On behalf of our nearly 14,000 members in the State of Michigan, the Natural Resources Defense Council advocates for cleaner, safer, more affordable and reliable energy through the greater use of renewable energy and energy efficiency.

Thank you for the opportunity to comment on the report at the draft stage. On the whole, the report uses conservative assumptions about the technical potential for and cost of renewable energy, and still concludes that a 30% renewable energy standard is both feasible and affordable. While the conclusions provide ample support for policies to scale up renewable generation in Michigan, our comments serve to demonstrate that with more realistic assumptions a more aggressive move toward renewable energy could be affordably achieved.

We welcome the chance to engage in this conversation and would like to provide comments on the following three areas: RPS provisions regarding where renewables can be located, the definition of a renewable resource, and the percent annual increase in the RPS.

RPS provisions regarding where renewables can be located

The current 99 percent "de-rating" factor that was applied to estimate statewide solar potentials (Table 2, pp. 22) is underestimating reasonable deployment potentials for urban utility and rooftop solar resources in Michigan. Several states in the northeast have already surpassed the de-rated solar potentials for urban utility and rooftop solar in the past three to five year time frame using scalable, cost-effective and carefully designed solar deployment policies. These three Northeast states: New Jersey, Massachusetts and New York have similar annual solar insolation levels and climate regimes to Michigan.[1] Thus we encourage energy policymakers in Michigan to start with a larger distributed solar resource potential, e.g. at least one gigawatt at a minimum, and further study the goals, objectives and program implementation details of the successful distributed solar deployment policies in Massachusetts, New York and New Jersey.

In addition, the current economic impact analyses may not be accurately accounting for valuable utility system, local economy and public health benefits of these smaller renewable generation systems.[2] Well-sited distributed and customer-level rooftop solar can provide significant benefits to the utility system at the distribution level. Two reports, including one by Lawrence Berkeley National Lab completed in 2012 and the Interstate Renewable Energy Council in 2013, showed that while evaluation methods may vary somewhat among utilities planning for more significant levels of penetration of distributed solar deployment on their system, distributed solar resources could defer costs toward transmission and distribution (T&D) infrastructure investment.[3,4] A good example of this type of substation-level utility and solar deployment planning is the Long Island Power Authority (LIPA), serving over one million customers on Long Island, New York, with annual solar insolation and climate variations similar to Lower Michigan. LIPA determined that several tens of megawatts of new solar resources in at

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[1] GTM Research (2013) Solar Market Insight Report Q2 2013. Online: http://www.seia.org/research-resources/us-solar-market-insight

[2] We infer that the Levelized Cost of Energy (LCOE), Levelized Avoided Cost of Energy (LACE) impact analysis (pp. 32-35) are not accounting for important and valuable localized utility system and economic benefits that well-sited distributed renewables can provide.

[3] Mills, A. and R. Wiser (2012) An Evaluation of Solar Valuation Methods Used in Utility Planning and Procurement Processes. DOE-LBNL, online: http://emp.lbl.gov/sites/all/files/lbnl-5933e_0.pdf.

[4] Keyes, J. and K. Rabago (2013) A REGULATOR'S GUIDEBOOK: Calculating the Benefits and Costs of Distributed Solar Generation. IREC, online: http://www.irecusa.org/wp-content/uploads/2013/10/IREC_Rabago_Regulators-Guidebook-to-Assessing-Benefits-and-Costs-of-DSG.pdf

least two high summer peak-coincident load pockets could defer expensive T&D investments.[5] The economic benefits of well-sited distributed, clean and renewable resources extend beyond the utility system impacts. The U.S. EPA's "RE-Powering America's Land" program shows that distributed renewable resources such as solar on formerly contaminated lands, landfills, and mine sites can significantly increase the economic value of these areas.[6] The EPA recently introduced a high resolution pre-screened mapping tool to locate these areas on its program website. Additional public health, environmental and even local jobs impacts should be taken into consideration toward an expansion of distributed renewable resource goals. To help shape successful distributed renewables and solar deployment policies in Michigan, we encourage energy policymakers to take a closer look at the goals, objectives and program implementation details of the successful distributed solar and renewable resource deployment policies in Massachusetts, New York and New Jersey as well as the specific solar resource planning methods used on Long Island, NY.

Definition of a renewable resource

The current definition for eligible biomass under the Michigan renewable portfolio standard (P.A. 295) includes several forms of plant and woody materials: "Biomass means any organic matter that is not derived from fossil fuels, that can be converted to usable fuel for the production of energy, and that replenishes over a human, not a geological, time frame, including, but not limited to, all of the following: (i) Agricultural crops and crop wastes. (ii) Short-rotation energy crops. (iii) Herbaceous plants. (iv) Trees and wood, but only if derived from sustainably managed forests or procurement systems, as defined in section 261c of the management and budget act, 1984 PA 431, MCL 18.1261c. (v) Paper and pulp products. (vi) Precommercial wood thinning waste, brush, or yard waste. (vii) Wood wastes and residues from the processing of wood products or paper. (viii) Animal wastes. (ix) Wastewater sludge or sewage. (x) Aquatic plants. (xi) Food production and processing waste. (xii) Organic by-products from the production of biofuels. "

Until recently, energy from these forms of biomass collectively was widely considered an important part of a robust renewable portfolio, along with technologies like solar, wind, and geothermal. Over the past two years, however, emerging scientific evidence has discredited certain forms of bioenergy from forests as a clean, renewable fuel.

In particular, recent advances in the science analyzing carbon emissions from different types of woody biomass have clarified that burning *whole trees* to produce electricity actually increases carbon emissions compared with fossil fuels for many decades. On the other hand, electricity from sources such as short-rotation crops, wood waste and reclaimed wood, and timber harvest residues (tops and branches) have net lifecycle emissions that are far lower than those from fossil fuels or reduce emissions altogether.

Four of the most well regarded studies are summarized below. While there is some regional variability in their results due to variations in climate and forest type, all four find that burning whole trees in power plants increases carbon emissions relative to fossil fuels for many decades—anywhere from 40 to 100 years or more. These studies are part of a growing body of science on the lifecycle impacts of biomass that points to the need to distinguish amongst different sources of biomass.

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[5] LIPA (2013) Clean Solar Initiative Feed-In Tariff, online: http://www.lipower.org/FIT/.

[6] U.S. EPA (2013) "RE-Powering America's Land", online: http://www.epa.gov/renewableenergyland/index.htm

Manomet Center for Conservation Sciences, *Biomass Sustainability and Carbon Policy Study*, June 2010

The Manomet Center study, commissioned by the Massachusetts Department of Energy Resources, examines the atmospheric effects of regional biopower generation by developing a "business-as-usual" baseline and then projecting the carbon emissions impact of different scenarios in which electricity is created either from woody biomass or fossil fuels. It defines the "carbon debt" incurred by bioenergy, as forest biomass generally emits more greenhouse gases than fossil fuels per unit of energy produced, and then models how re-growth of the harvested forest removes this carbon from the atmosphere, reducing the carbon debt. It is only after the point at which the debt is paid off, that biomass energy begins yielding *carbon dividends*—i.e. atmospheric greenhouse gas levels that are lower than would have occurred if fossil fuels had been used to produce the same amount of energy. The report also discusses how different sources of biomass and different approaches to managing forests after biomass is harvested can have a big impact on net carbon emissions.

The authors conclude that between the initial carbon debt incurred when whole trees are burned to produce electricity and the slow reabsorption as the trees re-grow, using whole trees as a source of biomass would increase emissions compared to coal power for at least 40 years. The study found that forest-derived residues (tops and branches) have far shorter carbon debt periods compared with fossil fuels (typically less than a decade), after which point net emissions are lower than those from fossil fuels.

Oregon State University, *Impacts of Thinning on Carbon Stores in the PNW: A Plot Level Analysis*, May, 2011

The study by researchers at Oregon State University looks at the lifecycle carbon emissions impacts of different levels of thinning on forest plots in eastern and western Oregon. It finds that far from providing a "carbon neutral" fuel source, forest thinning increases net carbon emissions to the atmosphere for more than 50 years, even accounting for tree re-growth and the carbon emissions avoided when thinnings are used as biomass to displace fossil fuels. Carbon losses on-site account for the bulk of the effect of thinning on carbon.

These results hold for multiple kinds of thinning operations across a wide spectrum of forest locations and types in the Pacific Northwest. And while carbon stocks in the forest can, in time, rebound, it may be many centuries or longer before carbon stocks in a thinned forest catch up to one left unlogged.

The Biomass Energy Resource Center, Forest Guild, and Spatial Informatics Group, *Biomass Supply and Carbon Accounting for Southeastern Forests*, February 2012

The Biomass Energy Resource Center study, conducted in partnership with the Forest Guild and Spatial Informatics Group, used a similar methodology to that employed by researchers at Manomet and reached conclusions consistent with the Northeast-focused study. The authors assessed the energy demand of 17 existing and 22 proposed biopower facilities in the Southeastern United States and modeled how the carbon emissions impacts of meeting that demand by burning biomass would compare to using coal or natural gas.

The authors conclude that sourcing all 39 facilities with whole trees, "creates a carbon debt that takes 35 – 50 years to recover before yielding ongoing carbon benefits relative to fossil fuels." The study

found that burning forest-derived residues in the 17 existing power plants is "now generating and would continue to generate an improved atmospheric carbon benefit relative to fossil fuel technologies."
Duke University and Oregon State University, *Carbon debt and carbon sequestration parity in forest bioenergy production*, May 2012

This study conducted by the Nicholas School of the Environment at Duke University and Oregon State University, assesses 1,764 unique combinations of ecosystem properties, initial landscape conditions, harvest frequencies, and bioenergy conversion factors. The authors conclude that regardless of land-use history and ecosystem characteristics, most scenarios required well over 100 years to reach "carbon neutrality."

Therefore, in determining eligibility for biomass fuel sources, we urge the administration to draw distinctions between biomass fuels: eligible sources should be limited to fuels whose short term net emissions (over a period of 1 – 3 years) are proven to be less than fossil fuels.

In addition, other technologies should be identified as ineligible under the RPS program. Proponents of the following technologies and resources often claim that they are renewable, but in fact, they rely on dirty fossil fuel energy or create other pollution hazards during the process of energy extraction:

- Coal waste from coal mining
- Methane gas recovery from coal mines
- Waste-to-Energy (WTE) facilities, i.e. waste incineration
- "Waste heat" recovery from fossil fuels.

Percent Annual Increase
Currently, the scenarios outlined in the report conclude a 1% increase in renewable energy per year is feasible and affordable, claiming it to be "on par with the pace of Michigan's current standard and several other Midwest states such as Wisconsin, Pennsylvania, Illinois, and Minnesota that all have percentage increase per year of 0.8% to 1.3%." However, a faster rate of increase in the RPS is necessary for a more meaningful reduction in greenhouse gas emissions, and we believe is likewise feasible and affordable, and would provide greater economic development and job creating benefits for Michigan. We urge you to analyze additional renewable energy ramp-up rates, by running scenarios that:

- Use current wind costs specific to Michigan which are significantly lower and more accurate than EIA's national averages,
- Include the value of avoided costs such as transmission and distribution costs in the economic analysis to weigh the costs and benefits of higher renewable energy penetration rates;
- Acknowledge a higher potential for solar distributed generation by adjusting downward the 99 percent de-rating factor used in your analysis.

All together, these changes would support a 1.5% annual rate of increase.