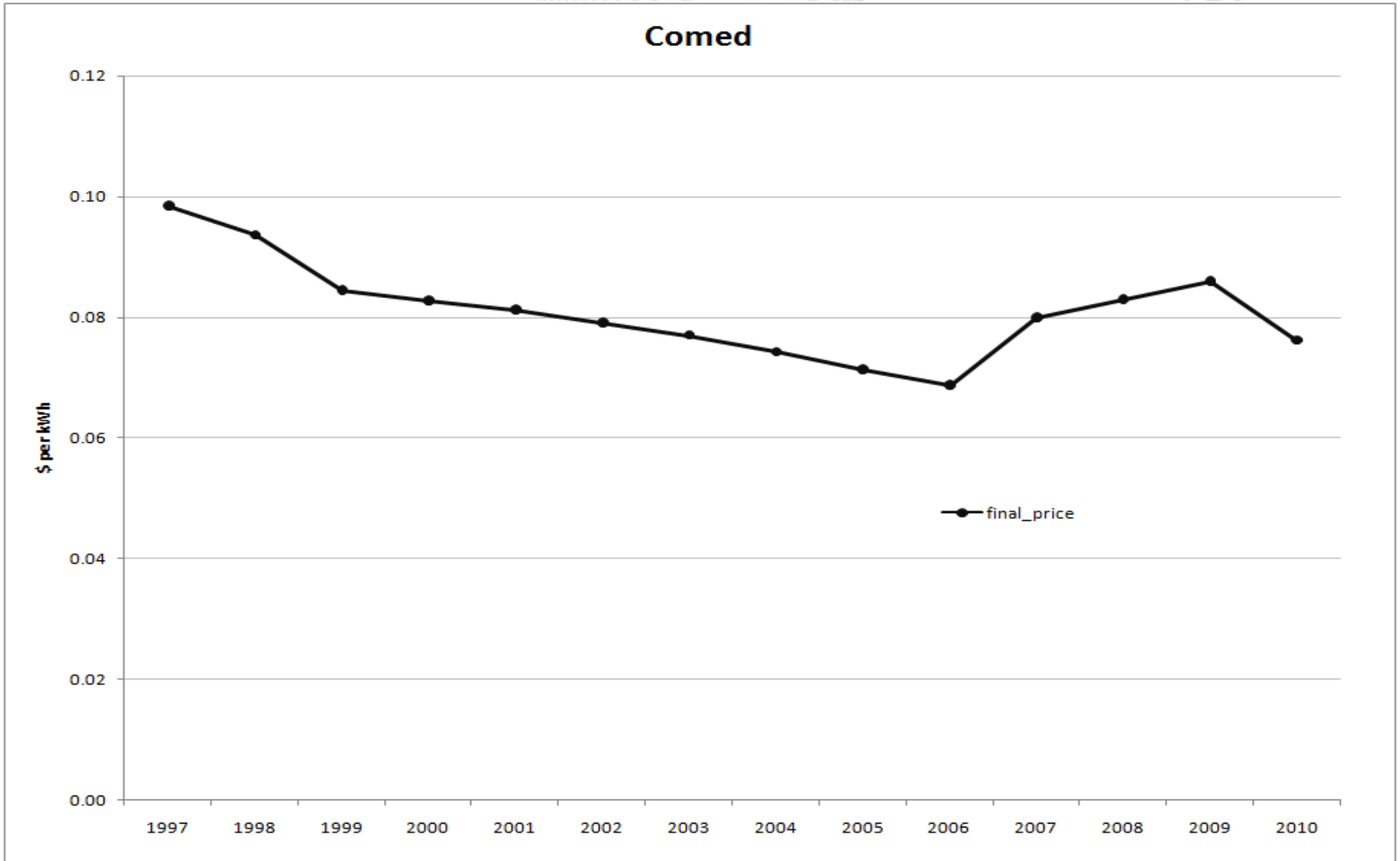




Results of Test of Price Variable In PJM Load Forecast Model

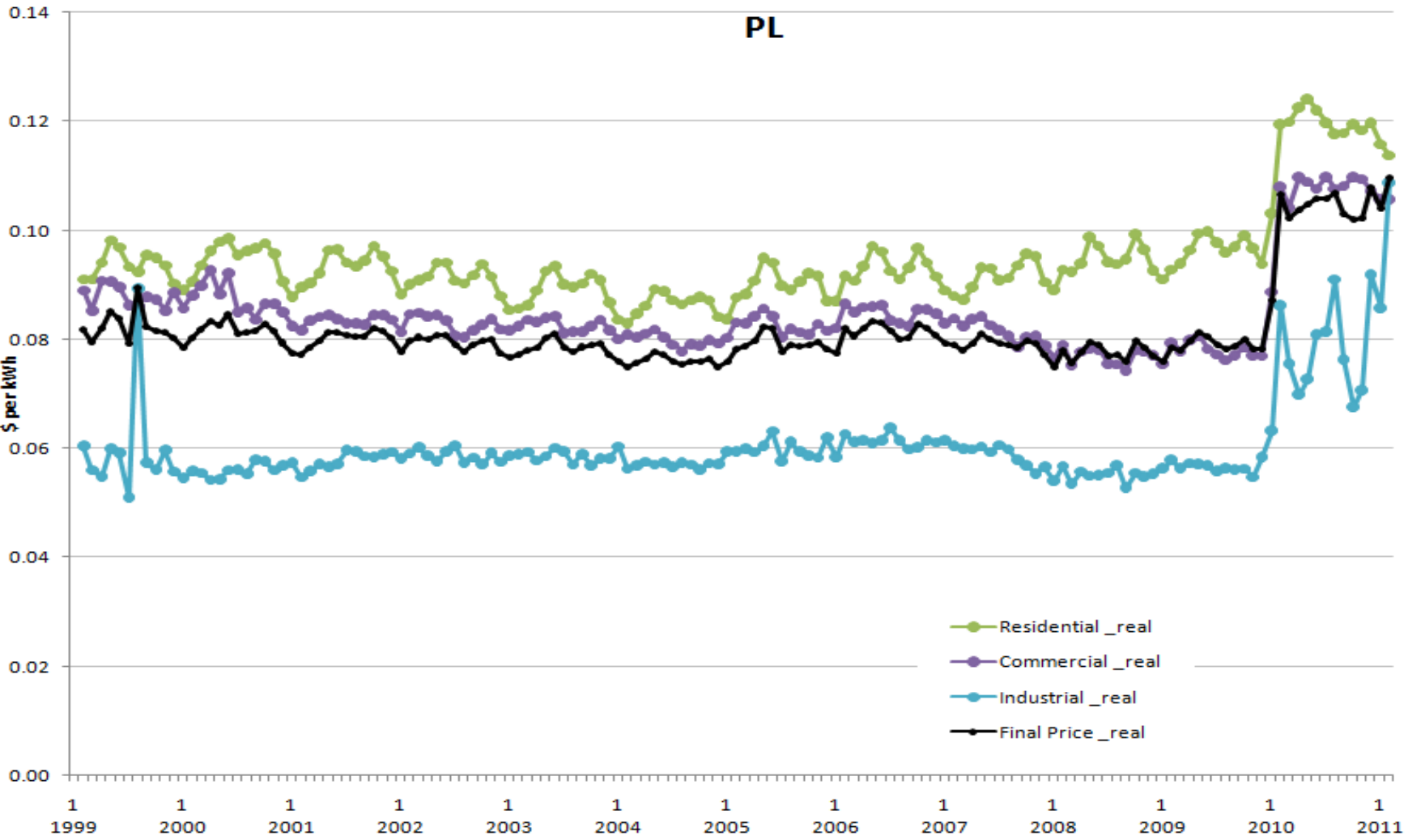
PJM Load Analysis Subcommittee
July 25, 2011



- ComEd supplied yearly total prices for 1997 - 2010 (no Residential/Commercial/Industrial breakdown)
- Model results:

Non-Coincident Peak						Energy					
Comed Zone											
	Price						Price				
	Coefficient	T-Stat	Elas	Adj RSq	MAPE		Coefficient	T-Stat	Elas	Adj RSq	MAPE
Without Price Term	-	-		0.974	2.20%	Without Price Term	-	-		0.978	1.78%
With Price Term	224.49	0.149	0.1%	0.974	2.20%	With Price Term	-8.126	-0.337	-0.2%	0.978	1.78%

Non-Coincident Peak impact estimate for 2010 is $224.49 * 0.076 = 17.06$ MW



- PPL supplied monthly prices for 2/1999 – 2/2011 with Residential/Commercial/Industrial breakdown, and PJM is assuming a 10% discount for shopping customers.
- Model results estimated through the end of August 2010:

PPL Zone - 10 percent discount Monthly prices - estimation end 2010

	Price						Price				
	Coefficient	T-Stat	Elas	Adj RSq	MAPE		Coefficient	T-Stat	Elas	Adj RSq	MAPE
Without Price Term	-	-		0.957	2.29%	Without Price Term	-	-		0.968	1.92%
With Price Term*	-5695.232	-14.072	-8.8%	0.959	2.24%	With Price Term	-112.897	-16.11	-8.4%	0.97	1.87%

* estimation 2/1/1999 - 8/31/2010

Non-Coincident Peak impact estimate for 2010 is $-5695.23 * 0.117 = -666.34$ MW

- Model results estimated through the end of August 2009:

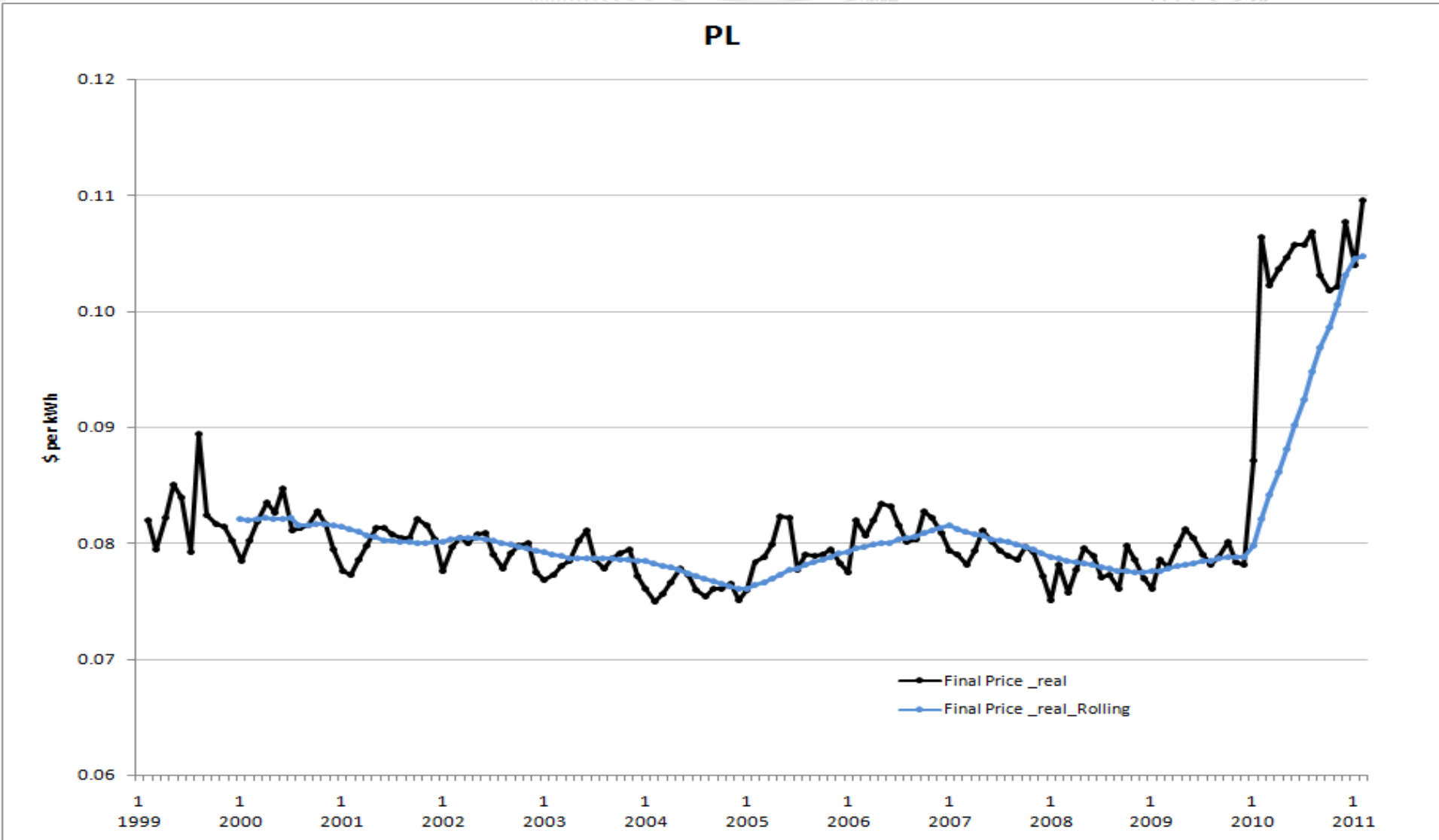
PPL Zone - 10 percent discount Monthly prices - estimation end 2009

	Price						Price				
	Coefficient	T-Stat	Elas	Adj RSq	MAPE		Coefficient	T-Stat	Elas	Adj RSq	MAPE
Without Price Term	-	-		0.961	2.17%	Without Price Term	-	-		0.972	1.79%
With Price Term*	10077.607	7.455	15.4%	0.962	2.16%	With Price Term	202.315	8.736	14.8%	0.973	1.78%

* estimation 2/1/1999 - 8/31/2009

Non-Coincident Peak impact estimate for 2010 is $10077.61 * 0.117 = 1179.08$ MW

PL Zone Monthly Price – Rolling Average



- Rolling average of prices was applied (months 1 – 12 were averaged for Dec, months 2 – 1 were averaged for Jan, etc.)
- Estimation begin date is 1/1/2000
- Model results estimated with monthly rolling prices:

Non-Coincident Peak						Energy					
PPL Zone - 10 percent discount Rolling Average Monthly prices - estimation end 2010											
	Price						Price				
	Coefficient	T-Stat	Elas	Adj RSq	MAPE		Coefficient	T-Stat	Elas	Adj RSq	MAPE
Without Price Term	-	-		0.956	2.27%	Without Price Term	-	-		0.967	1.92%
With Price Term*	-6723.67	-7.151	-10.2%	0.957	2.26%	With Price Term	-138.022	-8.411	-10.0%	0.968	1.91%

* estimation 1/1/2000 - 8/31/2010

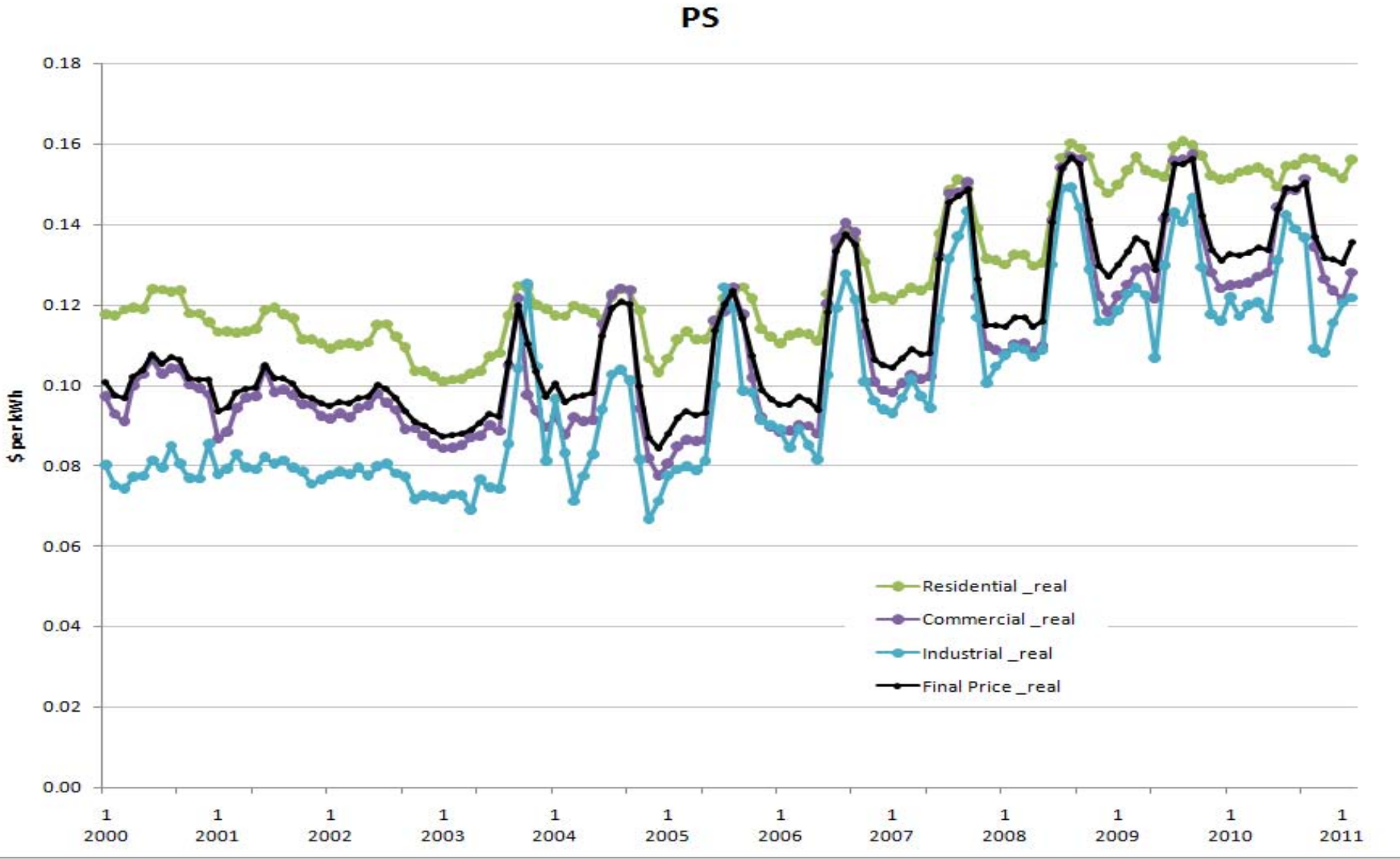
Non-Coincident Peak impact estimate for 2010 is $-6723.67 * 0.092 = -618.58$ MW

- Model results estimated through the end of August 2009:

Non-Coincident Peak						Energy					
PPL Zone - 10 percent discount Rolling Average Monthly prices - estimation end 2009											
	Price						Price				
	Coefficient	T-Stat	Elas	Adj RSq	MAPE		Coefficient	T-Stat	Elas	Adj RSq	MAPE
Without Price Term	-	-		0.961	2.16%	Without Price Term	-	-		0.972	1.79%
With Price Term*	23704.248	12.996	35.8%	0.962	2.11%	With Price Term	500.385	16.074	36.2%	0.974	1.72%

* estimation 1/1/2000 - 8/31/2009

Non-Coincident Peak impact estimate for 2010 is $23704.25 * 0.092 = 2180.79$ MW



- PSEG supplied monthly prices for 1/2000 – 2/2011 with Residential, Commercial, and Industrial breakdown.
- **Data does not account for prices paid by customers who are shopping**
- Model results estimated with monthly prices:

Non-Coincident Peak						Energy					
PSEG Zone - Monthly Prices											
	Price			Adj RSq	MAPE		Price			Adj RSq	MAPE
	Coefficient	T-Stat	Elas				Coefficient	T-Stat	Elas		
Without Price Term	-	-		0.964	2.51%	Without Price Term	-	-		0.965	2.08%
With Price Term*	-5282.752	-18.283	-9.5%	0.967	2.36%	With Price Term*	-93.194	-18.941	-8.2%	0.968	1.97%

* estimation 1/1/2000 - 8/31/2010

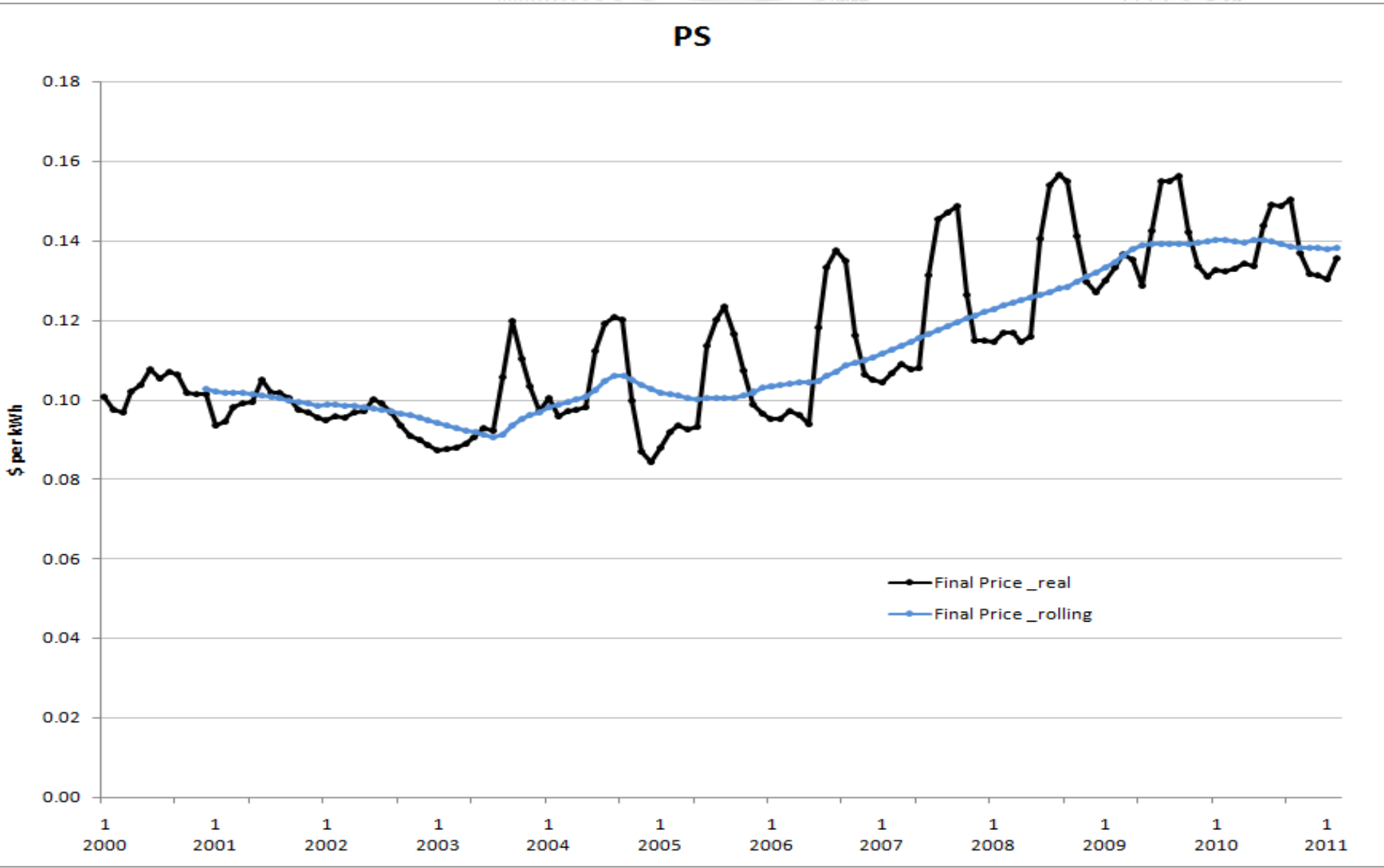
Non-Coincident Peak impact estimate for 2010 is $-5282.75 * 0.149 = -787.13$ MW

- Model results estimated with seasonal averages of monthly prices:

Non-Coincident Peak						Energy					
PSEG Zone - Seasonal averages of Monthly Price data											
	Price			Adj RSq	MAPE		Price			Adj RSq	MAPE
	Coefficient	T-Stat	Elas				Coefficient	T-Stat	Elas		
Without Price Term	-	-		0.964	2.51%	Without Price Term	-	-		0.965	2.08%
With Price Term*	-5847.257	-20.299	-10.5%	0.967	2.35%	With Price Term*	-104.473	-21.351	-9.2%	0.969	1.95%

* estimation 1/1/2000 - 8/31/2010

Non-Coincident Peak impact estimate for 2010 is $-5847.26 * 0.147 = -859.55$ MW

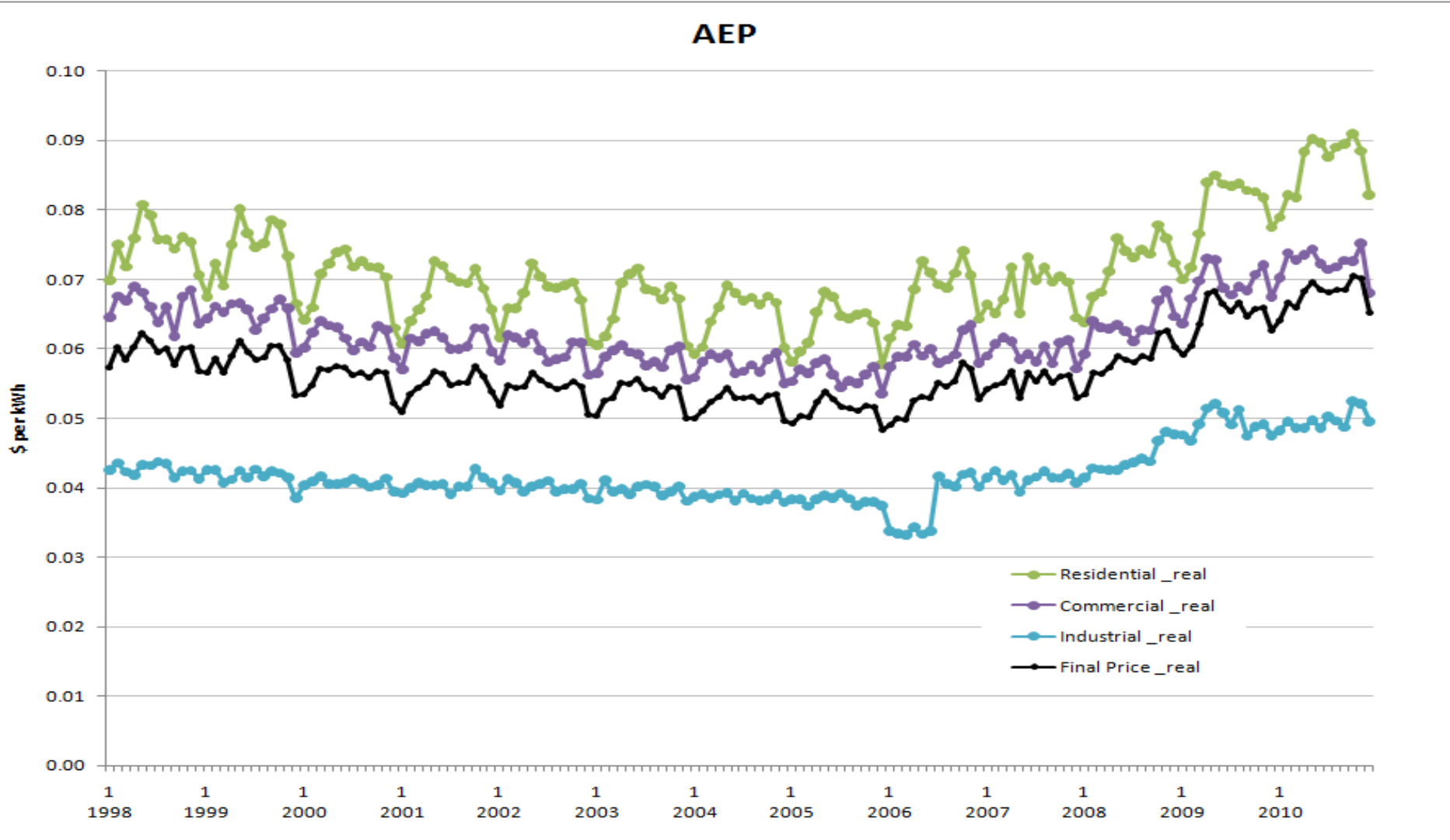


- Rolling average of prices was applied (months 1 – 12 were averaged for Dec, months 2 – 1 were averaged for Jan, etc.)
- Estimation begin date is 1/1/2001
- Model results estimated with monthly rolling prices:

Non-Coincident Peak					Energy						
PSEG Zone - Rolling Average Monthly Prices											
	Price			Adj RSq	MAPE		Price			Adj RSq	MAPE
	Coefficient	T-Stat	Elas				Coefficient	T-Stat	Elas		
Without Price Term	-	-		0.964	2.52%	Without Price Term	-	-		0.964	2.11%
With Price Term*	-8369.454	-25.654	-14.9%	0.969	2.27%	With Price Term*	-159.057	-28.948	-13.9%	0.971	1.85%

* estimation 1/1/2001 - 8/31/2010

Non-Coincident Peak impact estimate for 2010 is $-8369.45 * 0.140 = -1171.72$ MW



- AEP supplied monthly prices for 1/1998 – 12/2010 with Residential/Commercial/Industrial breakdown.
- **Data does not account for prices paid by customers who are shopping**
- Model results estimated with monthly prices:

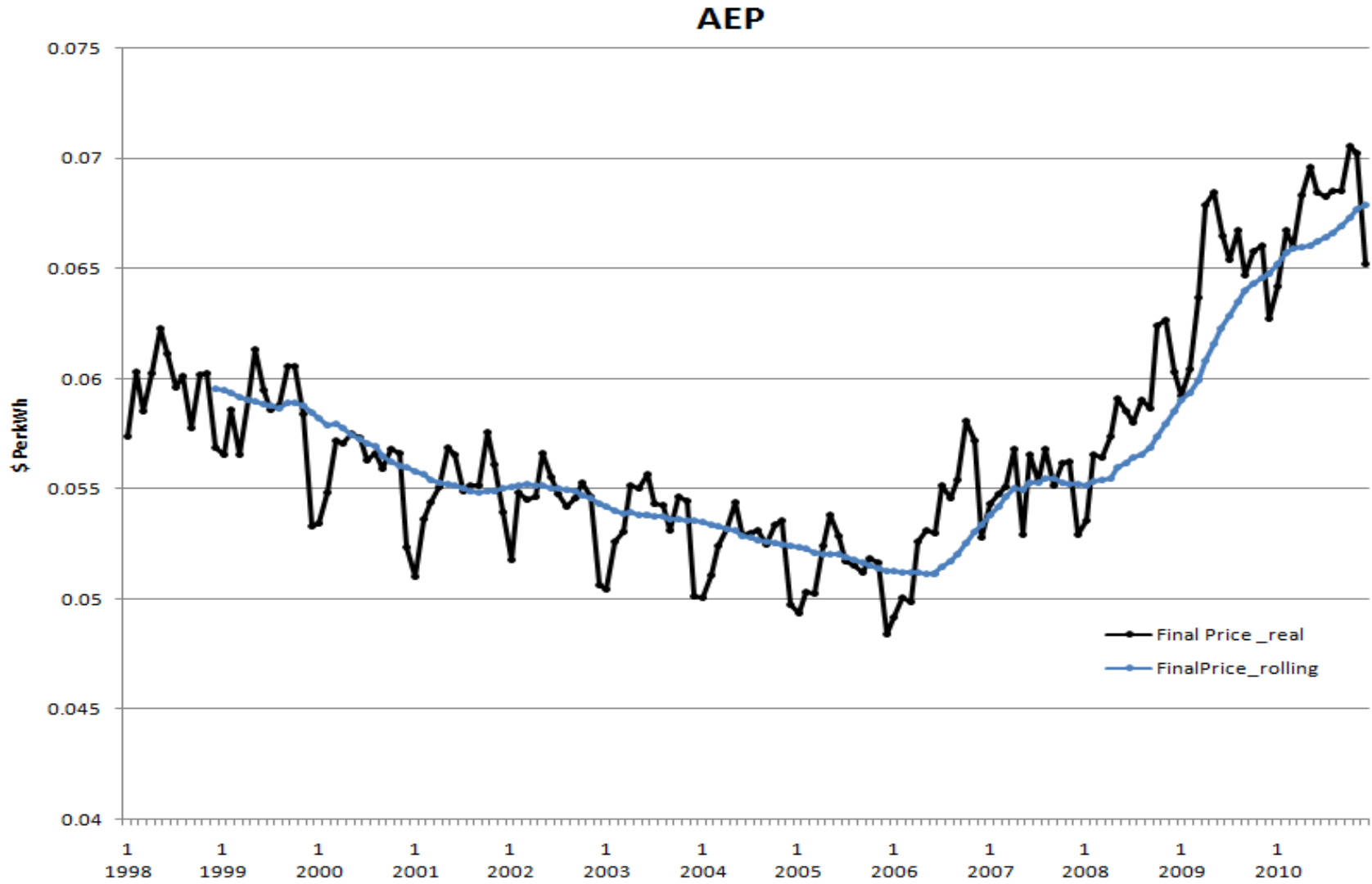
Non-Coincident Peak						Energy					
AEP Zone - estimation end 2010											
	Price						Price				
	Coefficient	T-Stat	Elas	Adj RSq	MAPE		Coefficient	T-Stat	Elas	Adj RSq	MAPE
Without Price Term	-	-		0.955	2.16%	Without Price Term	-	-		0.967	1.66%
With Price Term	-10159.671	-2.127	-3.3%	0.955	2.16%	With Price Term	-115.923	-1.472	-1.8%	0.967	1.67%

Non-Coincident Peak impact estimate for 2010 is $-10159.7 * 0.068 = -690.86$ MW

- Model results estimated with monthly prices and estimation end 2009:

Non-Coincident Peak						Energy					
AEP Zone - estimation end 2009											
	Price						Price				
	Coefficient	T-Stat	Elas	Adj RSq	MAPE		Coefficient	T-Stat	Elas	Adj RSq	MAPE
Without Price Term	-	-		0.955	2.13%	Without Price Term	-	-		0.968	1.63%
With Price Term	-20012.895	-3.629	-6.4%	0.955	2.13%	With Price Term	-402.792	-4.444	-6.1%	0.968	1.63%

Non-Coincident Peak impact estimate for 2010 is $-20012.9 * 0.068 = -1360.88$ MW



- Rolling average of prices was applied (months 1 – 12 were averaged for Dec, months 2 – 1 were averaged for Jan, etc.)
- Estimation begin date is 1/1/1999
- Model results estimated with monthly rolling prices:

Non-Coincident Peak						Energy					
AEP Zone Rolling Average - estimation end 2010											
	Price			Adj RSq	MAPE		Price			Adj RSq	MAPE
	Coefficient	T-Stat	Elas				Coefficient	T-Stat	Elas		
Without Price Term	-	-		0.956	2.14%	Without Price Term	-	-		0.968	1.64%
With Price Term	-16706.268	-2.915	-5.4%	0.956	2.14%	With Price Term	-31.564	-0.334	-0.5%	0.968	1.64%

* estimation 1/1/1999 - 8/31/2010

Non-Coincident Peak impact estimate for 2010 is $-16706.3 * 0.067 = -1119.32$ MW

- Model results estimated with monthly rolling prices and estimation end 2009:

Non-Coincident Peak						Energy					
AEP Zone Rolling Average - estimation end 2009											
	Price			Adj RSq	MAPE		Price			Adj RSq	MAPE
	Coefficient	T-Stat	Elas				Coefficient	T-Stat	Elas		
Without Price Term	-	-		0.956	2.10%	Without Price Term	-	-		0.968	1.61%
With Price Term	-46916.104	-4.933	-14.9%	0.956	2.10%	With Price Term	-782.073	-5.008	-11.7%	0.969	1.61%

* estimation 1/1/1999 - 8/31/2009

Non-Coincident Peak impact estimate for 2010 is $-46916.1 * 0.067 = -3143.38$ MW

- PJM was unable to acquire comprehensive price data - revenue class data that fully reflected shopping customers' realized price.
- Results are inconsistent and in some cases spurious (positive coefficients, unrealistic magnitude)
- Results can be driven by one large price change
- Elasticities tended to be outside a zone of reasonableness
- Results were equally weak for summer peak load and net energy for load

- Given these results and the challenges of collecting historical data and forecasting prices, **PJM will not further pursue the introduction of a price variable into the load model.**