

Maryland RPS Project Webinar

November 14, 2018

Agenda:

- Introductions (Bob Sadzinski, PPRP)
- Input-Output Modeling for RPS Project (Peter Hall, Metametrics)
- Questions/Discussion
- Interim Report Status (Bob Sadzinski, PPRP)
- Project Status (Kevin Porter, Exeter Associates, Inc.)
- Questions/Discussion
- Adjourn

Slides from the presentations are available at the RPS Study Work Group webpage (<http://dnr.maryland.gov/pprp/Pages/RPS-WorkGroup.aspx>). If there are additional questions regarding the presentations or the RPS study in general, email them to Bob Sadzinski (bob.sadzinski@maryland.gov).

Presentation: Economic Impact Modeling for the RPS (Peter Hall, Metametrics)

Questions and Comments

- *Bill Fields (Maryland Office of People's Counsel)* – Is the IMPLAN analysis going to consider any rate impacts or additional costs that customers (residential/ commercial/ industrial) incur through higher utility bills?
 - *Kevin Porter (Exeter)* – It will be included in the final report itself. It won't be included in the input/output model.
 - *Bill Fields (People's Counsel)* – Is there a reason that it will not be included in IMPLAN?
 - *Peter Hall (Metametrics)* – With respect to using an input/output model like IMPLAN, opportunity costs are not accounted for within the model. The increase in rates associated with renewable projects is considered opportunity costs. That rate impact analysis would have to be done outside the IMPLAN model.
 - *Bill Fields (People's Counsel)* – Are you saying that the IMPLAN model cannot be used to estimate the impact of the entire rate?

- *Peter Hall (Metametrics)* – IMPLAN is not structured to handle that kind of feedback.
 - *Bill Fields (People’s Counsel)* – It is worth a little more consideration because it is certainly a question that is going to come up within this project. People are spending some money to implement renewables through higher utility bills and therefore not spending that money on something else.
- *Janet Christensen-Lewis (Kent Conservation and Preservation Alliance)* – How does the IMPLAN model take into consideration jobs that look like they could be inside of Maryland but in fact are not? When corporations come into Maryland to develop PV projects, jobs such as remote monitoring and environmental impact studies are being done by entities out of state. This is particularly true in rural areas like the Eastern Shore, where the labor pool isn’t large enough to accommodate utility-scale projects, so the labor pool is coming from outside of Maryland. What inputs in IMPLAN are used to capture that?
 - *Peter Hall (Metametrics)* – The way in which the labor force is addressed in IMPLAN is covered in slide 16. This issue is particularly important in manufacturing as there are components for PV or wind that are not manufactured in MD and therefore, we must account for the required out-of-state labor. Similarly, there is accounting that can be done for the construction labor force. The labor requirements for PV facilities do not require a lot of unique skill and much of that labor is available within MD. However, for offshore wind, the labor force is going to be far more specialized. This is not particularly a bad thing as workers that are brought into MD for these projects will spend their wages at motels or temporary housing, and within MD. The demand for labor, the required skill set, and the skill set available to build facilities will play into where the labor pool comes from and needs to be taken into consideration on an individual project basis.
- *Cyrus Tashakkori (Utility Scale Solar Energy Coalition of MD)* – For solar projects, does the IMPLAN model include a calculation of the economic benefits of offsetting fuel use?
 - *Kevin Porter (Exeter)* – The IMPLAN model is not set up for that. You can find that out through production cost modeling or maybe some spreadsheet modeling.
 - *Peter Hall (Metametrics)* – This is an opportunity cost, or an opportunity benefit.
- *Janet Christensen-Lewis (Kent Conservation and Preservation Alliance)* – Are we to assume that the IMPLAN model is just a separate thing that is going to be put in the final report and that you will address the other questions that we have raised in the report as well?

- *Kevin Porter (Exeter)* – Yes, some of the analysis will be done outside of the model. However, we are not doing any additional production cost modeling and will be relying on the results from the *Long-Term Electricity Report*.
- *Janet Christensen-Lewis (Kent Conservation and Preservation Alliance)* – In the model, will we be able to address issues such as poaching workers; i.e. taking workers out of one industry and moving them to another industry while not increasing the net workers in the state?
 - *Peter Hall (Metametrics)* – I don't think we'd cover that degree of specificity in the model. We know that the construction industry is a short-term job opportunity and that if we look at a 3-year period there will not be new net workers from year to year and it would not be cumulative. I think that the poaching of the workers will be a separate thing and will not be addressed because I don't know how we would necessarily estimate that. It is not job substitution, it is employment substitution.
- *Janet Christensen-Lewis (Kent Conservation and Preservation Alliance)* – What is value added? (regarding slide 23)
 - *Peter Hall (Metametrics)* – Value added is the value of goods and services produced through the supply chain, not including final demand. Value added is a component of output that includes the initial investment and is also reflected in household income and taxes.
- *Alex Pavlak (Future of Energy Initiative)* – What is the land use impact? How many acres?
 - *Peter Hall (Metametrics)* – The rule of thumb for utility-scale PV is 5-10 acres per megawatt. The number of acres is not part of the IMPLAN model other than when it is reflected in the cost of acquiring the land and the development costs, which are soft costs. Acreage is also an opportunity cost that cannot be incorporated directly into the IMPLAN framework.
 - *Kevin Porter (Exeter)* – We will be covering some of the land impacts (acreage, etc.) separately in the final report, but at a fairly high level.
- *Cyrus Tashakkori (Utility Scale Solar Energy Coalition of MD)* – In 2025, we have roughly 100 MW resulting in about \$85 million in net impact, is that right? (in reference to slides 21-23)
 - *Peter Hall (Metametrics)* – That is correct; the total output associated with the incremental capacity is the \$85 million in 2016 dollars.

- *Cyrus Tashakkori (Utility Scale Solar Energy Coalition of MD)* – Would it be approximately correct to just multiply that 100 MW by whatever MW factor? For example, if we want to know the economic impact for 400 MW, we would just multiply that \$85 million by four? (in reference to slides 21-23)
 - *Peter Hall (Metametrics)* – Yes and no. There are economies of scale involved in building renewable projects as well as scarcities impairing required labor materials. If you were to just multiply it by four, you would have to qualify that by saying it was a back-of-the-envelope estimate. I could make a model run with the additional four times the capacity, but I don't think it is going to be four times exactly. It may less than four times the total effect.

Clearly, there are economies of scale in utility-scale PV construction. This was shown in the slide showing NREL's apportionment of overnight capital costs (Slide/Page 15) where not only does the total cost and the distribution of costs to categories depend on technology (fixed vs. tracker), but also on the size of the system. The other important point to note is that capital costs are not only being influenced by economies of scale (due to efficiencies, volume purchases, etc.), but also by cost reductions due to the maturing of manufacturing technologies in industries that produce the inputs to solar systems plus "learning curve" efficiencies gained in the construction and service industries, which are, for the most part, unrelated to scale economies, and may be accounting for a greater proportion of cost reduction than scale economies, at least in the near-term future. We discussed this briefly on slides 17-18, which showed cost reductions in various cost categories over time for a 100MW tracker system.

It is true that IMPLAN does not account for economies of scale because the production function is fixed, and PPRP forecasts do not attempt to account for them. Overnight capital cost projections that are distributed to final demand in our analysis are for a representative single axis tracking system with capacity of 100 MW, so there is no economies of scale factor involved. These projections are distributed to NREL cost categories and then mapped to IMPLAN final demand sectors for a similar system. The mapping incorporates NREL 2014-2017 cost reduction trends associated with manufacturing, construction and service industry efficiencies, but not economies of scale.

Our capital cost projections do not attempt to guess the system sizes that make up the solar PV capacity increments for each forecast year. This may lead to an overstatement or understatement of economic impacts if capacity increments are fulfilled by a small number of very large projects (overstatement) or a large number of small projects (understatement), but is beyond our power to predict.

With all the uncertainties involved in the projections, multiplying our projections by a capacity ratio factor should at least provide a ballpark estimate.

- *Peter Hall (Metametrics)* – There are limitations with any model. When we make assumptions regarding the capacity that we are allocating for PV manufacturing, we are assuming that the capacity exists to produce that. This may not be the case; if Maryland manufacturing plants cannot expand and provide additional materials and labor, then that would have to be imported. This is something that this model will not accommodate, unless we do it outside of the model. We would have to factor out final demand by a certain percentage to account for the fact that there is only so much capacity to manufacture PV in MD.
- *Alex Pavlak (Future of Energy Initiative)* – Hawaii discovered a limit with their PV when electricity demand was shifted to the evening and they were just rooftops. Not to say that we would experience something like that in MD. I just wanted to point out that rooftop PV and utility-scale PV are not independent of each other and both fall in the same bucket in terms of impact on the system.
- *Janet Christensen-Lewis (Kent Conservation and Preservation Alliance)* – Have the IMPLAN models been utilized for other renewables in other states? Has anyone verified that they did an IMPLAN model and they looked at it five years later to see if there is correlation?
 - *Peter Hall (Metametrics)* – I’m not sure whether there have been *ex post* studies done on these. Often the *ex post* studies end up also including opportunity costs, which the models just don’t handle. I can investigate any peer-reviewed studies that have been done for this. Large coal-fired and nuclear power plants may have done *ex post* studies.
- *Julian Silk* – Which vintage of IMPLAN is being used?
 - *Peter Hall (Metametrics)* – IMPLAN model version is 2.0. The data that is being used is the most recent available, 2016.
- *Julian Silk* – What assumptions about insurance are being made?
 - *Peter Hall (Metametrics)* – I don’t think we get down to that degree of detail in the service industry. There has been discussion about whether it is worthwhile disaggregating service industries less than services as a whole. It’s not going to make a ton of difference in terms of what the economic impact is going to be.
 - *Julian Silk* – IMPLAN has sectors for 437 and 438 for insurance, and it will be important for offshore wind.
 - *Peter Hall (Metametrics)* – We have included it in offshore wind.

Presentation: Status Report on Maryland RPS Report Required by H.B. 1414 (Kevin Porter, Exeter Associates, Inc.)

Questions

- *Marni Carroll (OneEnergy Renewables)* – Would the final deadline be in early 2019 or in the spring; the legislative session runs through spring? It would be helpful to understand what happens after the December 1, 2018 interim report deadline.
 - *Kevin Porter (Exeter)* – The final report is not due until December 1, 2019. I can't be too much more specific other than that. I do not know yet how much time it will take to finish the work for the final report.
 - *Bob Sadzinski (PPRP)* – We are in the process of redrafting the interim report and conducting an internal review before it is due to the Maryland General Assembly by December 1, 2018. The final report is still a long way off. That process also involves internal review, agency review, and redrafting. The work group can also review the interim report once it has been to the General Assembly.
- *Janet Christensen-Lewis (Kent Conservation and Preservation Alliance)* – It does not look like the issues that were brought up previously about the opportunity costs not addressed in IMPLAN are considered on your list of impacts on the MD RPS. It seems as if the IMPLAN model is holding utility-scale renewable projects in a glass bubble with no outside inputs that could possibly derail some of the estimates, and doesn't give you the full picture and range of possibilities.
 - *Kevin Porter (Exeter)* – Can you elaborate on that last point? What range of possibilities?
 - *Janet Christensen-Lewis (Kent Conservation and Preservation Alliance)* – The impacts on farming, land, labor, and supplies. Most of the companies that are doing utility-scale PV in MD are from out of state. Even if MD has the capacity for developing PV, those companies may already have contracts in their states for supplies that the IMPLAN model would not account for.
 - *Kevin Porter (Exeter)* – We will have a high-level discussion of land impacts in the final report. It deserves a separate study that would look at that issue in more detail than what we are going to do.
- *Bill Fields (Maryland Office of People's Counsel)* – Are you going to be doing work on rate impacts of a 50 percent RPS?
 - *Kevin Porter (Exeter)* – Yes, it is my intention to do some kind of analysis of the potential rate impacts of a 50 percent RPS.