

# WHY HAVE SO MANY STATES IN THE U.S. ADOPTED A RENEWABLE PORTFOLIO STANDARD FOR POWER SALES?

Asbjorn Moseidjord  
Chevron Professor of Energy and Resources  
Saint Mary's College of California  
Moraga, CA 94575  
(925) 631-4583 / (925) 376-5625  
[amoseidj@stmarys-ca.edu](mailto:amoseidj@stmarys-ca.edu)

I

**Table 1: RPS States**

<b>State</b>	<b>Non-Hydro Renewable Percent of Total Generation (2001)</b>	<b>Year RPS First Enacted</b>	<b>RPS Target Percent</b>	<b>Target Year</b>
Arizona	0.0%	2001	1.1%	2007
California	11.0%	2002	20.0%	2017
Colorado	0.1%	2004	10.0%	2015
Connecticut	0.6%	1998	10.0%	2010
Iowa	1.5%	1991	2.0%	1999
Maine	20.9%	1999	30.0%	2000
Maryland	0.1%	2004	7.5%	2019
Massachusetts	5.4%	1997	4.0%	2009
Minnesota	4.7%	2001	19.0%	2015
Nevada	3.5%	2001	15.0%	2013
New Jersey	2.2%	1999	6.5%	2008
New Mexico	0.1%	2002	10.0%	2011
New York	0.2%	2004	24.0%	2013
Pennsylvania	1.4%	2004	8.0%	2020
Rhode Island	0.1%	2004	16.0%	2019
Texas	6.0%	1999	2.7%	2009
Wisconsin	2.2%	1998	2.2%	2011
All United States	2.1%		None	
European Community			22.1%	2010

**Note:**

The Massachusetts standard applies to "new" green power, i.e., power from facilities built after 1997. Hawaii and Washington D.C. excluded from this table and this paper.

**Sources:**

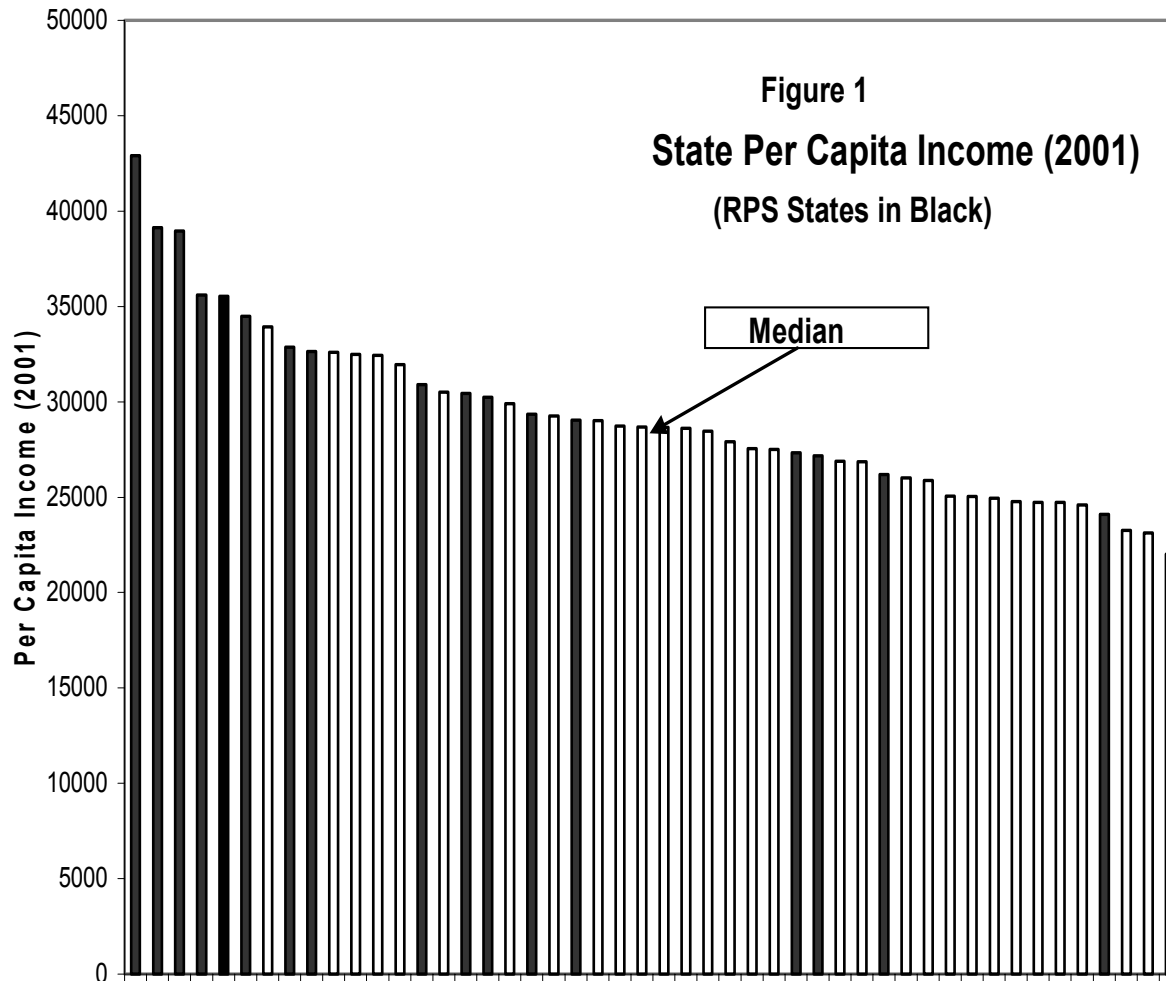
Interstate Renewable Energy Council website at  
 Union of Concerned Scientist website at  
 U.S. Energy Information Administration at

<http://www.irecusa.org>  
<http://www.ucsus.org/index.cfm>  
<http://www.eia.doe.gov>

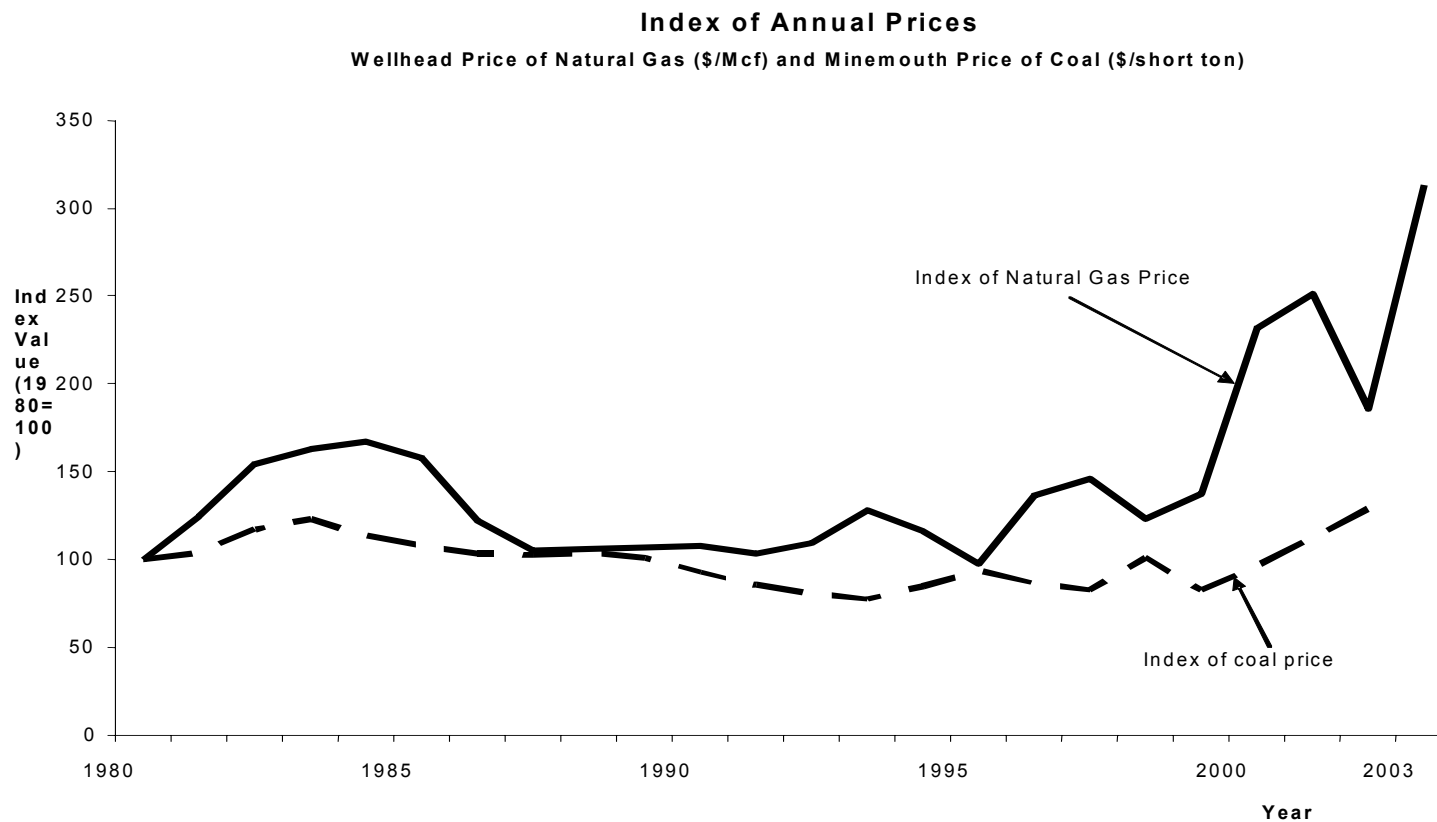
# THE STATISTICAL MODEL: General Form

- This paper employs a binary logit model of the form:
- $RPS01 = f(E, D, I)$
- **RPS01** is a binary variable equal to one if the state has adopted an RPS and zero otherwise.
- **E** is a variable reflecting the motive to improve the environment. Below, this variable is proxied by state per capita income using the reasoning behind the environmental Kuznets curve.
- **D** reflects the desire to diversify energy inputs into power generation. This variable is proxied by the in-state power generating industry's existing exposure to natural gas, i.e., the fuel that is likely to be used less if an RPS is adopted.
- **I** reflects the intent to develop an in-state renewable power industry. The two proxies used below to capture this are the existing in-state market share of renewable resources in electricity production and wind power potential (the least cost renewable resource)

# States with High Per Capita Income Are More Likely to Have Chosen and RPS



# Natural Gas Has Been Getting Relatively More Expensive

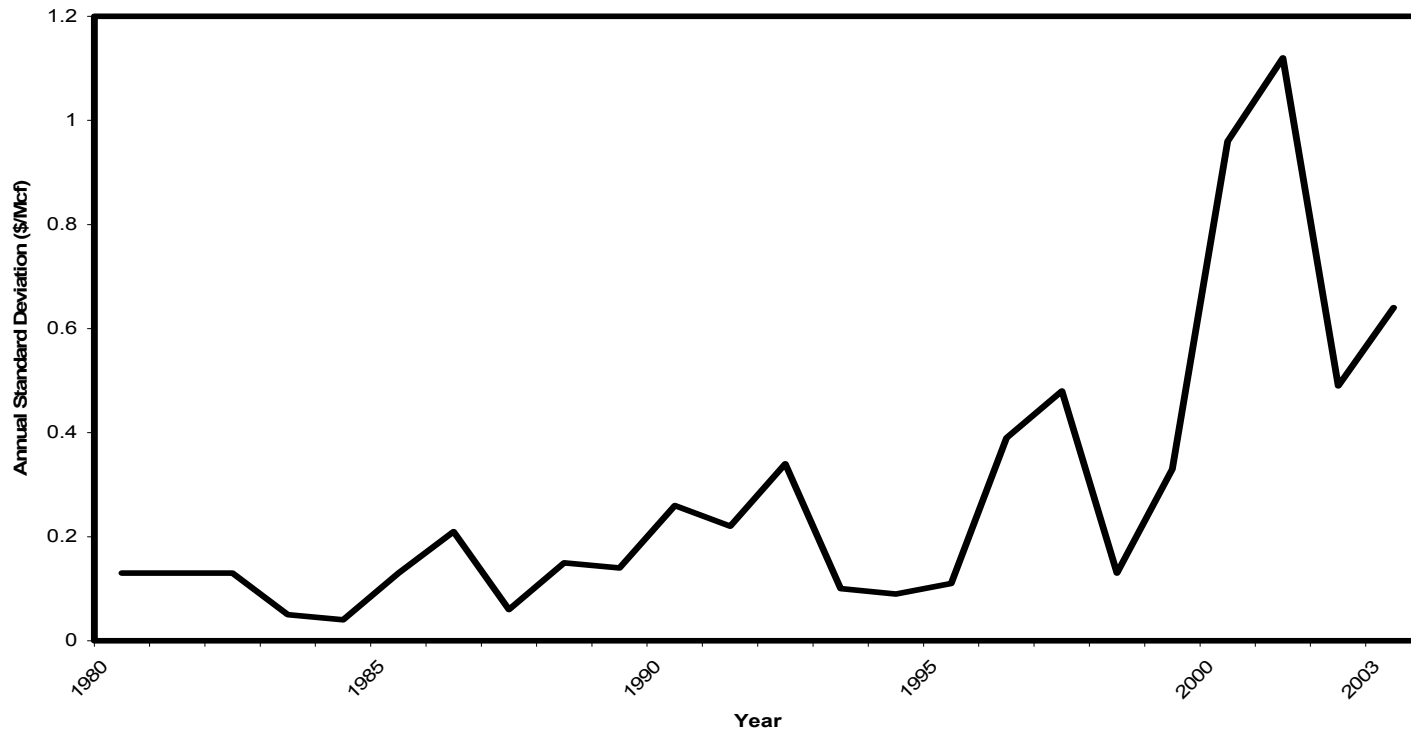


Source: U.S. Energy Information Administration website

# - And Gas Price Volatility Has Increased

## Natural Gas Price Variability

Standard deviation of monthly wellhead prices, by year, 1980-2003



Source of Price data: U.S. Energy Information Administration website



# The Estimated Model

- The estimated statistical model is:
- $RPS01 = g(PCINCOME, PERGAS, PERRENEWABLE, WINDEX)$
- , where
- **RPS01** = a binary decision variable equal to 1 if the state has adopted an RPS and zero otherwise;
- **PCINCOME** = state per capita income in 2001, in dollars.
- **PERGAS** = percent of in-state power generation from natural gas (2001);
- **PERRENEWABLE** = percent of in-state power generation from renewables (2001); and
- **WINDEX** = an index of potential wind power generation in the state



## TABLE 2: LOGIT ESTIMATION OUTPUT

Dependent Variable: **RPS01**

Method: ML - Binary Logit

<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>z-Statistic</b>	<b>Prob.</b>
<b>C</b>	-10.27117	3.423707	-3.000014	0.0027
<b>PCINCOME</b>	0.000292	0.000111	2.628753	0.0086
<b>PERGAS</b>	5.325108	2.600851	2.047448	0.0406
<b>PERRENEWABLE</b>	5.579489	11.91891	0.468121	0.6397
<b>WINDEX</b>	1.706824	5.977720	0.285531	0.7752
Mean dependent var	0.354167		S.D. dependent var	0.48332
S.E. of regression	0.389153		Akaike info criterion	1.073220
Sum squared resid	6.511922		Schwarz criterion	1.268143
Log likelihood	-20.75743		Hannan-Quinn criter.	1.146885
Restr. log likelihood	-31.19942		Avg. log likelihood	-0.43244
LR statistic (4 df)	20.88398		McFadden R-squared	0.334685
	Probability(LR stat)	0.000334		
	Total obs		48	
Percent correct predictions:	93.55%		Percent incorrect:	6.45%