Federal Energy Policies and the Maryland Agriculture Sector

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Important Trends

1. Capital cost of renewable energy has drastically decreased in the last few years.
2. Abundance of unconventional oil and gas is making a downward pressure on prices of fossil fuels.
3. Electricity prices (residential and commercial) are likely to increase substantially in the foreseeable future due to grid modernization and investments in renewables.
4. Climate change policies will bring new incentives to invest in renewable energy and energy efficiency.

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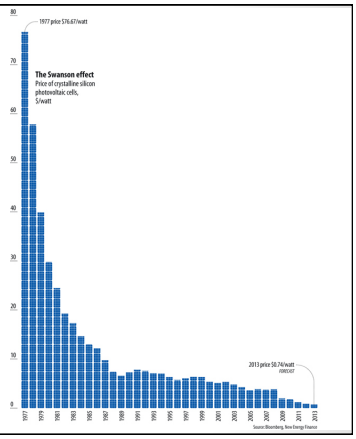
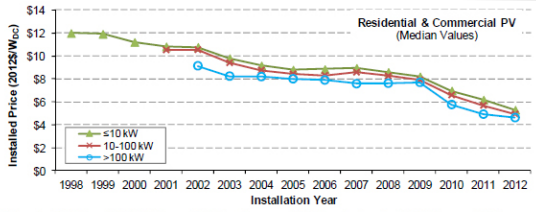
4. Climate change policies will bring new incentives to invest in renewable energy and energy efficiency.
5. **Energy efficiency has been and will remain the cheapest energy source.**

Capital Cost of Solar



From 2001 to 2013 the cost of solar PV has decreased by more than half.



Notes: See Table 1 and Table B-2 for residential and commercial PV sample sizes by installation year. Median installed prices are shown only if 15 or more observations are available for the individual size range.

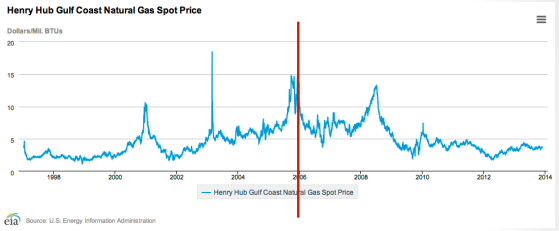
Figure 7. Installed Price of Residential & Commercial PV over Time

Source: LBNL

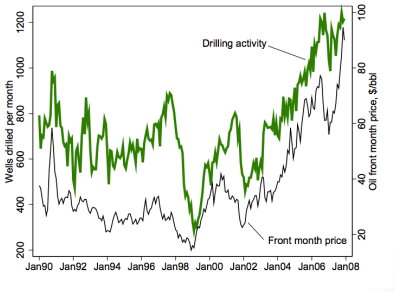
Adoption of Renewable Energy on U.S. Farms

Year	Data Item	Type of Operation	Maryland	U.S. Total
2012	Number of Operations with Devices	Methane Digesters	2	537
		Solar Panels	284	36,331
		Wind Turbines	29	9,054
		Methane + Solar + Wind	**315**	**45,922**
2009	Number of Operations	Methane + Solar + Wind	24	8,509

The Raise of Unconventional Oil & Gas



Implication of Fracking on Future Natural Gas/Oil Prices



Source: Kellogg et al. 2014

Comparison of Levelized Cost of Electricity (2012 $/MWh)

Plant type	LCOE	Subsidy	LCOE including Subsidy
Conventional Coal	**95.6**		
Natural Gas-fired			
Conventional Combined Cycle	**66.3**		
Advanced Combined Cycle	**64.4**		
Advanced CC with CCS	**91.3**		
Advanced Nuclear	96.1	-10	86.1
Geothermal	47.9	-3.4	44.5
Biomass	102.6		
Wind	**80.3**		
Wind-Offshore	**204.1**		
Solar PV2	**130**	**-11.5**	**118.6**
Solar Thermal	243.1	-19.5	223.6
Hydro3	84.5		

Source EIA: 2014 Annual Energy Outlook

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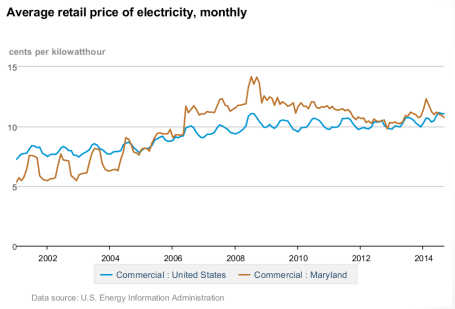
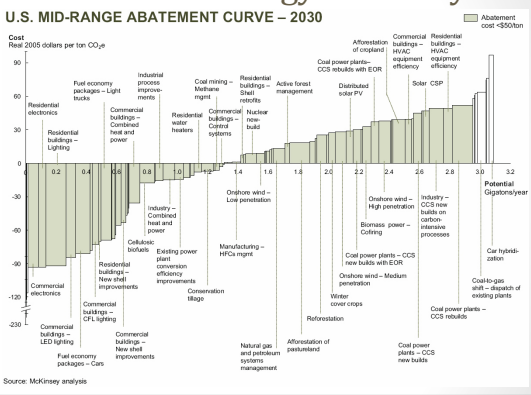
Electricity Price (2001 – 2014)



What About Energy Efficiency?



Federal Policies to Encourage Investments in Energy Efficiency

Energy Efficiency-Related Programs at the USDA

- Energy
  - **Rural Energy for America Program (REAP)**
- Rural Development
  - Multi-Family Housing Energy Efficiency Initiative
  - Business and Industry (B&I) Guaranteed Loan Program
  - **Rural Business Enterprise Grant Program (RBEG)**
  - Rural Economic Development Load and Grant Program (REDLG)
  - Value-Added Producer Grant (VAPG)
  - Electric Program
  - **High Energy Cost Grant**
- Environmental Quality Incentive Program (EQIP)

Rural Energy for America Program (REAP)

- **Description**: It provides financial assistance to promote energy efficiency and renewable energy development in rural areas.
- **Type of program**: Grant / loan guarantee (more)
- **Min-Maximum Amount**:
  - $1,500 - $250,000 **grants** for energy efficiency projects
  - $2,500 - $500,000 **grants** for renewable energy systems
  - $50,000 (max) **grants** for feasible studies
  - $5,000 - $25 million guaranteed **loan**
- **Eligibility**: rural small business and agricultural producers
- **Technology targeted**: Renewable energy systems and energy efficiency improvements
- Status of the program: Not have a set expiration date
- **Application Process**: (grants.gov)
  - Simplified application for grant request under $50,000
  - Standard application includes more detailed financial and project information.
- **Link to the program**: http://www.rurdev.usda.gov/BCP_Reap.html

Rural Business Enterprise Grant Program (RBEG)

- **Description**: It provides grants for rural projects that finance and facilitate development of small and emerging rural businesses.
- **Type of program**: Grants
- **Min-Maximum Amount**: $10,000 - $500,000
- **Eligibility**: Rural public entities, Indian tribes and rural private non-profit corporations
- **Technology targeted**: Broad range; only small portion used for energy efficiency programs
- **Application Process**: At rural development state office
- **Program Status:** Expired on April 30, 2013
- **Link to the program**: http://www.rurdev.usda.gov/bcp_rbeg.html

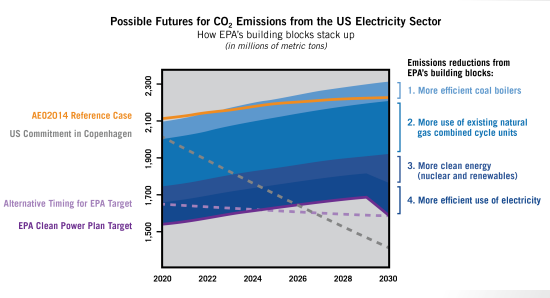
High Energy Cost Grant

- **Description:** It provides financial assistance for the improvement of energy generation, transmission, and distribution facilities servicing eligible rural communities with home energy costs that are over 275 percent of the national average.
- **Type of program**: Grants
- **Min-Maximum Amount**:
- **Eligibility**: individuals or business that face an electricity costs above 275% of the national average (mostly Alaska or Hawaii)
- **Technology targeted**: on-grid and off-grid renewable energy projects, energy efficiency and energy conservation projects serving eligible communities
- **Status of the Program:** Application closed on August 1, 2014
- **Application Process**: grants.gov
- **Link to the program**: http://www.rurdev.usda.gov/uep_our_grant_programs.html

The Clean Power Plan

- **30% reduction** in carbon emissions in the power sector (w.r.t. 2005 level).
- Rely on the **Clean Air Act** to regulate carbon emissions.
- **Considerable flexibility** given to states to achieve their goals.
- All states must submit initial or complete plans by **June 30, 2016**.
- The plan has **4** building blocks:
  - **More efficient coal boilers**
  - **More use of existing natural gas combined cycle units**
  - **More clean energy (nuclear and renewables)**
  - **More efficient use of electricity**

The 4 Building Blocks



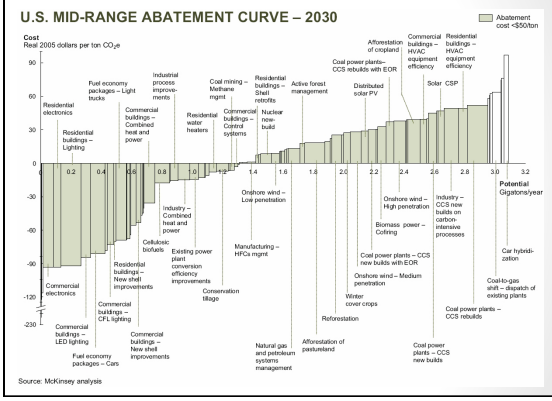
Source: Paul and Pan (2014), Resources for the Future

State Flexibility

- State-specific goals: carbon intensity targets
  - State must reduce carbon emissions per unit of electricity produced
- Existing policies will count, e.g.,
  - Renewable portfolio standards
  - Demand-side management incentives
  - Existing cap-and-trade programs
- States can submit a multi-state compliance plan

Implications of a Regional Cap-and-Trade

- The CPP may result in establishing a carbon price (at least implicitly).
- Maryland is already participating to RGGI: the Regional Greenhouse Gas Initiative (allowance price is currently about 3 $/ ton of CO2).
- A carbon price in the 25-50 $/ton of CO2 will provide important incentives for the agricultural sector beyond energy efficiency, e.g.,:
  - Afforestation of pastureland
  - Conservation tillage
  - Winter cover crops



Conclusion

- Renewables are becoming increasingly cost-effective for small businesses.
- Opportunities for energy efficiency appear important, even without incentives, but have been overlooked.
- The climate policy landscape will provide implicit or explicit financial incentives for both renewables and energy efficiency.