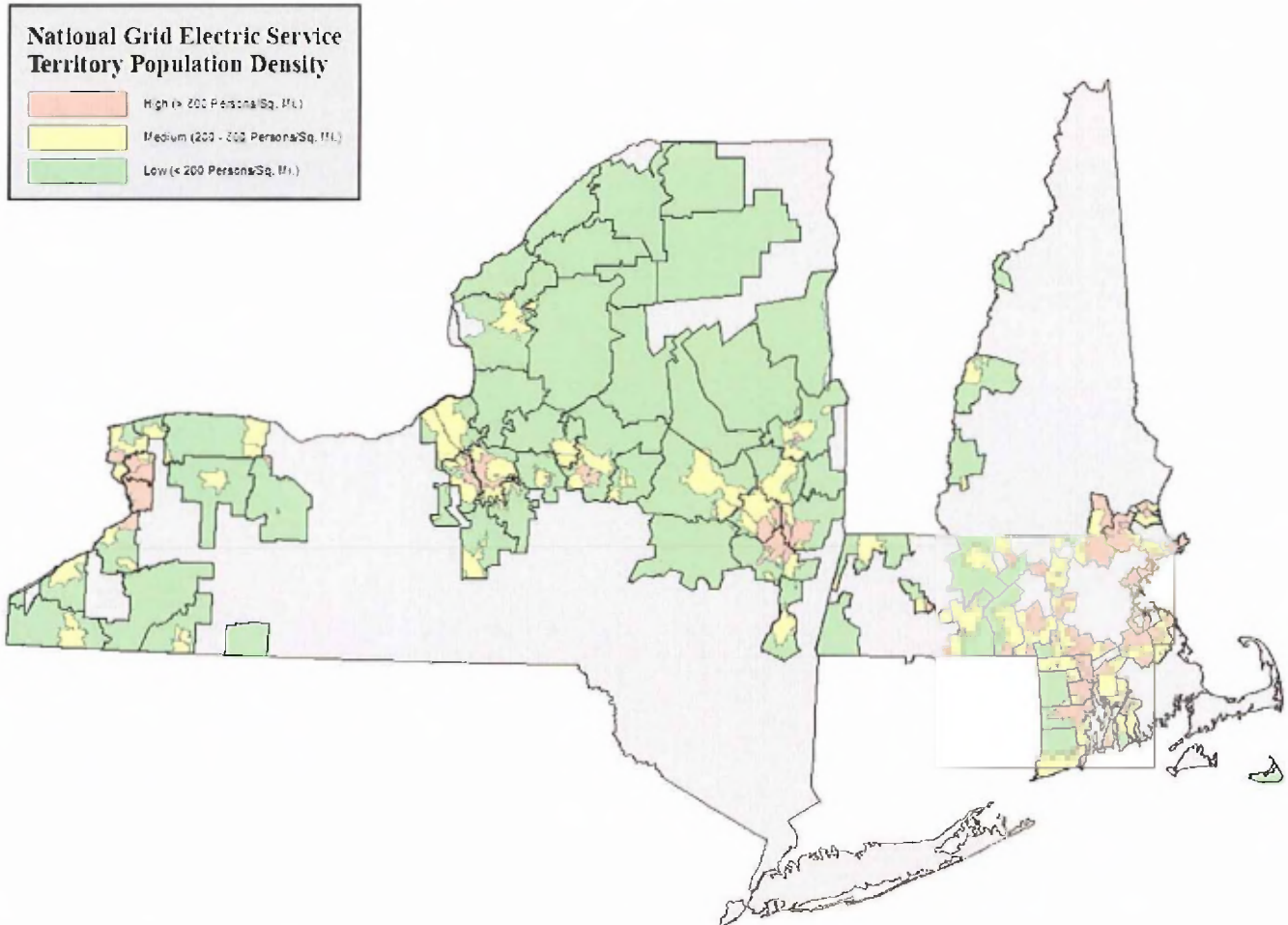
*Substation assets in Vermont are listed in the New Hampshire numbers

6.2 Service Territory Graphics

Geographically US EDO's four retail companies are broken into five divisions:



Based on 2000 Census data, the majority of the service territory has a low customer density with concentrations of high/medium customer density on the East Coast and along Route 90 from Massachusetts through New York. The low, medium and high densities were developed internally based on census data.



6.3 Load Data by Company

The current mix of customers (2007 calendar year) served by each company and the system as a whole as calculated by percent of total energy delivered and customer count is detailed as follows:

Company	Residential		Commercial		Industrial	
	% KWH	% Customers	% KWH	% Customers	% KWH	% Customers
Massachusetts Electric	39.3	87.3	43.2	12.3	17.5	0.4
Nantucket Electric	66.0	89.0	33.4	10.9	0.6	0.1
Narragansett Electric	39.3	88.0	46.4	11.6	14.3	0.4
Niagara Mohawk	33.1	89.8	38.2	10.1	28.8	0.1
Granite State Electric	32.9	83.7	53.4	15.7	13.7	0.6
US EDO	36.0	88.5	41.0	11.2	23.0	0.3

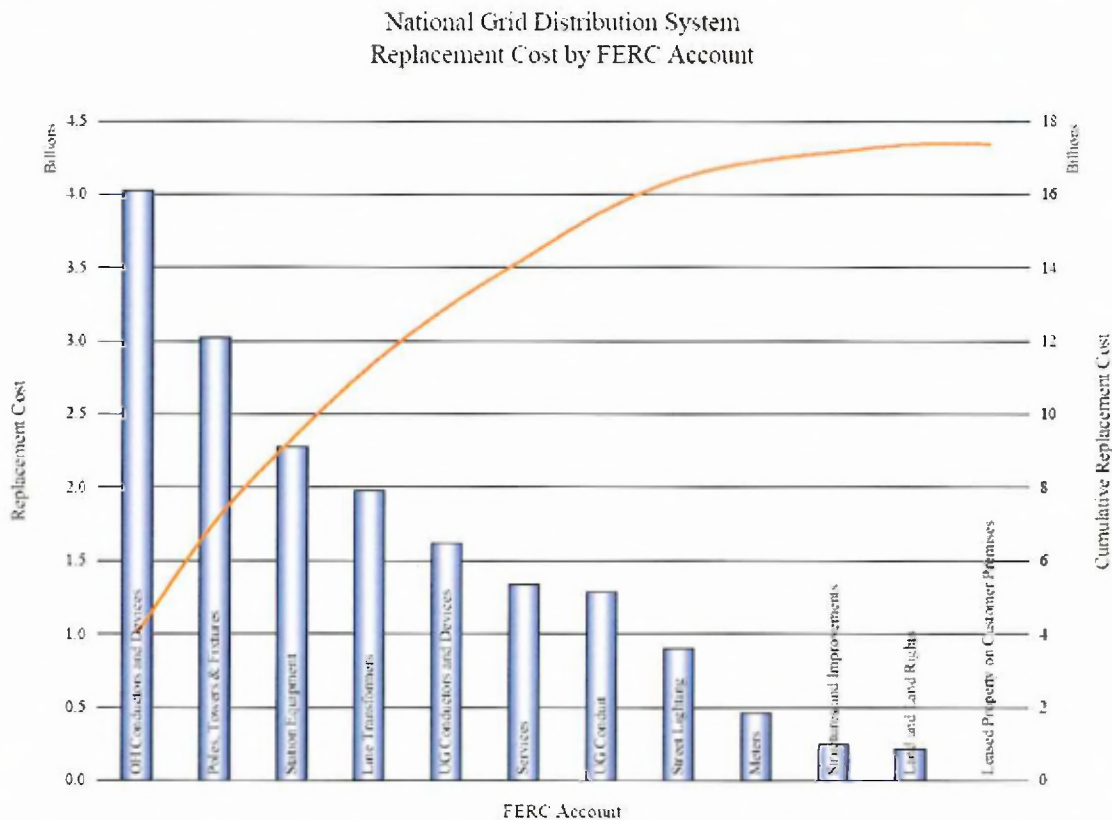
The non-coincident peak load data for each company for the last two calendar years for both summer and winter is as follows:

Company	2006 Peak		2007 Peak	
	Summer (MW)	Winter (MW)	Summer (MW)	Winter (MW)
Massachusetts Electric	5,104	5,312	4,654	3,807
Nantucket Electric	39	26	39	27
Narragansett Electric	1,923	1,302	1,768	1,317
Niagara Mohawk	6,754	5,590	6,454	5,657
Granite State Electric	188	147	179	138
US EDO*	14,008	12,377	13,094	10,946

*US EDO total peaks are estimates, New England and New York non-coincident peaks are being added for US EDO totals

6.4 Replacement Value of Assets

The total replacement value by FERC account of the distribution system, based on PowerPlant financial data, is estimated to be \$17 billion (2007 dollars). Grouping these accounts together indicates that approximately 50% of the replacement value of the system is overhead, 26% underground and 13% substation (remaining 11% composed of miscellaneous small accounts). The actual installed cost of these same assets is \$7.5 billion. This data includes the subtransmission assets in New England but does not include subtransmission assets in New York. The complete breakdown by FERC account is:

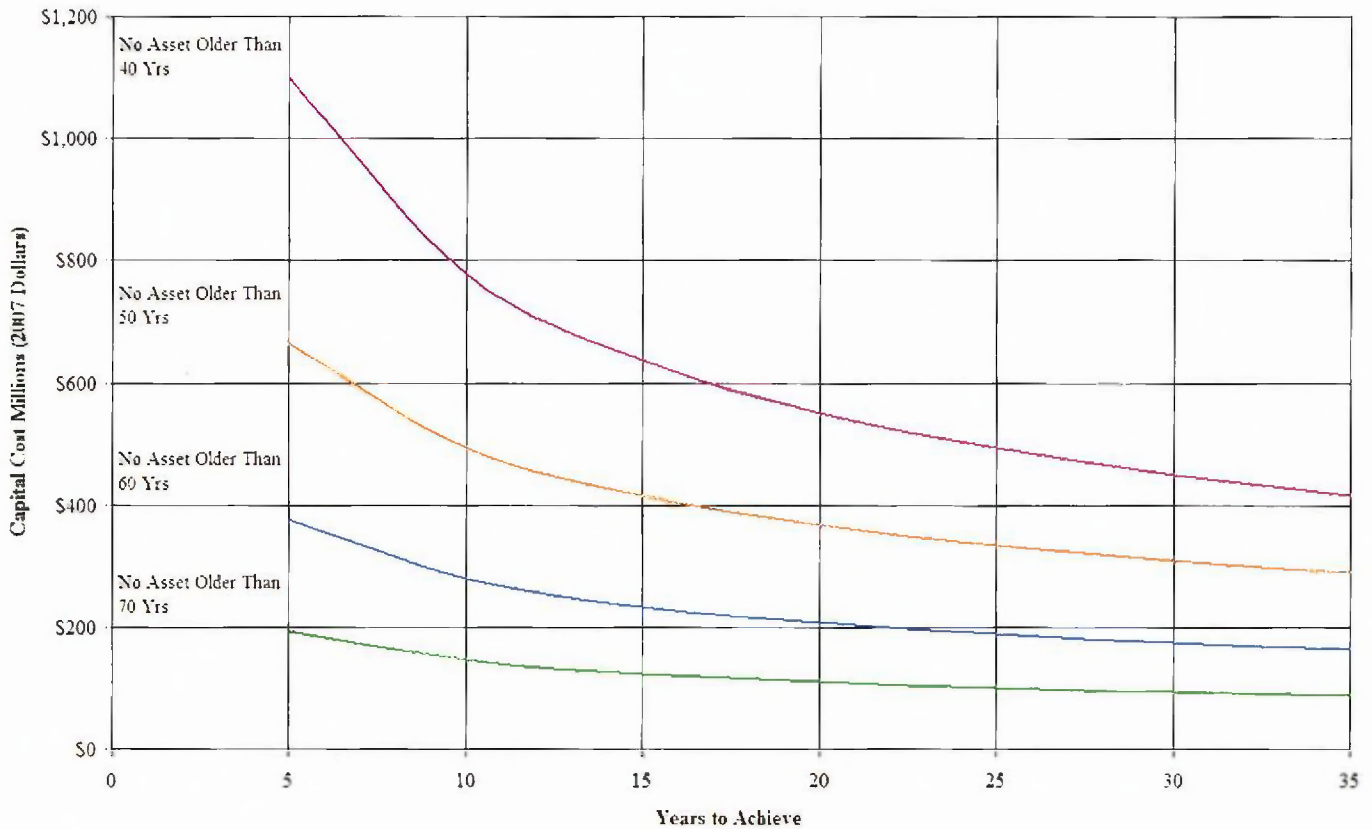


Distribution asset data (excluding substations) is contained in the Smallworld GIS system. Age data for most asset classes is questionable or absent. However, age data for certain assets, particularly line transformers and poles, is

reasonably accurate and complete. A weighted composite of these two asset classes was used to create a surrogate for the age profile of the system.

This surrogate age profile was used to create a high level view of the cost of an asset replacement program based strictly on age. The chart illustrates the annual costs of such a program based on a targeted replacement age of 40 to 70 years and a range of 5 to 35 years to achieve. While this approach is not being recommended, the chart illustrates the potential magnitude of the annual asset replacement costs.

Annual Asset Replacement Spend



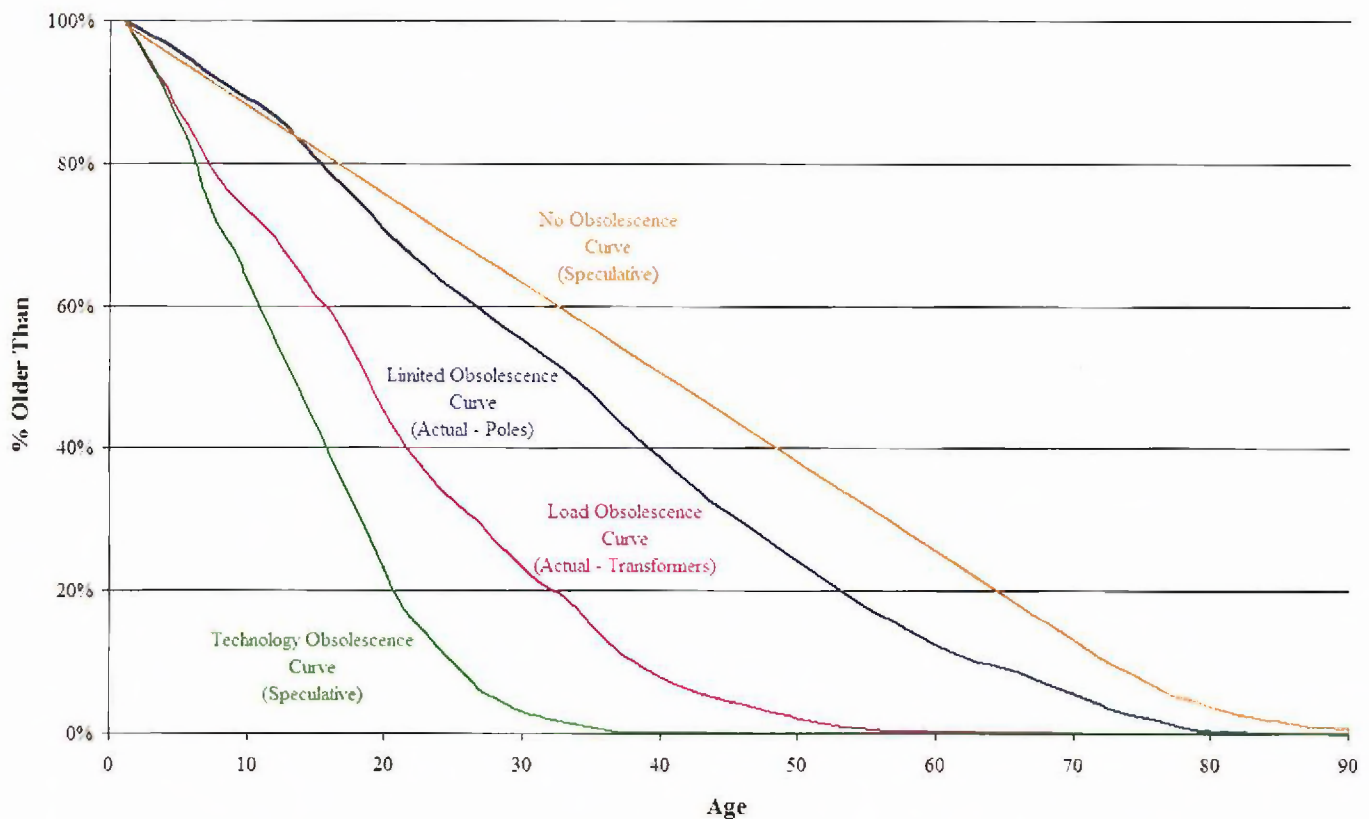
6.5 Asset Age Profiles by Asset Class

As noted above, while age data is reasonably available for a portion of the distribution system, poles and transformers, for example, age records for much of the distribution system is either unavailable or of such quality as to be unreliable. Age data is held in two primary systems: the Smallworld GIS and the PowerPlant plant accounting system. In New England, assets are retired on a first in-first out (FIFO) basis by town. Therefore, regardless of the age of equipment retired, the oldest equipment in a given town is retired from the books, distorting the age profiles. In New York, assets were historically retired using specific asset locations. The difficulty of aligning actual retired units with specific units on the books has also lead to a questionable level of accuracy. New England continues to use FIFO for retirements. New York no longer uses specific asset locations for distribution plant and has moved to a town based retirement process, similar to New England, using the actual install year (not FIFO) for asset retirement. This change has simplified the New York retirement process.

Age profiles for some assets can be inferred from other attributes or other associated equipment. In some cases, it is known when certain types of equipment were added or removed from the distribution standards. For example overhead copper conductor, this has not been installed for forty years (except in Nantucket). Other asset age data exists but not in a form that is readily available for analysis. Significant age data for manholes and ducts may still exist in paper form at the local office level.

Condition data for most distribution line assets is limited to visual inspection data. In some cases the only surrogate available for asset condition may be age.

Cumulative Age Profiles by Asset Class



As shown in the graph above, age profiles can differ significantly from asset class to asset class. The curves are speculative for asset classes other than poles and transformers.

Distribution assets are replaced for any number of reasons including load, failure, and obsolescence. Many of the assets that make up the distribution system do not have a particularly distinct age related failure mechanism. Based on the known age profiles for poles and transformers and engineering judgment regarding other assets, one can construct conceptual age profiles based on the concept of obsolescence. Four such profiles are described below:

- **No Obsolescence:** Equipment such as manholes which are generally only replaced based on condition;
- **Limited Obsolescence:** Equipment such as poles which, in themselves, do not become obsolete due to technology changes or load but may be replaced as associated assets, such as when conductors are replaced;

- Load Obsolescence: Equipment such as transformers which are generally changed due to increases in load before end of life; and
- Technological Obsolescence: Equipment such as reclosers which become obsolete with new technology.

Distribution assets can expect to fall somewhere between the extremes of these age profiles. There may be cases where technology changes cause a particular asset class to move from one profile to another. For example, electro-mechanical relays may have followed a profile further to the right than current electronic relays.

7.0 Ability to Deliver

Many of the asset strategies developed to date have been developed without constraint. That is, the ability to deliver has not been considered. Other strategies, specifically those intended to allow the company to meet its reliability objectives have been developed taking into account the company's ability to deliver. As individual strategies become part of the integrated strategic plan the ability to deliver is factored into the analysis.