

VACAR

Planning Task Force

Presentation to the
VACAR Executive Committee

Charleston, SC
April 8, 2008

Planning Task Force Roster

Jennifer Connors

Alcoa

Nelson Burks

Dominion Virginia Power

Brian Moss

Duke Energy

Denise Roeder

Electricities

Rick Anderson

Fayetteville PWC

Bob Beadle

NCEMC

Mark Byrd (Chair)

Progress Energy Carolinas

Clay Young

SCE&G

Jim Peterson

SCPSA

Herb Nadler

SEPA

Agenda

- VACAR and SERC Load, Capacity, and Reserves
- Generation Development Survey
- Transmission Development Survey
- SERC East-RFC, SERC, and VACAR Studies
- VACAR Underfrequency Load Shedding

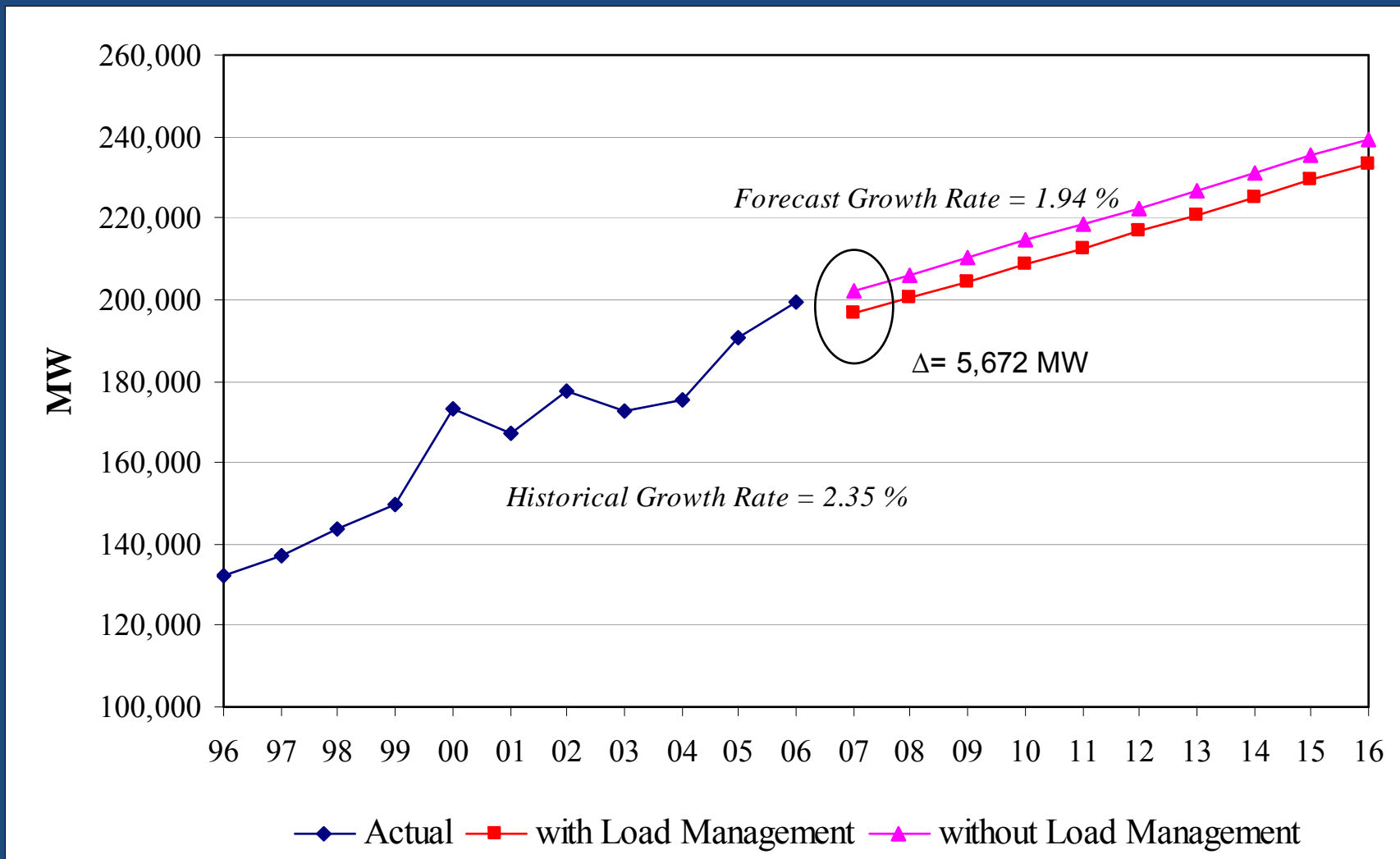
VACAR and SERC Load, Capacity, and Reserves

Mark Byrd
Progress Energy Carolinas

Charleston, SC
April 8, 2008

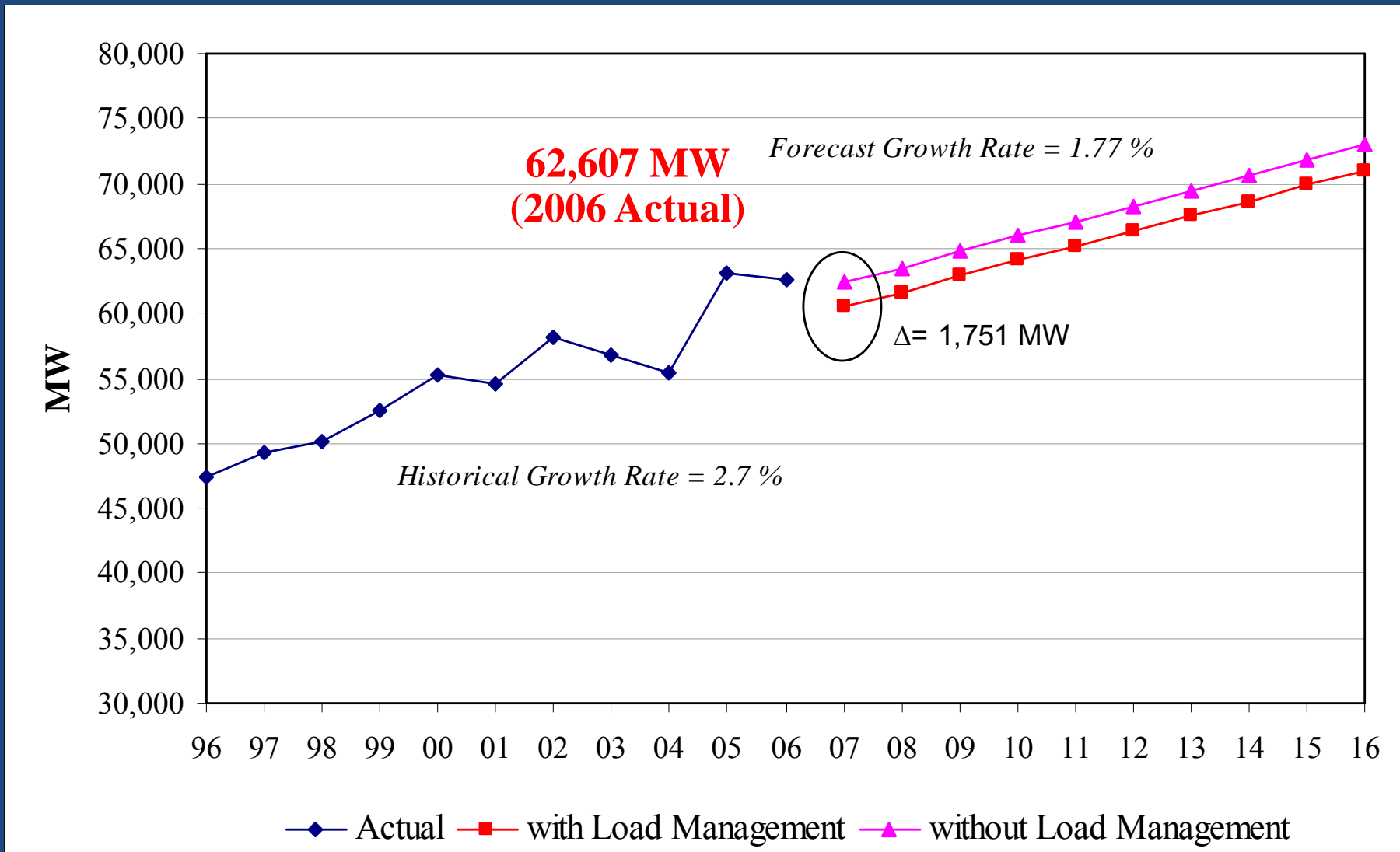
SERC Region

SERC Summer Peak Demand Historical Actual vs. 2007 Forecast

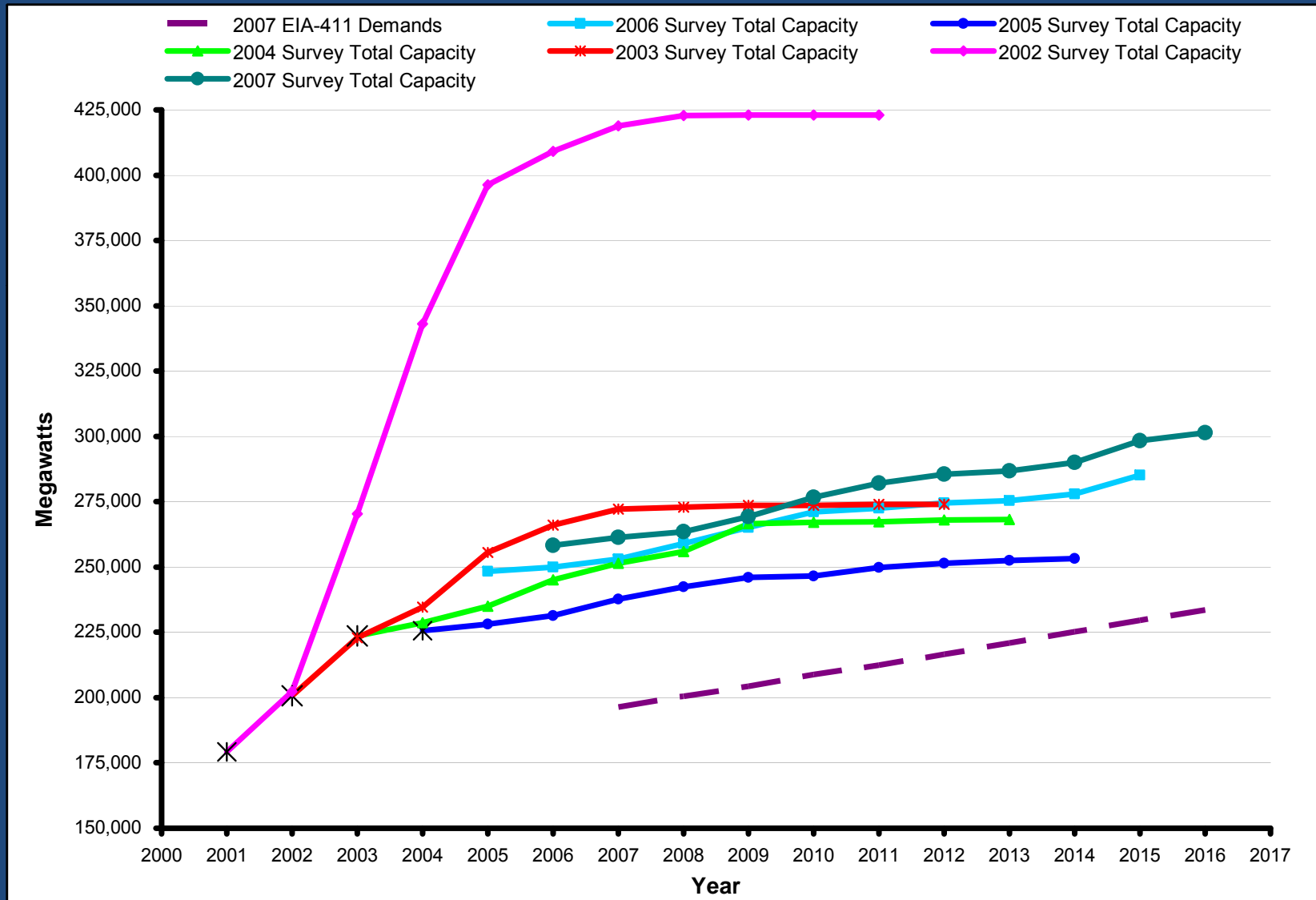


VACAR Subregion

VACAR Summer Peak Demand Historical Actual vs. 2007 Forecast

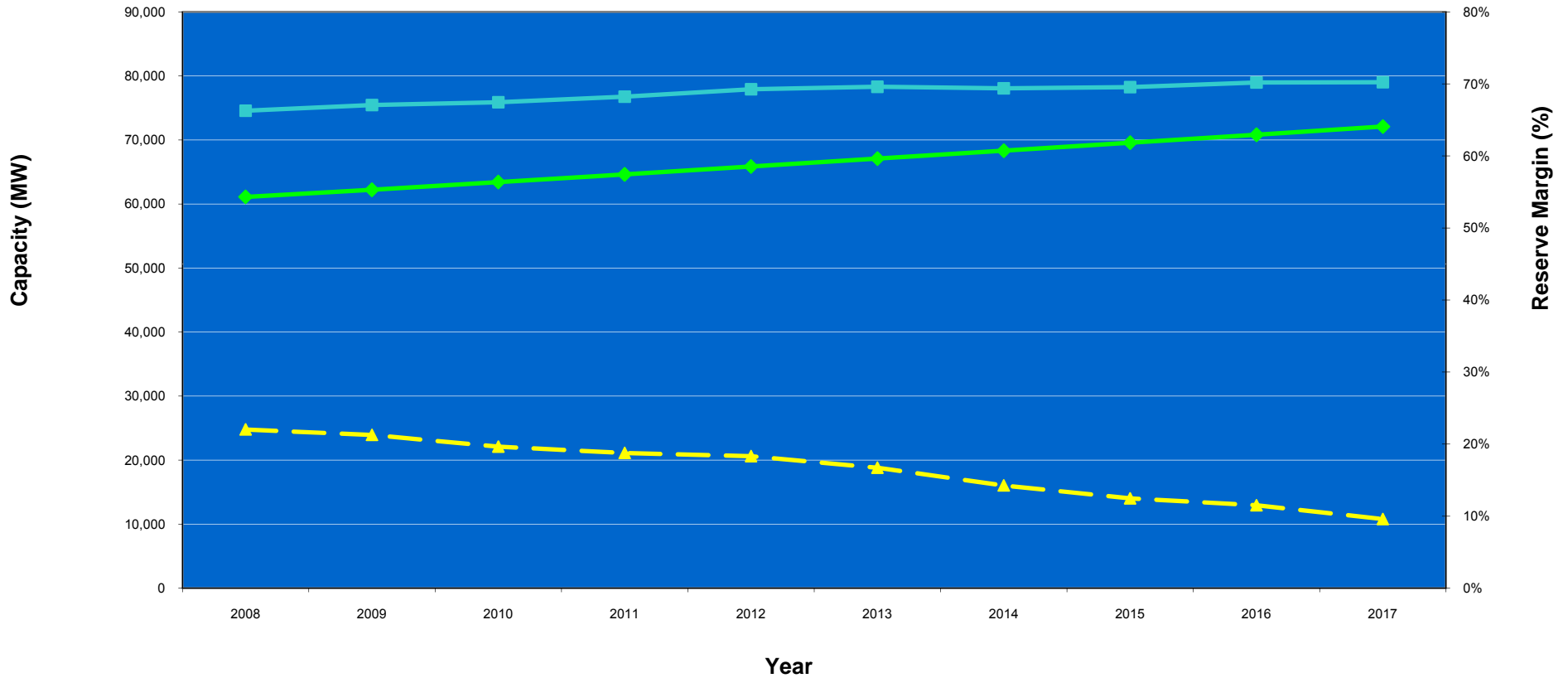


SERC Region Total Capacity



VACAR Reserve Margin

VACAR Reserve Margin



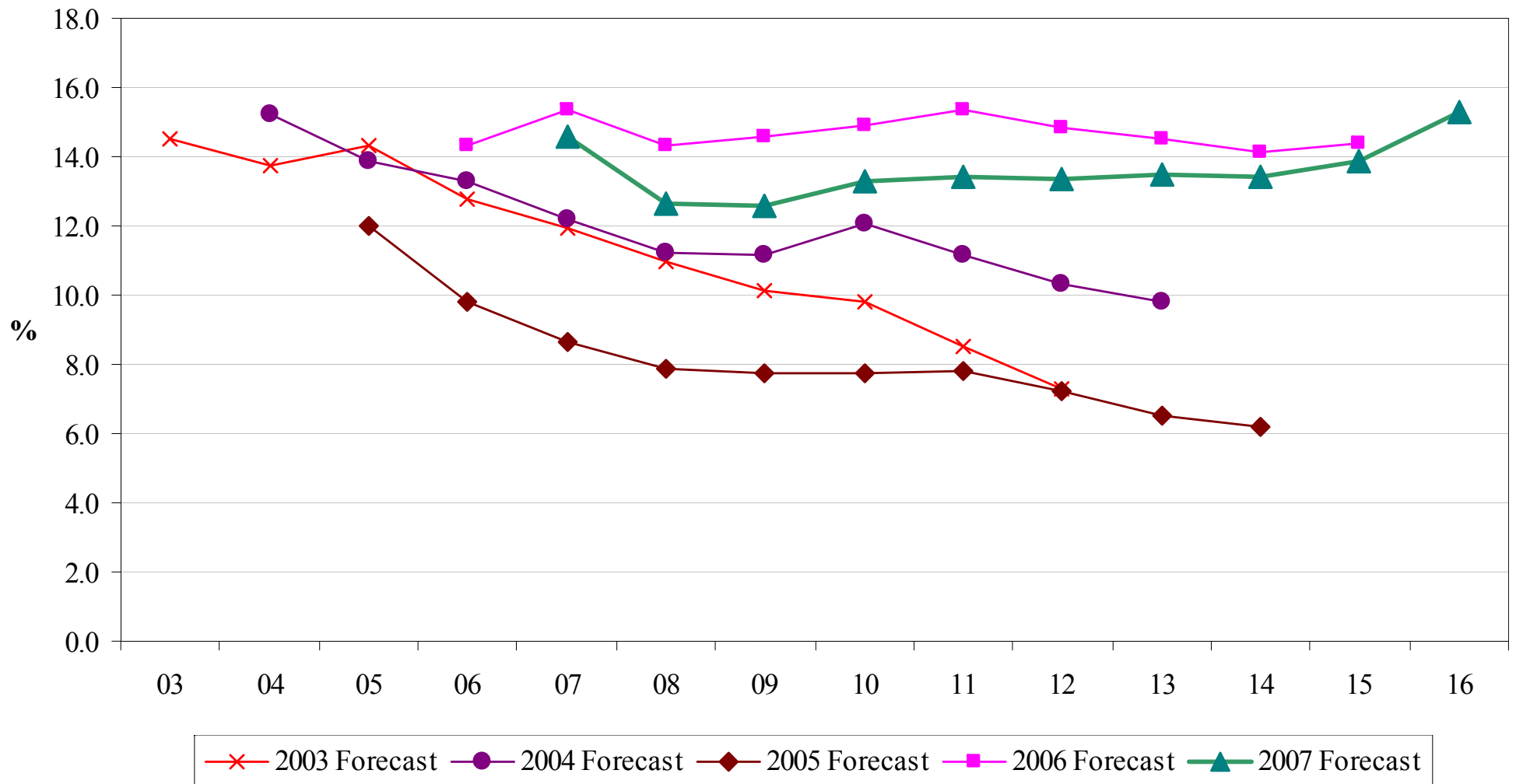
2008 EIA-411 Total Capacity

2008 EIA-411 Demands

EIA-411 Reserve Margin

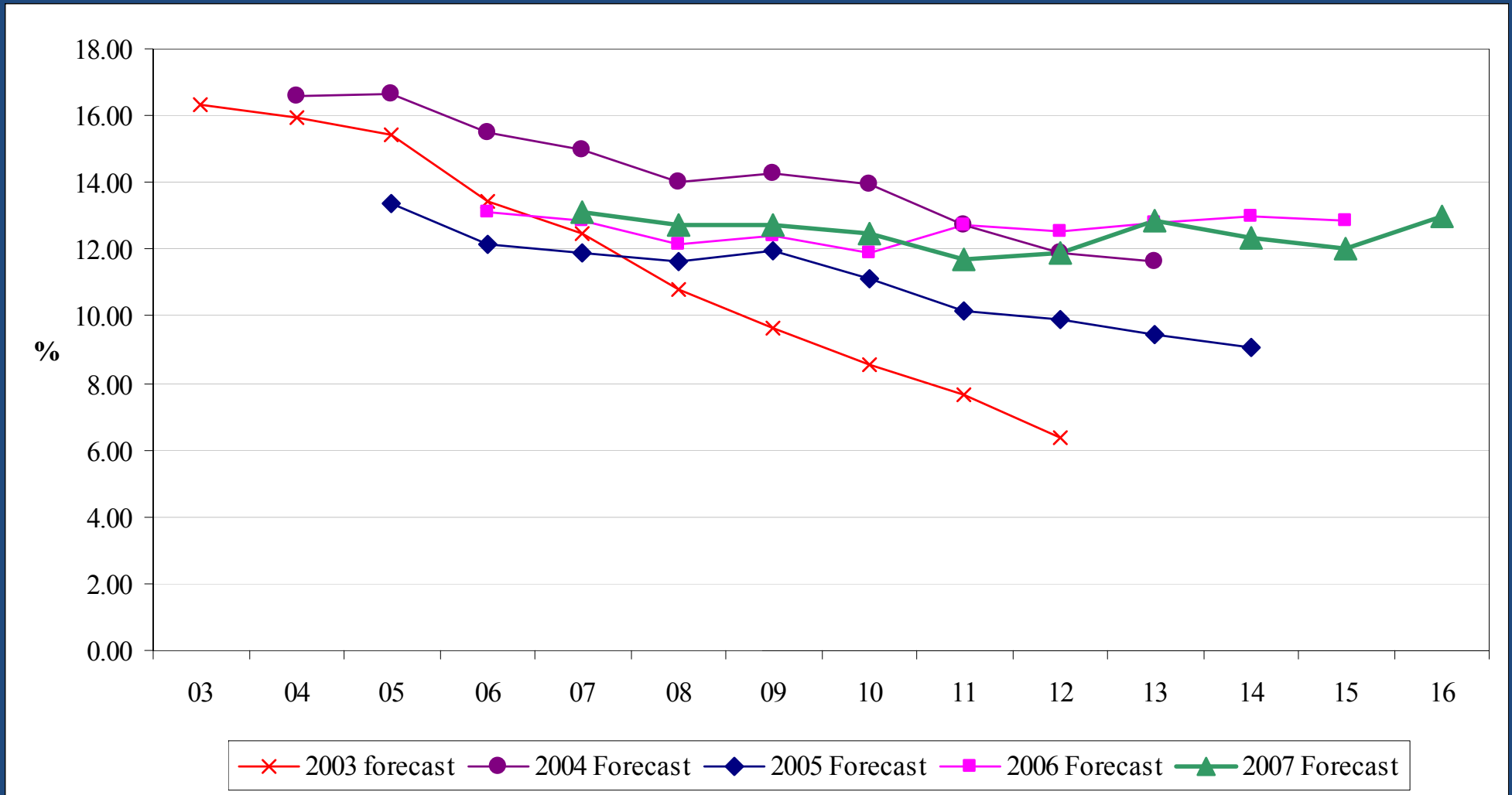
SERC Region

Planned Capacity Resource Margin - 5 Year Trend



VACAR Subregion

Planned Capacity Resource Margin - 5 Year Trend



Generation Development Survey

Denise Roeder
ElectriCities

Charleston, SC
April 8, 2008

Survey Request

- Tenth annual survey
- Survey request sent in late January
- Information requested from Transmission Providers
- Results received in March

Survey Specifics

- 10 years of planned generation development
- Categorized by interconnection status
 - Interconnection Service requested (IS)
 - Interconnection Agreement signed (IA)
- Sub-categories indicated the amount designated as a network resource
- Aggregate generation plant capabilities, not plant specific

Survey Results - VACAR

Prior to December 31, 2007

Total Interconnected Generating Plant Capability in Commercial Operation: (Summer Net Plant Capability)	70009 MW
Considered Merchant Generation:	2,111 MW (3.0%)

Survey Results - VACAR

Current Status of Generation Plant Development	In-Service Year of Added Generation (MW)									
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Interconnection Service Requested, Only	6031	599	1,222	4,699	3,026	2,294	663	146	2,735	1,241
➤ <i>DNR or Firm PTP</i>	1,784	445	1,092	2,119	747	978	663	30	2,735	1,25
Interconnection Agreement Signed/Filed	1189	1007	25	1579	800	40	0	0	614	0
➤ <i>DNR or Firm PTP</i>	439	849	25	829	800	40	0	0	614	0

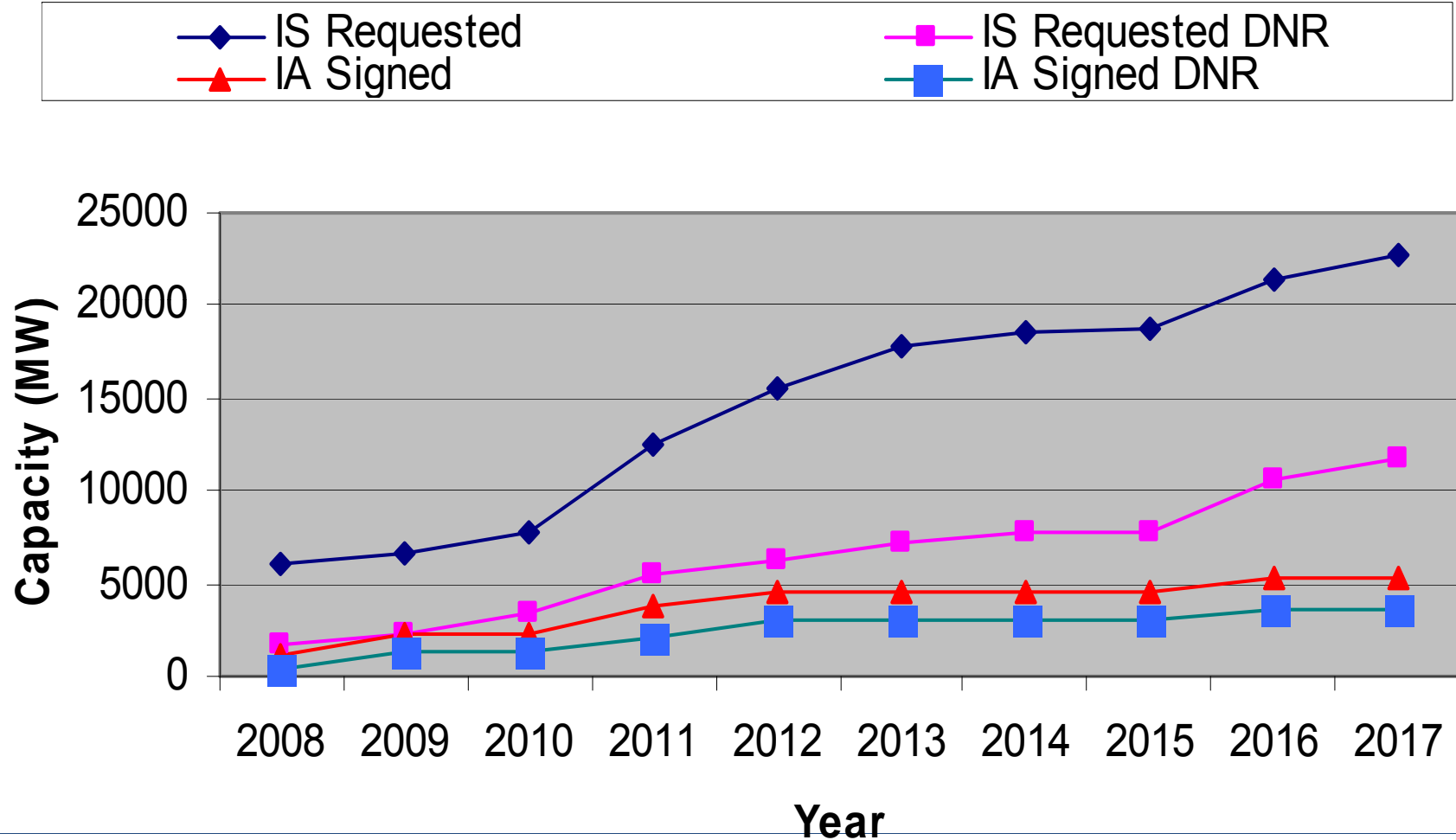
Survey Results - VACAR

Total Interconnected Generating Plant Capability in
Commercial Operation Prior to December 31, 2007: 70009 MW
(Summer Net Plant Capability)

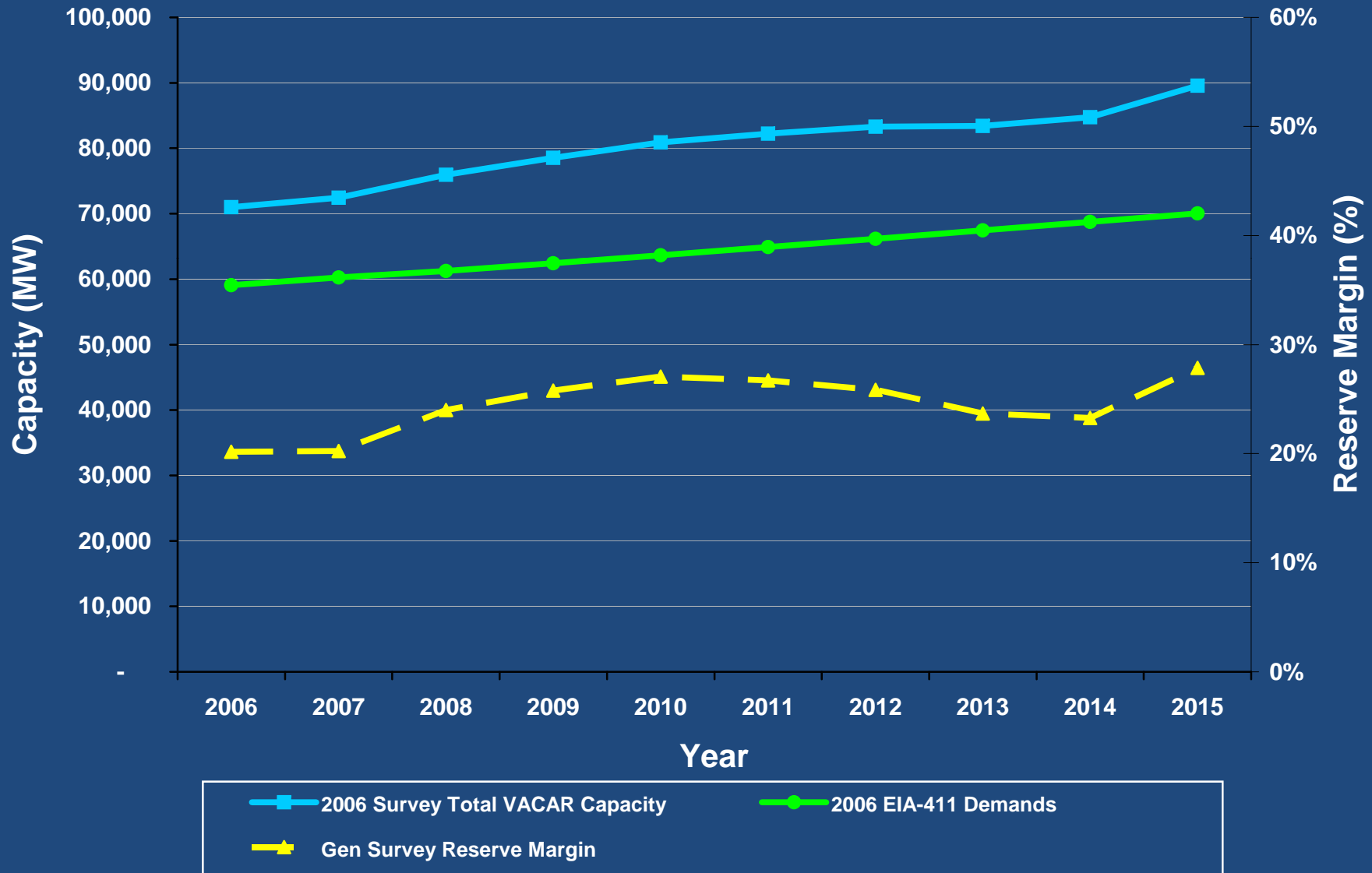
Total Projected Generating Plant Capability
Additions by July 1, **2017**: 27,910 MW
(Summer Net Plant Capability)

Total Projected Generating Plant Capability
by July 1, **2017**: 97,919 MW
(Summer Net Plant Capability)

Cumulative Capacity Additions - VACAR

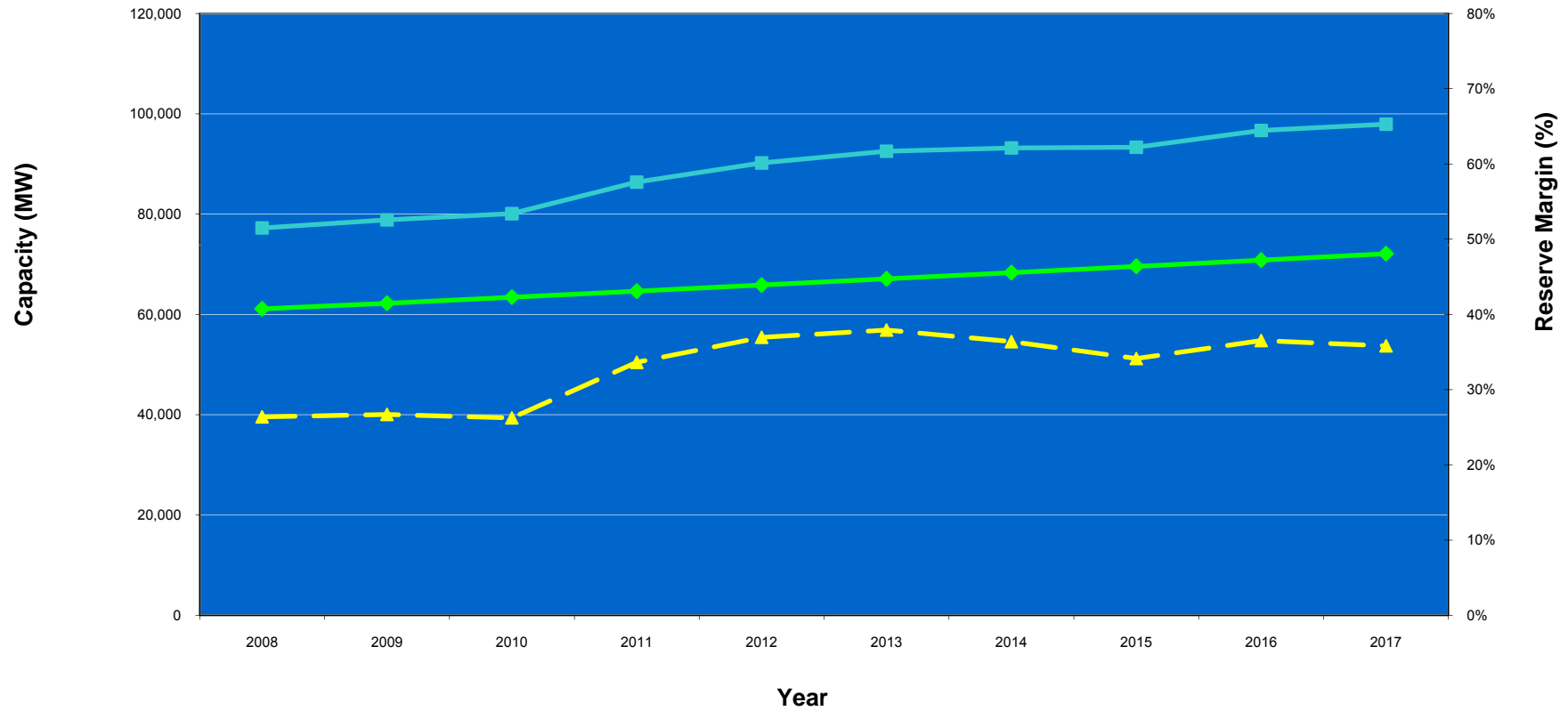


VACAR Reserve Margin



VACAR Reserve Margin

VACAR Reserve Margin



—■— 2008 Survey Total VACAR Capacity

—◆— 2008 EIA-411 Demands

- -▲- - Gen Survey Reserve Margin

Transmission Development Survey

Jim Peterson
SCPSA

Charleston, SC
April 8, 2008

Survey Request

- Seventh year of survey
- Survey request sent on January 24
- Information requested from Transmission Providers
- All results were due to SERC by February 18

Survey Specifics

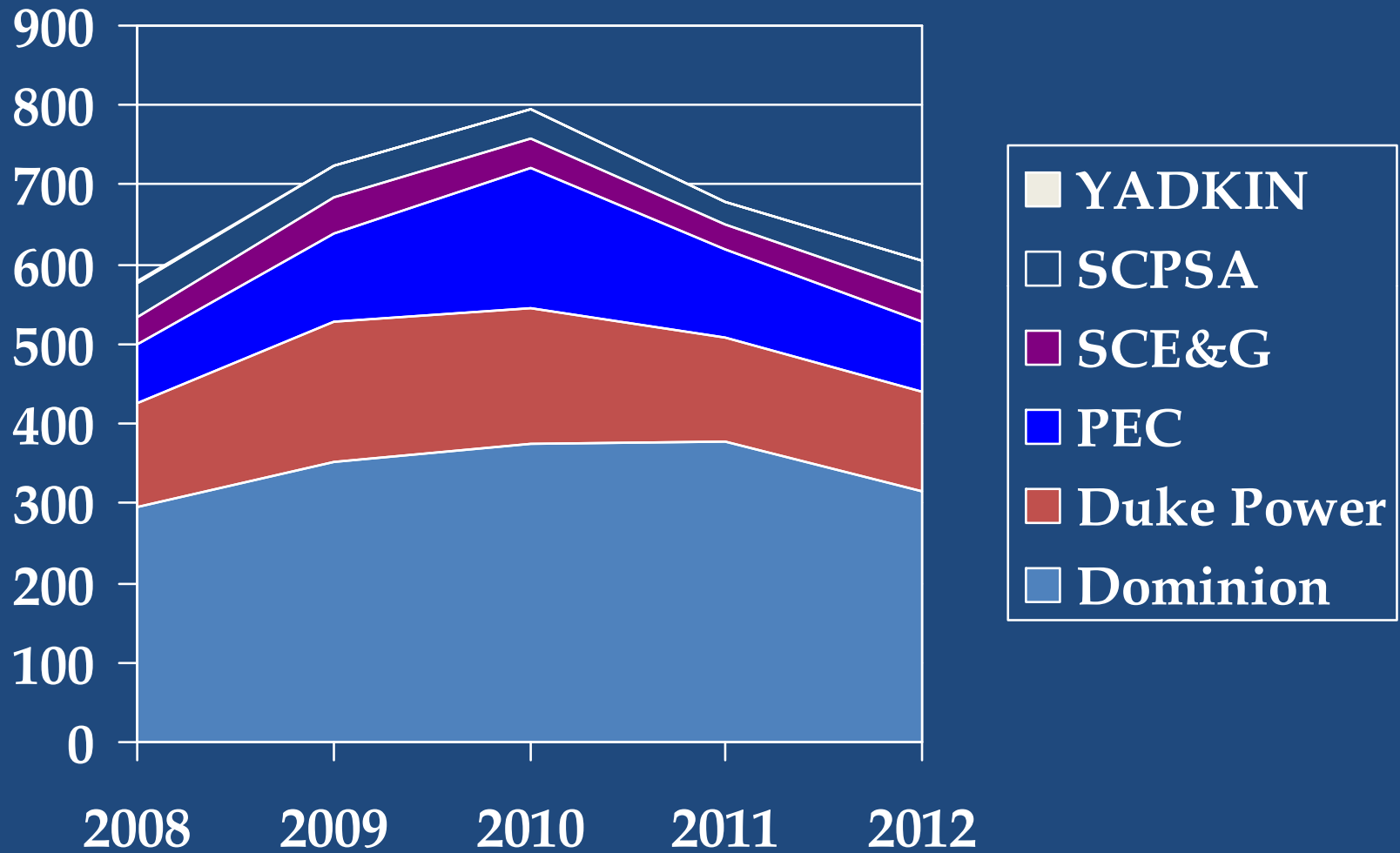
- 5 years of planned transmission capital expenditures
- All line and substation projects where low-side voltage is 100 kV or greater
- Fully-loaded figures including any tax gross-up and overhead
- Expenditures for IPP, merchant, and other direct interconnect customers included regardless of eventual reimbursements

Survey Results - VACAR

Planned Transmission Expenditures (\$ in Millions)

	2008	2009	2010	2011	2012
Dominion	296	353	376	377	314
Duke Power	130	175	170	130	125
PEC	74	112	174	111	88
SCE&G	34	45	39	31	37
SCPSA	42	40	37	28	41
YADKIN	0	0	0	0	0
TOTAL	576	726	796	678	605

Survey Results - VACAR



VACAR vs. SERC Transmission Investment



2004 - 2007 \$ = Actual

Survey Results - VACAR

Planned Transmission Expenditures (\$ in Millions)

	2008	2009	2010	2011	2012	5-Year
Transmission Associated with Generation	17	43	77	21	20	176
Total Transmission	576	726	796	678	605	3,381
% Generation Related	2.9%	5.9%	9.6%	3.1%	3.2%	5.2%

SERC East-RFC, SERC, and VACAR Studies

Brian Moss
Duke Energy

Charleston, SC
April 8, 2008

SERC East-RFC Studies

ERAG Coordination

- SERC East-RFC, MRO-SERC West-RFC-SPP, and NPCC-RFC Steering Committees hold joint meetings to coordinate study efforts
- Jointly develop base cases for use in all ERAG Seasonal and Near-Term/Long-Term Reliability Studies
- Reports are approved by the Steering Committees and reviewed by the ERAG Management Committee

Seasonal Reliability Studies

- 2007 and 2008 Summer
- 2006/07 and 2007/08 Winter

SERC East-RFC Studies

Seasonal Reliability Studies

- Determine Transfer Capabilities (FCITC) between regions/subregions
 - MISO to/from SERC East
 - PJM to/from SERC East
 - MISO to/from Non-PJM VACAR
 - PJM to/from Non-PJM VACAR
 - MISO to/from Central
 - PJM to/from Central

SERC East-RFC Studies

Near-Term/Long-Term (NT/LT) Reliability Studies

- In 2007, the SERC East-RFC NT/LT Study Group compiled a list of studies performed in the regions/subregions and listed the areas of the NERC TPL-005 standard that each addressed.
- In 2008, each of the ERAG Study Groups will conduct a 2013 study with methodology similar to the seasonal studies.
- The goal is to perform the study work necessary for the regions to comply with NERC TPL-005 standard.

Studies Completed since March 2006

SERC Near-Term SG (NTSG)

Seasonal Reliability Studies

- 2006 and 2007 Summer
- 2006/07 and 2007/08 Winter

OASIS Support Studies

- Five seasonal studies produced each quarter
 - 2006, 2007, and 2008 Spring
 - 2006 and 2007 Summer
 - 2006 and 2007 Fall
 - 2006/07 and 2007/08 Winter

Studies Completed since March 2006

SERC Near-Term SG (NTSG)

2008 SERC Drought Study

- 2008 Summer Peak cases studied
 - Case A - 2007 Summer Peak Hydro Availability
 - Case B - Projected Conditions
 - Case C - Extreme Conditions
- (N-1) AC Contingency Analysis
 - VACAR identified only minor local voltage and thermal constraints which were unrelated to the drought conditions
- No significant problems identified

Studies Completed since March 2006

SERC Near-Term SG (NTSG)

2008 VACAR Drought Study

- 2008 Spring and Summer Peak cases studied
 - Base Case - No drought impacts
 - Expected Case - Projected drought conditions
 - Moderate Case - Moderate drought conditions
- Transfer analysis to assess imports into VACAR to replace drought impacted generation
 - Transition from Base to Expected
 - Transition from Expected to Moderate
 - Transition from Moderate to Extreme

Studies Completed since March 2006

SERC Near-Term SG (NTSG)

2008 VACAR Drought Study

- Identify best import options (assessed five different areas)
 - MISO/Commonwealth Edison
 - PJM West (Allegheny, AEP, Dayton, Duquesne)
 - PJM Mid-Atlantic (historic PJM)
 - TVA
 - Southern Company
- In Spring 2008, only import from TVA was limited (500 of needed 1200 MW) during transition from Moderate to Severe drought
- In Summer 2008, all imports were limited (1600-2200 of needed 2700 MW) during transition from Moderate to Severe drought

Studies Completed since March 2006

SERC Long-Term SG (LTSG)

2013 Future Year Study

- Issued November 2006
- Subregional Transfer Capabilities (FCITC)
 - FCITC from 900-3000 MW between SERC subregions
- NERC TPL-001 and 002 (N-1) Contingency Evaluation
 - No significant impacts on neighboring systems for SERC contingencies tested
 - No areas of non-compliance with NERC standards

Studies Completed since March 2006

SERC Long-Term SG (LTSG)

2011 Future Year Study

- Issued December 2007
- Subregional Transfer Capabilities (FCITC)
 - FCITC from 1500-3000 MW between SERC subregions
- NERC TPL-001 and 002 (N-1) Contingency Evaluation
 - No significant impacts on neighboring systems for SERC contingencies tested
 - No areas of non-compliance with NERC standards

Studies Completed since March 2006

SERC Long-Term SG (LTSG)

2011 Future Year Study

- Wateree 115/100 kV Transformer
 - Taken out of service in base model
 - Prevent overloads in the Great Falls-Wateree-Elgin area
 - Similar to past studies where the DK1 operating guide (opening of Duke's Great Falls-Wateree line) was invoked to accommodate additional transfers
 - Becoming a required, pre-contingency operating condition

Studies Completed since March 2006

VACAR Power Flow WG (PFWG)

2007 Summer Peak Study

- Issued May 2006
- Transfer Capabilities (FCITC) among VACAR
 - FCITC from 1000-2000 MW between VACAR Companies
- Parallel Transfers Analysis
 - PJM Mid-Atlantic to FRCC (4000 MW)
 - FRCC to PJM Mid-Atlantic (4000 MW)
 - PJM West to PJM Mid Atlantic (2000 MW)

Studies Completed since March 2006

VACAR Power Flow WG (PFWG)

2011 Summer Peak Study

- Issued April 2007
- Transfer Capabilities (FCITC) among VACAR
 - FCITC from 1000-2000 MW between VACAR Companies
- Parallel Transfers Analysis
 - PJM Mid-Atlantic to FRCC (4000 MW)
 - FRCC to PJM Mid-Atlantic (4000 MW)
 - PJM West to PJM Mid Atlantic (3000 MW)

Studies Completed since March 2006

VACAR Power Flow WG (PFWG)

2013 Summer/Winter Peak Study

- In progress with scheduled completion May 2008
- NERC TPL-001 and 002 (N-1) Thermal Assessment
 - 2013 Summer Peak (Wateree 115/100 kV Open)
 - 2013 Winter Peak
 - 2013 Summer/Winter Peak with VACAR Reserve Sharing scenarios
 - VACAR generator outaged and replaced with a combination of self-supply generation and imported power from the remaining VACAR companies
- NERC TPL-003 (N-2) Thermal Assessment
 - 2013 Summer Peak

Studies Completed since March 2006

VACAR Stability WG (SWG)

2012 Summer Peak Study

- Issued April 2006
- Evaluated TPL-001 and selected contingencies (TPL-002 and 003) in the long-term planning horizon
- VACAR in compliance with tested NERC reliability requirements

2010 Summer Peak Study

- Issued March 2007
- Evaluated TPL-001 and selected more severe contingencies (TPL-003 and 004) in the short-term planning horizon
- VACAR in compliance with tested NERC reliability requirements

Studies Completed since March 2006

VACAR Stability WG (SWG)

2008 Fall Peak Study

- Completed with report pending PTF Approval
- Evaluated TPL-001 and selected contingencies (TPL- 002 and 003) on a light load case in the short-term planning horizon
- VACAR in compliance with tested NERC reliability requirements

VACAR Study Summary

- The overall health of the VACAR Transmission System appears good.
- Power Flow studies to date indicate that a wide variety of generation and transfer scenarios can be reliably accommodated.
- No significant stability problems have been found in studies performed to date.
- The VACAR subregion complies with the tested NERC TPL Reliability Standards.

VACAR Underfrequency Relay Coordination

Clay Young
SCE&G

Charleston, SC
April 8, 2008

NERC Standards

- PRC-006 – Requires Regional Reliability Organizations to have an UFLS program
- PRC-007 – Requires UFLS owners to comply with the Regional program
- PRC-008 – Requires UFLS owners to maintain and test UFLS equipment
- PRC-009 – Requires UFLS owners to analyze and document an UFLS event

SERC Supplement

PRC-006 through 009

- Each SERC Member that serves load within SERC is required to participate in a regional UFLS scheme
- Schemes must have the capability of shedding at least 30 percent of peak hour load in approximately equal increments in at least three steps
- Set points must be distributed over the frequency range of 59.5 Hz to 58.4 Hz
- First set point should be no lower than 59.3 Hz
- Range between set points should be at least 0.2 Hz but no greater than 0.5 Hz

VACAR Underfrequency Load Shedding

Set Point (Hz)	Balancing Area					Total
	Dominion	Duke	Progress	SCPSA	SCE&G	
59.3	1781	2046	1482	466	554	6329
59.0	1896	2044	1363	475	515	6293
58.5	1820	2164	1384	488	463	6319
TOTAL	5497	6254	4229	1429	1532	18941
2006 Peak	17038	19725	13221	4352	4747	59083
% of 2006 Peak	32.3	31.7	32.0	32.8	32.3	32.1

Questions?