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## **TRENDS IN ALTERNATIVE FUEL CARS, SOLAR PANELS, AND INTERNET ACCESS AND USE**

Dr. Lynne Holt

Policy Analyst, Public Utility Research Center  
Warrington College of Business Administration  
The University of Florida

The Bureau of Business and Economic Research (BEER) surveys about 500 consumers each month to gauge their confidence about the economy and their personal economic well-being. As part of its consumer sentiment surveys, BEER began asking questions in April 2012 on a quarterly basis about consumers' access to the Internet at home and on a biannual basis about their ownership of alternative fuel cars and houses with solar panels. The questions were revised in July 2012 to collapse alternative fuel questions, better capture whether houses with solar panels were purchased and the incentives governing the purchase, and to elicit responses about Internet service usage. The question of how the Internet was used (banking, entertainment, getting information or news, or shopping) was subsequently deleted because the type of usage in recent years has so expanded as to make the responses almost meaningless. The most recent BEER survey posing questions about alternative fuel vehicles, solar panels, and Internet access was October 2014, when there were 508 completed interviews.

The trends have been pretty stable from April 2012 through October 2014 in most respects: Below is a summary of the findings:

### **ALTERNATIVE FUEL CARS**

The BEER survey asked respondents how many cars in their households ran on fuels other than gasoline. Between 8-9% of all respondents to the April 2013 and October 2014 surveys claimed to own at least one alternative fuel car (natural gas, electric, hybrid, or diesel). The number of vehicles with natural gas reported in the October 2014 survey was greater than that of each of other types of alternative fuel vehicles but pretty much the same number was reported in October 2014 (16) as in April 2013 (15).

Demand for natural gas vehicles is likely to be constrained to the extent that a national refueling infrastructure needs to exist to service such vehicles. However, that infrastructure is unlikely to be built unless there is demand from the vehicles (the chicken-egg issue).<sup>1</sup> Demand for electric vehicles (only a total of 9 reported in October 2014) is likely to be limited due to challenges facing that industry, specifically, the number of charging stations, the driving range between charging stations, storage capacity, battery degradation in inclement weather, and the cost of batteries. For example, the cost of a battery pack in a Tesla Model S is \$30,000.<sup>2</sup>

Certain financial incentives may help lower the overall cost of plug-in hybrid and electric vehicles, specifically a federal tax credit of up to \$7,500, depending on battery size. The Florida municipal electric utility, JEA, also offers rebates of up to \$1,000 toward the purchase or lease of a plug-in vehicle.<sup>3</sup>

A law passed by the Florida legislature in 2013 may contribute to more purchases of alternative fuel vehicles in the future. Florida local governments are statutorily authorized, if approved by referendum, to use income from a locally-imposed infrastructure surtax to provide loans, grants, or rebates to residential or commercial property owners for the installation of electric vehicle supply equipment, in addition to gas fueling infrastructure for propane, compressed natural gas, and liquefied natural gas.<sup>4</sup>

## **SOLAR PANELS**

Approximately 5% of all respondents lived in houses with solar panels in October 2014, the same percentage as in April 2013 and April 2012. The April 2012 survey did not ask whether respondents living in houses with solar panels had purchased the panels and if they did, whether they were motivated by incentives. The April 2013 survey tried to capture that information. In response to that survey and the October 2014 survey, roughly three-fourth of the respondents with solar panels in their homes had purchased the panels and most claim they were not motivated by any financial incentives in doing so.

The survey did not ask respondents motivated by incentives which type of incentive contributed to their purchase decisions. However, there are federal and state taxes that can reduce the overall investment cost to consumers. A federal tax credit of 30% of qualified expenditures may be claimed for a solar system used in a taxpayer's residence. The tax credit took effect at the start of 2006 and will expire at the end of 2016 unless it is extended.<sup>5</sup> A state sales tax exemption also applies to Florida solar systems. That exemption took effect in July 1997 and has no expiration date.<sup>6</sup>

Florida's investor-owned electric utilities were required to offer solar rebate programs to their residential customers as part of their demand-side management obligations under the Florida Energy Efficiency and Conservation Act. However, those programs will be terminated at the end of 2015 in compliance with a recent Florida Public Service Commission decision (November 25). A municipal utility, Gainesville Regional Utilities (GRU), adopted a different approach than that of rebates. GRU offered its customers the opportunity to install solar systems on their roofs, with a promise to buy back at a premium the energy produced by those systems (otherwise known as feed-in tariffs).<sup>7</sup> However, GRU suspended the feed-in tariff program in calendar year 2014.

According to a recent federal report, prices for installed photovoltaic systems in residences and commercial buildings declined by 6-8% annually from 1998 to 2013 depending on the system size range. For systems completed in 2013 the installed prices declined by 12-15% from the prior year and the same trends appears to apply to the early part of 2014.<sup>8</sup> In terms of policy implications, the report finds that the module price declines which spurred so much of the historic pricing decreases for PV installations ended in 2013; further reductions would need to come from activities related to "soft" costs such as marketing and customer purchases, system design, labor for system installations, permitting and inspections. The report recommends that strategies to further reduce "soft" costs to increase consumer adoption will probably entail a mix of incentives, targeted policies, and basic and applied research and development.<sup>9</sup>

Historic installed pricing decreases and various utility incentives do not appear to have resulted in a significant uptick in Floridian solar installations; at least based on BEBR survey responses, the number of households with solar panels in Florida continues to be in the range of 5%.

## **INTERNET SERVICE ACCESS AND USE**

Internet service access was reported in the majority of respondents' households – 83% in April 2012, compared to 85% in July 2013, and 87% in both July and October 2014. Access is different than respondents' usage and various technology platforms exist to enable access. The BEBR surveys provided several options, including cable modems, digital subscriber line (DSL) from phone companies, dial-up, satellite, wireless, or fiber. Dial-up connectivity, which is very slow, is pretty much a thing of the past, with less than 1% of all types of connectivity reported by respondents in October 2014.

The BEBR surveys specified in its questions that wireless connectivity is wireless service provided through a cell phone provider. The underlying idea for that specification is that fixed wireless service would require connectivity through another platform. In the most recent survey (October 2014), over 6% of respondents with Internet service at home indicated they access the Internet through their cell phones, not much different than in July 2013.

Fiber connectivity may be growing as an alternative to other modes of connectivity with almost 10% of total household connections in respondents' homes in October 2014. It remains to be seen whether or not the findings from that survey portend an upward trend since only 7% of respondents reported fiber connectivity in July 2014 and 8% in July 2013. Fiber was not specified as an option in the April 2012 survey but it was beginning in July 2012, when 8% of respondents reported fiber connectivity in their homes.

Fiber to the premises (FTTH) provides the highest speed, on average, of all terrestrially-based connectivity options. Even though its deployment and adoption is increasing in the U.S., FTTH is still restricted to urban and suburban areas of Florida and still accounts for a relatively small segment of the U.S. market. A review of zip codes associated with fiber subscription in BEBR's quarterly surveys shows that to be the case. It costs a provider more to install fiber systems to individual homes than it does to install DSL or cable modems, all things equal.

In terms of fixed connectivity in BEBR respondents' households, cable modem connectivity is reported most often in each quarterly survey, followed by DSL, with the ratio of cable to DSL declining since April 2012 when the ratio was 1.6 to 1.0. In July 2013, the ratio of cable modem to DSL connectivity was 3.4 (cable modems) to 1.0 (DSL), 3.8 to 1.0 in January 2014, and 4.0 to 1.0 in October 2014. A plausible reason for the slower growth of DSL adoption could be that the technology lags behind cable and fiber technologies in terms of speed. It is very costly for companies to shorten the copper loops necessary to support higher speeds. In comparing DSL, the FCC noted that "both fiber and cable technologies intrinsically support higher bandwidths, and can support even higher speeds with more incremental investments."<sup>10</sup>

Satellite connectivity continues to represent a small segment of total broadband access in Florida households. Responses in various quarterly surveys from April 2012 through October 2014 indicated that approximately 1-2% households accessed Internet service through satellite.

Even though respondents may indicate that their household has access to Internet services, they themselves may not be accessing the Internet at home or at all. The Pew Research Center reports that 70% of Americans were using broadband at home in 2013 (the Center's most recent report on broadband adoption).<sup>11</sup> How does that compare to usage in Florida based on BEBR survey findings? In July 2013, the percentage of respondents using Internet at home was 78%, with 85% of respondents

reported having Internet access at home. In October 2014, the percentage of users increased to over 83%, with 87% of respondents to the BEBR survey reported having Internet access at home.

Access seems to have increased during the past two years and the percentage of respondents using Internet services at home likewise seems to have increased. The BEBR survey also asks for respondents' ages. The average age of those who reported using the Internet from home in October 2014 was younger (59 years old) than those who reported having Internet access at home but not using it there (69 years old). Comparable results were found in July 2013 and July 2014. Of those respondents 65 and older, 72% claimed to use the Internet at home (broadband and non-broadband connectivity). The trend of seniors lagging their younger counterparts is likewise a finding of a Pew Research Center survey.<sup>12</sup>

Residential Internet connections have been increasing over time in the U.S. as a whole but most of that growth has been due to mobile wireless connectivity. The FCC reports an increase in total residential connections of 121% from June 2009 through June 2013, with the most significant increase in mobile wireless connectivity during that period. Mobile wireless connectivity grew nationwide by 24% from June 2012 through June 2013, compared to 4% for fixed connectivity during that time period.<sup>13</sup>

The BEBR quarterly surveys did not pose questions about speed although the FCC reports that a growing number of connections using fixed and mobile services have been shifting to higher download speeds at or above 3 Mbps and upload speeds at or above 768 kbps. There was a particularly significant nationwide growth in mobile connections at those speeds in June 2014 (93 million connections) compared to a year earlier (43 million connections).<sup>14</sup>

Consumers are increasingly moving toward higher-tier speeds for their connections as they buy upgraded offerings through their internet service providers.<sup>15</sup> Companies are also upgrading their technology platforms to support speed requirements. For example, Comcast is investing in new cable modem technology called "Gigasphere" to provide higher speeds and is rolling out fiber in new residential areas.<sup>16</sup> Speed is one of the major metrics used by the FCC to assess progress toward universal broadband deployment in U.S. homes. Because technologies have evolved to support faster connectivity, the benchmark of speed is also one of the issues that will be revisited in the FCC's "Tenth Broadband Notice of Inquiry."<sup>17</sup>

A question in the future is the extent to which Internet residential subscribership for faster speed service constitutes the next digital divide and the extent to which higher speeds are really needed for respondents' home-based applications. Based on FCC estimates for Florida as of June 30, 2013, the ratio of residential fixed connections to subscriber households was only 0.58 at the minimum download speed of 3 Mbps compared to a ratio of 0.75 at speeds with a minimum of at least 200 kbps in one direction.<sup>18</sup> However, even if broadband at the highest speeds is offered, adoption tends to accrue to those most able to afford it and find it of use for the money. Google, Inc. found that to be the case after deploying high-speed fiber in Kansas City, Missouri. In six low-income neighborhoods, only 10% of residents subscribed to the company's high-speed fiber service compared to 42% in five middle- and higher-income neighborhoods in the Kansas City area.<sup>19</sup> If consumers fail to access higher-speed platforms, they may end up on the wrong side of the digital divide, thereby joining those without Internet access. However, there must be a defensible business case for companies to invest in high-speed platforms.

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<sup>1</sup> Bob Lukefahr and Balu Balagopal, "Cross Country: Forget Electric Cars; Natural Gas Is Powering Vehicles in Texas," *The Wall Street Journal*, Eastern edition [New York, N.Y.] September 27-28 2014: A.13, [http://online.wsj.com/public/resources/documents/print/WSJ\\_A013-20140927.pdf](http://online.wsj.com/public/resources/documents/print/WSJ_A013-20140927.pdf).

<sup>2</sup> Christopher Mims, "Batteries Vex World of Tech," *The Wall Street Journal* (online), October 6, 2014, B1.

<sup>3</sup> Brad Berman, "Incentives for Plug-in Hybrids and Electric Cars," November 13, 2014, <http://www.pluginCars.com/federal-and-local-incentives-plug-hybrids-and-electric-cars.html>.

<sup>4</sup> U.S. Department of Energy, "Florida Laws and Incentives for Natural Gas," Alternative Fuels Data Center, <http://www.afdc.energy.gov/fuels/laws/3253/FL> (accessed August 16, 2013).

<sup>5</sup> U.S. Department of Energy, "Federal incentives/Policies for Solar," DSIRE SOLAR, Database of State Incentives for Renewables & Efficiency, [http://www.dsireusa.org/solar/incentives/incentive.cfm?Incentive\\_Code=US37F&re=1&ee=1](http://www.dsireusa.org/solar/incentives/incentive.cfm?Incentive_Code=US37F&re=1&ee=1) (accessed August 16, 2013).

<sup>6</sup> U.S. Department of Energy, "Florida Incentives/Policies for Solar," DSIRE SOLAR, Database of State Incentives for Renewables & Efficiency, <http://www.dsireusa.org/solar/incentives/index.cfm?re=1&ee=1&spv=1&st=1&srp=0&state=FL> (accessed August 16, 2013).

<sup>7</sup> See Kevin Spear, "Florida's Solar Energy Really Sizzles in April," *Orlando Sentinel*, April 4, 2013, [http://articles.orlandosentinel.com/2013-04-04/news/os-florida-utilities-mixed-solar-performance-20130404\\_1\\_florida-solar-energy-center-ouc-central-florida](http://articles.orlandosentinel.com/2013-04-04/news/os-florida-utilities-mixed-solar-performance-20130404_1_florida-solar-energy-center-ouc-central-florida) (accessed August 16, 2013).

<sup>8</sup> Galen Barbose, Samantha Weaver, and Naim Darghouth, *Tracking the Sun VII*, Lawrence Berkeley National Laboratory, September 2014, pp. 13-14, [http://emp.lbl.gov/sites/all/files/Tracking%20the%20Sun%20VII\\_Report\\_0.pdf](http://emp.lbl.gov/sites/all/files/Tracking%20the%20Sun%20VII_Report_0.pdf).

<sup>9</sup> *Ibid.*, p. 43.

<sup>10</sup> Federal Communications Commission, FCC Releases Fourth "Measuring Broadband America" Report, News Release, June 18, 2014, p. 14, <http://data.fcc.gov/download/measuring-broadband-america/2014/2014-Fixed-Measuring-Broadband-America-Report.pdf>.

<sup>11</sup> Pew Research Center, "How Pew Research Calculates Broadband Adoption," *FactTank: News in the Numbers*, August 23, 2013, <http://www.pewresearch.org/fact-tank/2013/08/29/how-pew-research-calculates-broadband-adoption>.

<sup>12</sup> Aaron Smith, *Older Adults and Technology Use*, Pew Research Center, April 3, 2014, p. 1, [http://www.pewinternet.org/files/2014/04/PIP\\_Seniors-and-Tech-Use\\_040314.pdf](http://www.pewinternet.org/files/2014/04/PIP_Seniors-and-Tech-Use_040314.pdf).

<sup>13</sup> Federal Communications Commission, *Internet Access Services: Status as of June 30, 2013*, Table 6 (Residential Connections over 200 kbps in at Least One Direction by Technology 2009-2013), June 2014, [https://apps.fcc.gov/edocs\\_public/attachmatch/DOC-327829A1.pdf](https://apps.fcc.gov/edocs_public/attachmatch/DOC-327829A1.pdf).

<sup>14</sup> *Ibid.*, 1.

<sup>15</sup> Federal Communications Commission, FCC Releases Fourth "Measuring Broadband America" Report, News Release, June 18, 2014, [https://apps.fcc.gov/edocs\\_public/attachmatch/DOC-327722A1.pdf](https://apps.fcc.gov/edocs_public/attachmatch/DOC-327722A1.pdf).

<sup>16</sup> Shalini Ramachandran, "Comcast Steps Up Its Game on Internet Speeds: Cable Operator Is Going All-Fiber for Some of Its Customers," *The Wall Street Journal*, July 24, 2014.

<sup>17</sup> Federal Communications Commission, *Tenth Broadband Progress Notice of Inquiry*, Released August 5, 2014, p. 6, [https://apps.fcc.gov/edocs\\_public/attachmatch/FCC-14-113A1.pdf](https://apps.fcc.gov/edocs_public/attachmatch/FCC-14-113A1.pdf).

<sup>18</sup> Federal Communications Commission, *Internet Access Services: Status as of June 30, 2013*, Table 13 (Residential Fixed Connections at Least 3 Mbps Downstream / 768 kbps Upstream and Households by State as of June 30, 2013) and Table 14 (Residential Fixed Connections and Households by State as of June 30, 2013; Connections over 200 kbps in at least one direction and households, in thousands).

<sup>19</sup> Allstair Barr, "WSJ. D Technology: 'Google Fiber Leaves a Digital Divide: Survey Finds Few Low-Income Residents in Kansas City Subscribe to Superfast Service,'" *The Wall Street Journal*, October 3, 2014, p. B.4.