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The Clean Power Plan:
Building on Ohio's Clean Energy Accomplishments

Natural Resources Defense Council's comments on the proposed CO_2 emissions reduction target for Ohio

AUTHORS
Samantha Williams
Starla Yeh
Aliya Haq
Natural Resources Defense Council

NATURAL RESOURCES DEFENSE COUNCIL
20 N. WACKER DRIVE, STE 1600
CHICAGO, IL 60606
swilliams@nrdc.org
312-651-7930

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I. EXECUTIVE SUMMARY

The Ohio Environmental Protection Agency and the Public Utilities Commission of Ohio have asked stakeholders to provide guidance on the draft Clean Power Plan, the assumptions that went into setting Ohio's target, and to provide information that the agencies should consider in preparing the state's comments to the U.S. Environmental Protection Agency. To that end, NRDC submits these comments on Ohio's carbon reduction opportunities under the Clean Power Plan.

We focus primarily on a technical analysis of Block 3 (renewable energy) and Block 4 (energy efficiency). NRDC reviewed U.S. EPA's assumptions of the CO_2 reduction potential for renewables and energy efficiency in Ohio, and compared them with the progress Ohio is already making via its existing clean energy policies.

Our findings are encouraging.

Ohio is en route to meeting these assumptions now for both Block 3 and Block 4. While Ohio's clean energy policies are on hold for the next two years,[1] once they are fully implemented in 2017 Ohio will be able to meet and actually exceed EPA's assumed efficiency and renewable energy deployment well in advance of 2030. In fact, assuming Ohio's clean energy policies remain in place:

- The renewable energy requirement will enable Ohio to reach the 2030 level of renewables generation assumed in Block 3 (~13.8 million MWh) between 2022 and 2023—**seven years ahead of schedule**.[2]
- Simply by continuing its current trajectory of annual savings under the state's energy efficiency requirement, Ohio will achieve the 2030 level of cumulative energy efficiency savings assumed in Block 4 (~19 million MWh) by 2025—**five years ahead of schedule**.[3]

Ohio has the opportunity to focus its implementation plan **primarily on efficiency and renewables to the exclusion of fossil-fuel generation** (i.e., in lieu of coal plant heat rate improvements under Block 1 and ramped-up natural gas dispatch under Block 2) and still meet a range of carbon emissions target scenarios under the Clean Power Plan.

It may seem daunting to reduce carbon in a state like Ohio, which relies on coal for nearly 70 percent of its power. ***Not so.*** NRDC's analysis confirms that Ohio is already on track to achieving these reductions. NRDC's analysis of Ohio's target and the state-level energy policy landscape confirms that deep deployment of energy efficiency and renewables is the most cost-effective means for the state to cut carbon emissions under the Clean Power Plan.

These resources—which have to date spurred more than $1 billion in energy bill savings for Ohioans and are supporting a fast-growing economy—should be the linchpins of Ohio's implementation strategy.[4,5]

1 SB 310 freezes Ohio's efficiency and renewables requirements for 2015 and 2016 and reinstates them on January 1, 2017.

2 *See* source data at Appendix A.

3 *See* source data at Appendix B.

4 Utility self-reported energy efficiency data for program years 2009–2013, derived from annual status reports available via PUCO's online docketing system at dis.puc.state.oh.us/.

5 *See* Advanced Energy Economy Institute, *Employment in Ohio's Advanced Energy Industry*, July 2012, available at irawaynehenry.com/oaee/wp-content/uploads/2014/01/AEEOIJobsReport.pdf (citing more than 25,000 jobs associated with alternative energy and efficiency across 410 companies).

II. OVERVIEW OF THE DRAFT CLEAN POWER PLAN

On June 2, 2014, the U.S. EPA issued the first-ever standards regulating carbon emissions from our nation's power fleet, called the Clean Power Plan. Power plants are the single-biggest source of carbon pollution in the nation. In Ohio, the electric power sector accounts for approximately 100 million metric tons of CO_2 emitted into the air annually.[6] While we already limit how much arsenic, mercury, and soot power plants emit, previously there had been no such limits for carbon pollution.

EPA has developed a flexible approach that allows significant emissions reductions at low cost. The Clean Power Plan draws on a wide range of tools to achieve these reductions. Ultimately, EPA estimates that the proposal will cut CO_2 emissions on a national basis (via rolled-up estimates of the impact of state standards) 26 percent below 2005 emissions levels by 2020 and 30 percent below those levels by 2030.[7]

Each state's emission target was calculated using a range of cost-effective methods that have been proven to reduce emissions. EPA is required by the Clean Air Act to establish a "best system of emissions reduction" (BSER) in establishing state standards. Overall, each BSER proposed in the Clean Power Plan comprises four main categories, or "building blocks." All of the measures in these categories have been amply demonstrated via their current widespread use by utilities and states.

The targets were set as follows: EPA started with each state's 2012 energy mix. The agency then applied the set of four emission reduction tools state-by-state and calculated the degree to which these tools could reduce carbon pollution. While the state-specific goals that EPA has proposed are based on consistent application of a single goal-setting methodology (the four building blocks), EPA used data specific to each state's electric generating units and certain other attributes of its electricity system (e.g., the current mix of generation resources). Thus, the various pollution reduction techniques achieve significantly different savings in each state—and produce significantly different targets.

The four tools used to set the state targets are summarized in Table 1 below.

Table 1: Summary of the BSER Building Blocks

Building Blocks		Description	Assumptions for Goal Setting Formula	Net Cost Estimate ($/metric ton)
1	Making existing coal plants more efficient	Reducing the carbon intensity of generation at individual affected EGUs through heat rate improvements	Average heat rate improvement of 6% for coal steam electric generating units (EGUs)	*$6 to $12*
2	Using existing gas plants more effectively	Reducing emissions from the most carbon-intensive affected EGUs in the amount that results from substituting generation at those EGUs with generation from less carbon-intensive affected EGUs (including NGCC units under construction)	Dispatch to existing and under-construction NGCC units to up to 70% capacity factor	*$30*
3	Increased renewable and nuclear	Reducing emissions from affected EGUs in the amount that results from substituting generation at those EGUs with expanded low- or zero-carbon generation	Dispatch to new clean generation, including new nuclear generation under construction, moderate deployment of new renewable generation, and continued use of existing nuclear generation	*$10 to $40*
4	Increased end-use energy efficiency	Reducing emissions from affected EGUs in the amount that results from the use of demand-side energy efficiency that reduces the amount of generation required	Increase demand-side energy efficiency by 1.5% annually	*$16 to $24*

6 U.S. Energy Information Administration, State CO_2 Emissions, February 25, 2014, available at eia.gov/environment/emissions/state/state_emissions.cfm (link leads to state-specific spreadsheets, including *Ohio Carbon Dioxide Emissions from Fossil Fuel Consumption (1980– 2011)*).

7 For a more comprehensive analysis of the proposed Clean Power Plan, *see NRDC Summary of EPA's Clean Power Plan*, June 2, 2014, available at nrdc.org/air/pollution-standards/files/pollution-standards-epa-plan-summary.pdf.

It is important to note that, in practice, states *do not* have to take the precise steps EPA used to calculate the targets. While the proposal lays out specific CO_2 goals that each state is required to meet, it does not prescribe *how* a state should get there. Rather, the Clean Power Plan empowers the states to take the lead and develop their own plans, provided they are consistent with EPA's guidelines. This state-by-state approach has been used repeatedly to successfully cut pollution under the Clean Air Act.

Because of this flexible compliance approach, the Clean Power Plan retains each state's ability to pursue policies to reduce carbon pollution that continue to rely on a diverse set of energy resources, ensure electric system reliability, provide affordable electricity, recognize investments that states and power companies are already making, and that can be tailored to meet the specific energy, environmental, and economic needs and goals of each state.

EPA's goal structure is a two-part timeline: an interim goal that a state must meet on average over the 10-year period from 2020 to 2029, and a final goal that a state must meet at the end of that period in 2030 and maintain thereafter. A state can either adopt the goal established by EPA, which is expressed in terms of carbon intensity (i.e. the amount of carbon emitted per unit of power generation), or set a mass-based goal of an equivalent amount of pollution (i.e., the number of tons of carbon emitted).

Each state must submit an implementation plan to EPA by June 30, 2016. However, EPA is allowing for conditional approval with additional time to address state legislative and rulemaking activities, as well as a grace period for the development of multistate or regional plans.

III. OHIO'S CARBON REDUCTION TARGET

Employing the above methodology, Ohio has a carbon intensity reduction target of 22 percent that it must meet on average over the 10-year period from 2020 to 2029, and a target of 28 percent that it must meet by 2030 and maintain thereafter. Expressed as a rate of emissions reduction, Ohio's starting point is 1,850 lbs/MWh, which must be reduced to 1,452 between 2020 and 2029, and to 1,338 by 2030.

Ohio's target was created using the base assumptions in the four building blocks, which were then modified to account for individual dynamics in the state.

For example, in Block 3 EPA incorporated very modest assumptions for the expansion of renewable energy and based them on what states in each region have already committed to do. State renewable portfolio standards (RPS) vary significantly across the nation. To account for this, EPA grouped states into six regions and developed annual renewable energy growth factors and maximum generation targets based on each region's existing RPS.[8] Ohio was grouped with states in the East Central region (along with Pennsylvania, New Jersey, Virginia, West Virginia, the District of Columbia, Maryland, and Delaware), in which EPA assumed a maximum 16 percent renewables generation potential by 2030. In application, this 2030 projection varies by state, depending on the level of renewable energy deployment EPA assumed each state would start with in 2017 and the regional growth factor applied. For Ohio, EPA assumed an initial renewable generation level of 1.6 percent in 2017, growing to 10.6 percent of total generation by 2029 and thereafter.[9] NRDC compares these modified assumptions with Ohio's existing RPS policy ramp-up in the next section of these comments.

In Block 4, the Clean Power Plan assumes that states will expand their energy efficiency efforts at a very modest rate—1.5 percent annual savings. This rate was based on the existing efficiency policies of 12 leading states. To account for states that are not yet achieving this level of efficiency, EPA assumed a gradual ramp-up of 0.2 percent per year. As with Block 3, in application the Block 4 assumptions vary by state. EPA assumed that Ohio would start in 2017 by achieving 0.85 percent avoided MWh sales through energy efficiency, and would reach 1.5 percent by 2021 and thereafter. As with the renewables block, NRDC compares the Block 4 assumptions with Ohio's existing efficiency policy ramp-up in the next section of these comments.

It should be noted that most states (like Ohio) do not currently incorporate building code compliance, improved appliance codes, and third-party industrial energy efficiency in their energy efficiency requirements. Therefore, any additional energy savings from these measures would yield even deeper carbon reductions beyond the levels assumed by EPA in setting the targets.

NRDC also notes that the Clean Power Plan assumes very high energy efficiency program costs—almost double what experts report.[10] For example, the average levelized cost of saved energy in 2012 for Ohio's utility-run energy efficiency programs was about $0.01/kWh. In contrast, EPA assumes in Block 4 that efficiency programs average a far higher levelized cost of saved energy of $0.08/kWh. The Plan also assumes a short life-span for energy efficiency measures of about 10 years; in practice this is typically much longer.[11]

Even with these conservative assumptions, renewables and efficiency remain important, low-cost tools in the Clean Power Plan and should be a focus for Ohio as it moves forward in developing its implementation approach.

8 While we do not provide in this document specific comment on EPA's nuclear assumptions, NRDC notes that in addition to renewables growth potential, Block 3 also adjusts state targets to account for 6 percent of a state's existing nuclear fleet. It does this by adding 6 percent of current nuclear electricity generation, in MWh, to the denominator of each state's target. This creates an incentive for states to retain existing nuclear plants. The proposal, however, does not address the safety of this approach or the economic status of particular nuclear plants at risk of closing.

9 EPA has requested comment on an alternative approach to Block 3, including whether the approach should be modified to include a floor based on 2012 renewable energy generation in each state, or whether renewables should be quantified using a state-by-state assessment of renewable energy technical and market potential combined with Integrated Planning Model simulations of renewable energy deployment. NRDC may submit comments addressing these alternative approaches—as well as other elements of the target-setting—directly to EPA.

10 EPA assumed the following levelized cost/kWh of energy efficiency (which represents the per-kilowatt-hour cost of building and operating a generating plant over an assumed financial life and duty cycle): Levelized cost of saved energy in 2018: $83/MWh (= $0.083/kWh); in 2030: $90/MWh (= $0.09/kWh). *See* U.S. EPA, *GHG Abatement Measures*, technical support document, June 10, 2014, page 5-60, Table 5-30, available at www2.epa.gov/sites/production/files/2014-06/documents/20140602tsd-ghg-abatement-measures.pdf. In contrast, Lawrence Berkeley National Laboratory conducted a review of program-level cost and savings data nationwide (excluding low-income programs) and estimated Ohio's average levelized cost of saved energy at around $0.01/kWh, which is on the low end of state programs nationally. *See* Megan A. Billingsley et al., *The Program Administrator Cost of Saved Energy for Utility Customer-Funded Energy Efficiency Programs*, Ernest Orlando Lawrence Berkeley National Laboratory, LBNL Report # 6595E, March 2014, page 37, Figure 3-16, available at emp.lbl.gov/sites/all/files/lbnl-6595e.pdf. A recent report from the American Council for an Energy-Efficient Economy also finds a levelized cost of saved energy of $0.028/kWh. *See* ACEEE, *New Report Finds Energy Efficiency Is America's Cheapest Energy Resource*, March 25, 2014, available at aceee.org/press/2014/03/new-report-finds-energy-efficiency-a.

11 According to EPA, "Other studies have found slightly higher values for average measure life for EE portfolios, ranging from 10 to 13 years. Our assumption of 10 years is conservative by comparison and leads to lower cumulative impacts over time and correspondingly lower state goals." *See* U.S. EPA, *GHG Abatement Measures*, technical support document, June 10, 2014, page 5-36, Table 5-10, available at www2.epa.gov/sites/production/files/2014-06/documents/20140602tsd-ghg-abatement-measures.pdf.

IV. NRDC'S ANALYSIS: ACHIEVABILITY OF THE TARGET

NRDC conducted parallel analyses in assessing the achievability of Ohio's target:

1. We first examined the degree to which EPA's assumptions in Blocks 3 and 4 underestimate Ohio's state-level policy commitments to energy efficiency and renewables.
2. We then determined the degree to which Ohio could utilize its existing efficiency and renewables policies to achieve carbon reductions towards its emissions target, and thereby avoid reductions via the coal plant heat rate and natural gas dispatch assumptions used by EPA in Blocks 1 and 2.

Not only can Ohio deploy its existing clean energy policies to achieve nearly *double* the amount of efficiency and renewable energy that EPA assumed in Blocks 3 and 4 of the Clean Power Plan, but this robust availability of zero-emissions resources can be used to offset the assumptions that EPA made in Blocks 1 and 2.

NRDC concludes that Ohio has the opportunity to maximize Blocks 3 and 4 in its implementation plan. Thanks to Ohio's energy efficiency and renewable energy requirements, the state has these resources in abundance. In fact, these requirements have already contributed a conservative 4 million MWh of renewable energy to the state's generation mix since 2009 and have saved 12 million MWh of energy from utility-run efficiency programs in that same period.[12,13]

Ohio is not required to use any particular measures as it works toward compliance. It should use this flexibility to its advantage. The state is free to forgo increased or additional heat rate improvements at coal plants and natural gas ramp-up and instead prioritize the cleanest and most cost-effective energy resources: renewables and efficiency.

A. BREAKDOWN: BLOCK 3 (RENEWABLE ENERGY)

Figures 1 and 2 below break out NRDC's comparison of the Block 3 assumptions (in MWh and percent of electricity generation) with Ohio's existing state-level RPS.[14]

In setting the state's carbon reduction target, EPA projected that Ohio would generate 13.8 million MWh of renewable energy by 2030. But in practice, because of Ohio's RPS, the state was already generating nearly 2 million MWh of renewable energy in 2012 (about 200,000 MWh more than the 2012 level assumed by EPA). Moreover, Ohio has committed to meet—and exceed—by 2023 the renewable generation levels that EPA projected for 2030, far in advance

Figure 1: Block 3 Renewable Assumptions Vs. Ohio's RPS (MWh)

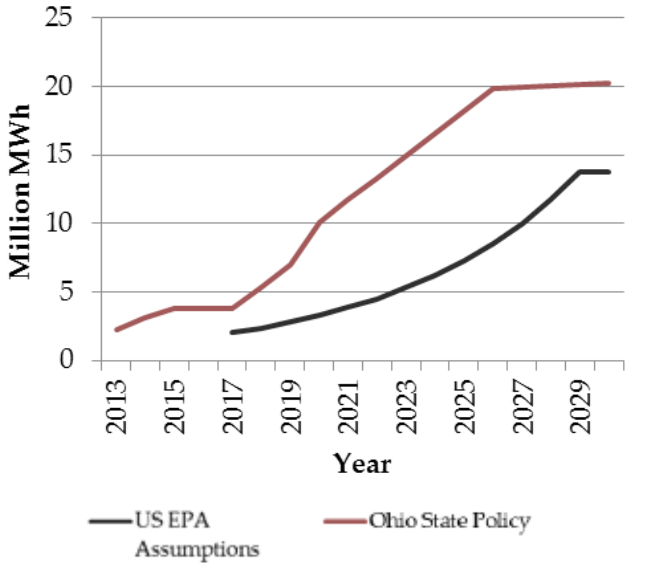
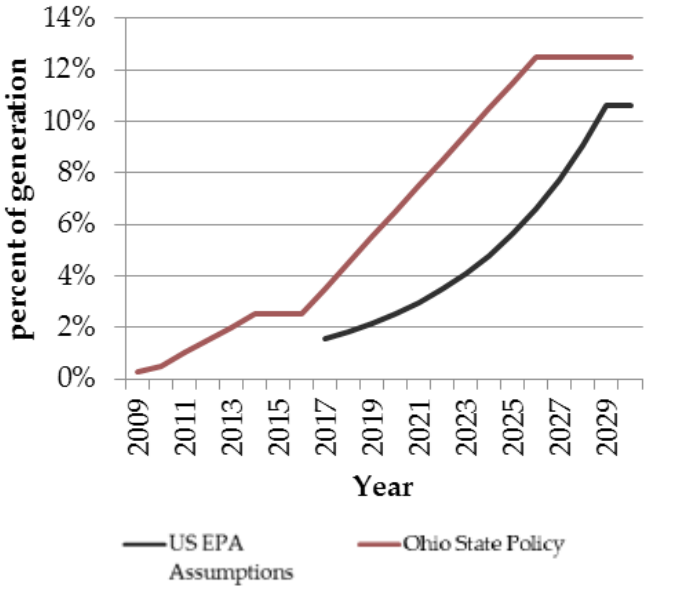


Figure 2: Block 3 Renewable Assumptions Vs. Ohio's RPS (percent of generation)



12 *See Alternative Energy Portfolio Standard Report* by the Public Utilities Commission (PUCO) to the General Assembly of the state of Ohio for compliance years 2009 and 2010; compliance year 2011; and compliance year 2012.

13 Utility self-reported energy efficiency data for program years 2009–2013, derived from annual status reports available via PUCO's online docketing system at dis.puc.state.oh.us/.

14 Appendix A sets out the annual ramp-up in renewables in EPA's calculation versus Ohio's state-level policy.

of the Block 3 assumptions. This is true even considering the limiting impacts of the two-year freeze on Ohio's clean energy requirements.

NRDC's analysis illustrates just how conservative EPA's projections are in Block 3. In fact, if it is allowed to fully mature, we project that by 2030 Ohio's RPS will yield nearly *twice* as much generation from zero-emitting sources than EPA assumed was possible in setting the state's target. To date, Ohio has more than 4,000 MW of certified facilities contributing renewable energy resources to the grid as part of the state's RPS.[15] And Ohio has vast potential to source even more renewable energy from *within* the state in the coming years. For example, the U.S. Department of Energy's National Renewable Energy Laboratory estimates that Ohio has the potential to generate more than 4.5 million GWh of renewable energy from solar, wind, biomass, and geothermal sources, and that it has 2,600 GW of capacity for renewables in the state.[16]

The bottom line is that the assumptions made in Block 3 of the Clean Power Plan underestimate Ohio's commitment to renewable energy. And because EPA allows for average compliance over the decade, this head start will provide Ohio with additional flexibility as it crafts its implementation plan.

B. BREAKDOWN: BLOCK 4 (ENERGY EFFICIENCY)

Similarly, Figures 3 and 4 below demonstrate that EPA's assumptions in Block 4 are achievable—and then some—simply by deploying Ohio's existing energy efficiency requirements.[17]

In fact, if Ohio allows these requirements to mature as currently intended, it will *more than double* EPA's projected 2030 deployment of energy efficiency. Thanks to robust, utility-run efficiency portfolios now in operation in Ohio, the state is already close to achieving the assumed 2030 target. In 2013 alone, utilities saved a total of 1.6 million MWh.[18] And by continuing its current rate of annual energy savings, Ohio

Figure 3: Block 4 Energy Efficiency Assumptions Vs. Ohio's EE Standards (cumulative savings in MWh)

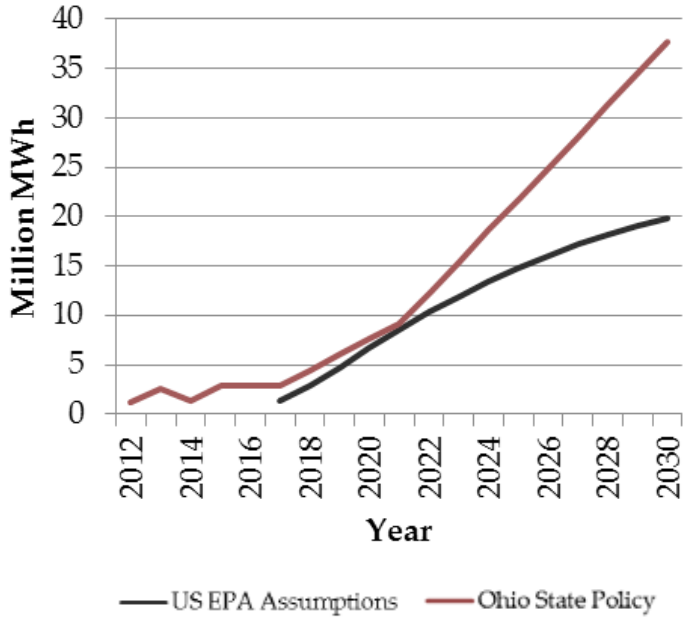
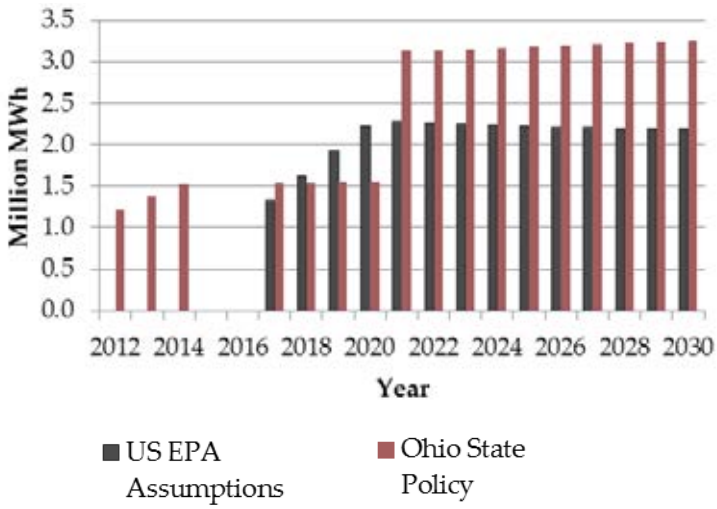


Figure 4: Block 4 Energy Efficiency Assumptions Vs. Ohio's EE Standard (annual incremental savings in MWh)[19]



15 Certified renewable energy facilities for the purposes of RPS compliance come from both within Ohio and outside of the state. PUCO keeps a log of these facilities, current through June 2014. *See* PUCO, *Ohio's Alternative Energy Portfolio Standard - Certified Renewable Energy Facilities*, available at puco.ohio.gov/emplibrary/files/util/EnergyEnvironment/SB221/Updated%20Approved%20REN%20Cases.pdf.

16 *See* U.S. Department of Energy, Office of Energy Efficiency & Renewable Energy, National Renewable Energy Laboratory, *U.S. Renewable Energy Technical Potentials: A GIS-Based Analysis*, Technical Report NREL/TP-6A20-51946, July 2012, pages 8-19, available at nrel.gov/docs/fy12osti/51946.pdf. NRDC sourced the total capacity and generation technical potential for Ohio from tables in this report, including urban and rural utility-scale photovoltaics (Tables 2 and 3), rooftop photovoltaics (Table 4), onshore and offshore wind (Tables 6 and 7), biomass (Table 8), and geothermal (Table 10).

17 Appendix B sets out the annual ramp-up in energy efficiency in EPA's calculation versus Ohio's state-level policy.

18 Utility self-reported energy efficiency data for program year 2013, derived from annual status reports available via PUCO's online docketing system at dis.puc.state.oh.us/.

19 *See* Appendix B for source data. Pursuant to SB 310, annual incremental energy efficiency savings in Ohio are frozen in program years 2015 and 2016. Thus, Figure 4 reflects no additional MWh of savings in those years. Figure 3 reflects a constant MWh of cumulative savings that carries forward from 2014 through the end of the freeze in 2016. Note that some utility energy efficiency portfolios are projected to continue through the freeze, while others may cease. This analysis incorporates a conservative assumption that all energy efficiency programming during the freeze will be on hold, re-start in 2017, and continue thereafter.

is projected to satisfy EPA's assumed 2030 cumulative savings level by 2025.

Ohio may reach the forecasted energy efficiency levels presumed in Block 3 even earlier, though. Several of its largest utilities have in place regulatory policy packages that remove any throughput incentive they may have to maximize sales and that provide them with modest incentives to invest in cost-effective energy efficiency even beyond what is required by law.[20] These policy packages have helped Ohio's utilities consistently exceed annual benchmarks over the past few years.

For example, in 2012 the four major utilities (AEP, Duke, FirstEnergy, and DP&L) saved an average of 1.24 percent of electricity from energy efficiency programs, far exceeding their required incremental benchmark of 0.8 percent.[21] In 2013 these same utilities saved about the same amount of energy on average, again exceeding that year's benchmark of 0.9 percent.[22]

In addition to our review of Block 4, NRDC also recently modeled the benefits to states—including Ohio—of deeper investments in cost-effective energy efficiency.[23] Not only will these investments yield substantial utility bill savings for Ohioans, but they are also projected to cut carbon emissions by 32 million tons annually, roughly the amount that would be emitted by 6.7 million cars.[24] And Ohio gets even more bang for its energy efficiency buck: a fortified clean energy economy that means more jobs for Ohioans. NRDC's analysis demonstrates that doubling down on energy efficiency as part of the state's implementation path for the Clean Power Plan can put 8,600 Ohioans to work in the energy efficiency economy and reduce the state's total electric bill by about $399 million per year (or $6.80 per month for every household).

Any additional efficiency savings resulting from building codes, appliance standards, and third-party efficiency investments will put Ohio even further ahead.

C. ENERGY EFFICIENCY AND RENEWABLES: POTENTIAL TO DISPLACE FOSSIL FUEL GENERATION

NRDC's second analysis examined the degree to which Ohio could forgo carbon reductions in Blocks 1 and 2 and instead rely on the state's energy efficiency and renewable energy requirements.

We found that (as discussed above and further illustrated below) EPA's assumptions in Blocks 3 and 4 are so conservative that Ohio has the opportunity to focus its implementation plan primarily on efficiency and renewables and still meet the proposed target set out in the Clean Power Plan.

But we also note that the availability of robust zero-emissions resources in Ohio provides the state with extensive flexibility beyond EPA's proposed methodology—even under alternative emissions targets. By focusing on energy efficiency and renewables, Ohio has degrees of freedom to reduce carbon emissions (i.e., by using these resources to back out fossil fuel-based generation) and thus meet a range of constrained carbon scenarios while reducing the need for investments in heat rate improvements or ramped-up natural gas capacity. NRDC concludes that there are significant advantages to having access to efficiency and renewables to the degree that Ohio's current energy policies allow, whether under the proposed target or in the event the final rule adopts tighter requirements.

In conducting this analysis, NRDC assumed that Ohio's implementation plan would forego EPA's assumed heat rate improvements and ramp-up of natural gas dispatch, in favor of clean energy investment.

In the first scenario, NRDC simply mirrored EPA's approach and reduced Ohio's carbon intensity in a stepwise fashion by backing out the assumed carbon reductions in Block 1, then Blocks 2, 3, and 4 (in that order). In the second scenario, NRDC conducted the same stepwise analysis but applied Ohio's existing state-level efficiency and renewables policies and assumed Ohio would take advantage of these carbon-cutting resources first before using any other tools.

20 *See, e.g.,* Docket No. 11-5568-EL-POR, Finding and Order, March 21, 2012, pages 7-8, Section B, in which AEP received approval for a shared savings incentive for its current energy efficiency portfolio, and Docket Nos. 11-351-EL-AIR, 11-352-EL-AIR, Opinion and Order, December 14, 2011, pages 7, 14, in which the PUCO approved on a pilot basis AEP's current revenue decoupling rider.

21 *See* utility self-reported energy efficiency data for program year 2012, derived from annual status reports available via PUCO's online docketing system at dis.puc.state.oh.us/. The specific dockets are: No. 13-1182-EL-EEC (AEP), No. 13-1129-EL-EEC (Duke), No. 13-1140-EL-POR (Dayton Power and Light), and No. 13-1185-EL-EEC (FirstEnergy).

22 *See* annual status reports for the 2013 program year, available via PUCO's online docketing system at dis.puc.state.oh.us/. The specific dockets are: No. 14-0853-EL-EEC (AEP), No. 14-0456-EL-EEC (Duke), No. 14-738-EL-POR (Dayton Power and Light), and No. 14-0859-EL-EEC (FirstEnergy).

23 In March 2014, NRDC released the report *Cleaner and Cheaper: Using the Clean Air Act to Sharply Reduce Carbon Pollution from Existing Power Plants, Delivering Health, Environmental, and Economic Benefits* (available at nrdc.org/air/pollution-standards/files/pollution-standards-IB-update.pdf), outlining several scenarios for how EPA could shape carbon standards for power plants to get the greatest reductions, at the lowest cost. In May 2014, NRDC built on one of those scenarios— "Moderate, Full Efficiency"—by calculating the electric bill savings and energy efficiency jobs this scenario would create nationally and for 13 states (including Ohio). *See* NRDC, *New Carbon Pollution Standards Can Save American Households $13 Billion on Electric Bills*, Create 274,000 Jobs, available at nrdc.org/air/pollution-standards/state-benefits.asp.

24 *See* NRDC, *Carbon Pollution Standards Fact Sheet: Ohio*, May 2014, available at nrdc.org/air/pollution-standards/files/cps-state-benefits-OH.pdf.

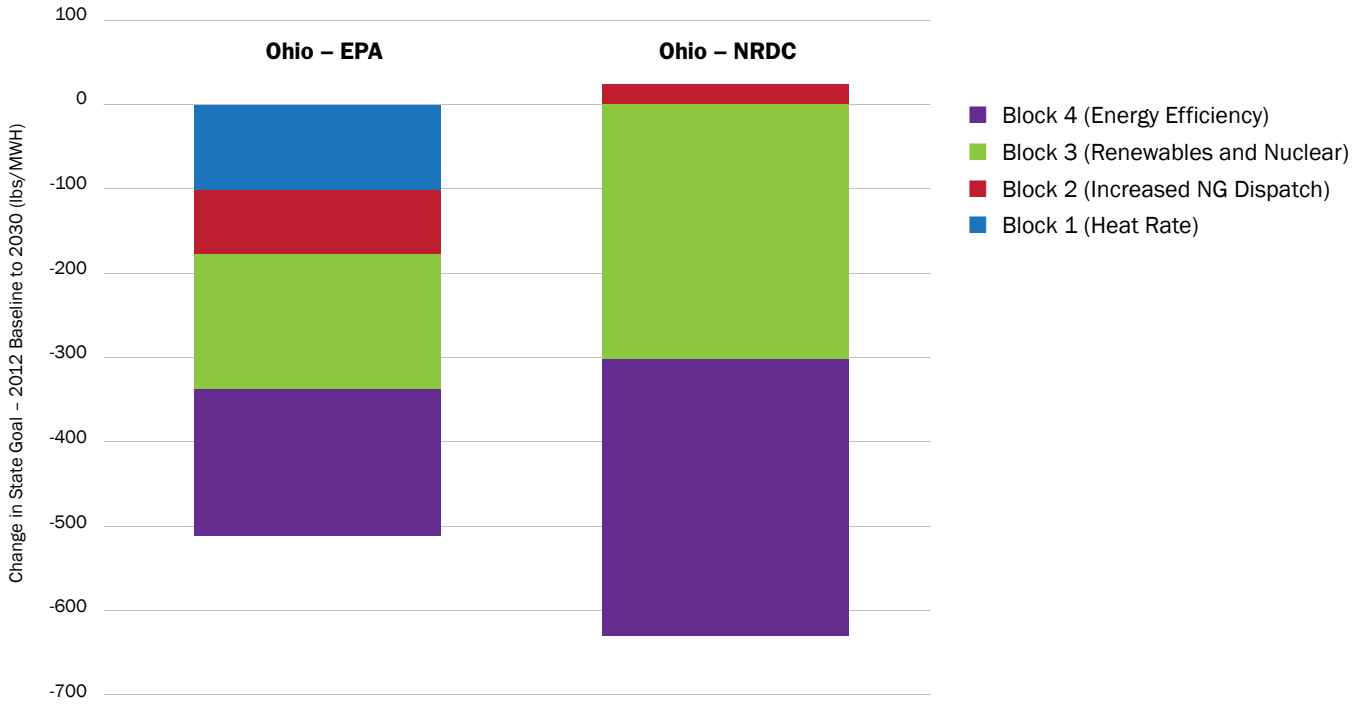
As Table 2 demonstrates, the result is compelling. Figure 5 below also illustrates this fact.

Even assuming Ohio gets no carbon reductions from Blocks 1 and 2 (as Table 2 shows, in our analysis we held the carbon intensity constant in each of these categories),[27] if the state fully implements its efficiency and renewables requirements, it has the potential to exceed the 2030 emissions target of 1,338 lbs/MWh. And because Ohio's energy efficiency programs have a very low cost of saved energy (as discussed above, ~$0.01/kwh) and the state has

Table 2: Comparison of EPA Assumptions vs. State-Level Efficiency and Renewables Focus

Methodology	2012 Emission Rate and Building Block Application for Proposed Final State Goal (2030)					
	2012 Fossil Rate (lbs/MWh)	2012 Fossil, RE, Nuclear	Block 1	Blocks 1 & 2	Blocks 1, 2, & 3	Blocks 1,2,3, & 4 (Final 2030 Goal)
EPA Approach	1,897	1,850	1,751	1,673	1,512	1,338
Ohio State Standards[25]	1,897	1,850	1,850	1,875[26]	1,574	1,245

Figure 5: Change in State Goal from 2012 Baseline to 2030 Target (EPA Assumptions Vs. State-Level Focus on Efficiency and Renewables)



25 These renewable energy and energy efficiency projections were calculated based on a percentage of the previous 3-year average of electricity sales (consistent with Ohio's state-level policy), and used the AEO2013 growth factor through 2030 and beginning with EIA 2012 Sales. *See* Appendices A and B for source data.

26 Note that this methodology produces a small increase in carbon intensity in Block 2. This is a result of the stepwise approach of backing out carbon intensity block by block. In this approach, by assuming no reduction in carbon intensity via Blocks 1 and 2, the emission rate exceeds EPA's rate at the equivalent stage in the calculation process in the absence of the Block 2 effect of displacing coal with lower-emitting natural gas (in the Block 2 reduction, EPA assumes a shift of 10 percent of Ohio's 2012 coal generation to existing gas plants). But Table 2 shows that this remnant does not impact the final conclusion: that relying solely on Blocks 3 and 4 for carbon reduction will actually allow Ohio to meet and even exceed the 2030 emissions rate of 1,338 lbs/MWh.

27 Save for the temporary increase in carbon intensity demonstrated in Table 2 and explained in note 26 above.

seen declining renewable energy costs in recent years,[28] Ohio has the option to derive its carbon reductions from exceedingly cost-effective tools.

But this is not the only scenario in which Ohio has extensive flexibility in investing in energy efficiency and renewables; the zero-emissions resources analyzed in Figures 1–5 of these comments also have benefits under alternative or revised emissions target scenarios. The EPA has offered in the Clean Power Plan several alternative approaches to calculating the state-level targets, and the agency will be reviewing extensive comments from a wide range of stakeholders over the coming months. This process may result in a more stringent target. Regardless of the target's final magnitude, however, Ohio has the ability to forgo reductions from the carbon-emitting sources in Blocks 1 and 2, particularly in the event there are technical or economic concerns about implementing these blocks. Energy efficiency and renewables are additive in terms of flexibility. They could be used to displace coal generation in the event Ohio opts to forgo additional heat rate improvements at its coal plants in Block 1, and likewise could offset coal in place of ramping up natural gas capacity to the level assumed by EPA in Block 2.

Ohio has already embraced and begun investing in energy efficiency and renewable energy, and this progress has prepared the state to quickly and effectively deploy these resources in the coming years. Assuming the state continues to implement its state-level standards beyond 2016, these resources can be deployed across a range of emissions target scenarios. The Clean Power Plan delivers the kind of flexibility that has been requested.

28 *See, e.g.,* Platts, *Special Report: Renewable Energy Certificates*, April 2012 (documenting growth of REC market and corresponding reduction in prices), available at platts.com/IM.Platts.Content/InsightAnalysis/IndustrySolutionPapers/RECSpecialReport1112.pdf. *See also* Public Utilities Commission of Ohio, *Renewable Resources and Wholesale Price Suppression,* August 2013 (concluding that the addition of renewable sources of power is pushing down the wholesale cost of power in the state by about 0.15 percent, while also reducing the amount of carbon dioxide produced), available at midwestenergynews.com/wp-content/uploads/2013/09/PUCO-renewable-energy-standard-study.pdf.

V. REGIONAL COMPLIANCE

NRDC is also providing comment on the opportunities for Ohio to participate in a multistate compliance approach. While there has been some concern about the resources and time needed to collaborate with other states on Clean Power Plan compliance, and practical concerns regarding the differences in emission reduction targets across states, NRDC believes such collaboration is feasible both within the timeframe laid out in the carbon rules and in a straightforward manner.

States are very likely to benefit from using a multistate or regional approach. Primarily, such an approach could help reduce costs to consumers and potentially lower costs for participating states, even while the stringency of state targets varies. Working within a multistate region opens up more options to reduce pollution, thus providing the increased flexibility to seek out the lowest-cost choices amongst participating states. This flexibility also reduces concerns about reliability. A regional approach will likewise align the existing regional electric market with environmental requirements.

Contrary to the concerns of some stakeholders, states that coordinate regionally do not need to have identical energy efficiency and renewable programs or even identical pollution reduction targets. The states participating would choose either a rate-based or a mass-based system, since the credits are not tradable between the two approaches. A mass-based system is the simplest to coordinate regionally, because all resources (including additional efficiency and renewable energy) would be accounted for in the mass-based cap without the need for additional crediting, monitoring, or verification. EPA has provided a path for cross-state collaboration by including a formula to convert a state's rate-based goal into a mass-based target.

Any resulting regional approach would be straightforward because emission targets have already been set by EPA. This eliminates the target-setting step for states, and the associated lead time for negotiations. EPA also allows extra time to develop multistate plans, with a deadline of June 2018. Finally, a regional approach need not be a "compact" subject to congressional review, as illustrated by other existing regional programs like the Regional Greenhouse Gas Initiative.

We encourage Ohio to explore a regional approach and begin reaching out to neighboring states to assess their willingness to coordinate on consistent policies (mass-based vs. rate-based) and to study costs and benefits of a cross-state plan versus discrete state plans. We also encourage Ohio to continue to work closely with PJM as a technical resource, but also to assist as needed in organizing across the multi-state footprint.

V. CONCLUSION

Ohio embraced and began investing in energy efficiency and renewable energy more than five years ago; this progress has prepared the state to effectively deploy these resources in the coming years. Assuming its clean energy policies are reinstated in 2017, Ohio has the opportunity to achieve deep carbon reductions—getting the state far down the road for hitting the interim and final targets proposed in the Clean Power Plan.

Our analysis confirms that these targets are achievable. U.S. EPA incorporated in its target-setting conservative assumptions for the state's clean energy potential. But thanks to Ohio's existing energy efficiency and renewable energy requirements, the state has these resources in such abundance that it is projected to exceed EPA's assumptions years ahead of schedule. In fact, Ohio's policies put it on the path to source more than 20 million MWh of electricity from renewable sources and to deploy over 37 million cumulative MWh of energy efficiency to the grid by 2030. These are powerful tools that represent a vast well of untapped opportunity to displace carbon emissions. And because these state-level policies are rigorously evaluated year-after-year by the PUCO in a transparent, public process, they are guaranteed to be cost-effective for Ohio's consumers.

With these policies underway, Ohio is positioned to be a leader in the Midwest region for constructively and cost-effectively crafting a smart compliance plan—fostering a thriving clean energy economy in the process.

Ohio is up to the task.

APPENDIX A

EPA Renewable Energy Assumptions (Block 3) Vs. Ohio's Policy					
Year	**Historic Utility Self-Reported Renewable Energy Gen (MWh)[A]**	**EPA Ramp-Up (% of generation)**	**EPA (MWh)[B]**	**OH Ramp-Up (%)**	**OH Ramp-Up (MWh)[C,D]**
2009	336,474			0.25	
2010	628,002			0.5	
2011	1,342,089			1.0	
2012	1,978,740	1.0	1,738,621	1.5	
2013				2.0	2,275,958
2014				2.5	3,075,657
2015				FREEZE	FREEZE
2016				FREEZE	FREEZE
2017		1.6	2,038,692	3.5	3,833,802
2018		1.8	2,390,552	4.5	5,389,167
2019		2.2	2,803,140	5.5	6,957,128
2020		2.5	3,286,937	6.5	10,090,083
2021		3.0	3,854,232	7.5	11,689,785
2022		3.5	4,519,438	8.5	13,302,341
2023		4.1	5,299,452	9.5	14,927,829
2024		4.8	6,214,090	10.5	16,566,327
2025		5.6	7,286,586	11.5	18,217,915
2026		6.6	8,544,185	12.5	19,882,671
2027		7.7	10,018,835	12.5	19,963,589
2028		9.1	11,747,996	12.5	20,044,837
2029		10.6	13,775,594	12.5	20,126,415
2030		10.6	13,775,594	12.5	20,208,324

Notes

A. Source: *Alternative Energy Portfolio Standard Report* by the Public Utilities Commission to the General Assembly of the state of Ohio for compliance years 2009 and 2010; compliance year 2011; and compliance year 2012.

B. EPA's renewables projections are calculated as a percent of 2012 electricity generation.

C. This table shows that EPA's Block 3 assumptions and Ohio's state-level policy ramp-up produce different MWh at the same % generation levels in a given year. This discrepancy is attributable to the different methodologies between the two approaches. For example, in the "EPA Ramp-Up" column EPA assumed that a 10.6 percent target in Ohio in 2029 would yield ~13.8 million MWh of generation from renewable sources. In contrast, in the "Ohio Ramp-Up" column when Ohio reaches its 10.5 percent target under the post-SB 310 ramp-up schedule it is actually projected to yield closer to 19 million MWh of generation from renewable sources. This is because EPA used an "annual growth factor" to determine the ramp-up of renewables in the states – something that Ohio state-level policy does not do. Specifically, Block 3 is based on a regional average RPS requirement and 2012 state generation, to which EPA applied an annual growth factor for each region to meet regional renewables targets by 2030. EPA gave Ohio a target of 16 percent and an annual regional growth factor of 17 percent. Because Ohio's state-level policies are not constrained by the factors that EPA used, the "OH Ramp-Up" columns demonstrate more MWh of renewable energy on a yearly basis than in EPA's assumed approach. This is yet another illustration of EPA's conservative approach in Block 3.

D. Consistent with Ohio's state-level policy, annual renewable targets in the "Ohio Ramp-Up" are calculated as a percentage of the average previous three years' electricity sales. Load growth is based on EIA 2012 sales projected through 2030 using AEO 2013 growth factors, as described in EPA's "Annual Energy Savings and Generation – AEO 2013 02-10-14."

APPENDIX B

EPA Energy Efficiency Assumptions (Block 4) Vs. Ohio's Policy								
Year	EPA Ramp-Up (%)	EPA Cumulative (%)	EPA Annual Incremental Savings (MWh)[A,B]	EPA Net Cumulative Savings (MWh)	OH Ramp-Up (%)	OH Cumulative (post-SB 310)	OH Annual Savings (MWh)[C]	OH Cumulative Savings (MWh)[C]
2009					0.3	0.3		
2010					0.5	0.8		
2011					0.7	1.5		
2012					0.8	2.3	1,213,844	1,213,844
2013					0.9	3.2	1,384,046	2,597,890
2014					1.0	4.2	1,533,109	1,384,046
2015					FREEZE	FREEZE	FREEZE	FREEZE
2016					FREEZE	FREEZE	FREEZE	FREEZE
2017	0.85	0.85	1,323,498	1,323,498	1.0	5.2	1,539,762	2,917,155
2018	1.05	1.85	1,628,901	2,882,741	1.0	6.2	1,546,028	4,456,917
2019	1.25	2.94	1,928,647	4,655,998	1.0	7.2	1,552,320	6,002,946
2020	1.45	4.17	2,221,652	6,620,753	1.0	8.2	1,558,638	7,555,266
2021	1.5	5.35	2,283,575	8,530,502	2.0	10.2	3,129,963	9,113,904
2022	1.5	6.43	2,264,626	10,301,114	2.0	12.2	3,142,701	12,243,867
2023	1.5	7.42	2,247,804	11,935,713	2.0	14.2	3,155,491	15,386,567
2024	1.5	8.32	2,233,062	13,437,265	2.0	16.2	3,168,333	18,542,058
2025	1.5	9.13	2,220,356	14,808,580	2.0	18.2	3,181,227	21,710,391
2026	1.5	9.86	2,209,643	16,052,322	2.0	20.2	3,194,174	24,891,619
2027	1.5	10.51	2,200,883	17,171,007	2.0	22.2	3,207,174	28,085,793
2028	1.5	11.07	2,194,040	18,167,013	2.0	24.2	3,220,226	31,292,967
2029	1.5	11.56	2,189,077	19,042,581	2.0	26.2	3,233,332	34,513,193
2030	1.5	11.97	2,185,962	19,799,818	2.0	28.2	3,246,491	37,746,525

Notes

A. EPA's savings projections are calculated as a percent of prior-year sales, net of efficiency. I.e., to determine the savings achieved in a given year, EPA projected prior-year sales, removed from that sales figure the assumed energy efficiency savings achieved that year, and then applied the current year's savings target (%) to net sales.

B. Because of the formula described in Note A, under EPA's assumed scenario in Ohio under Block 4 annual incremental savings from energy efficiency begins to decline in 2022. See *Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units*, Docket EPA-HQ-OAR-2013-0602-0153, GHG Abatement TSD Chapter 5 Supporting Data and Analysis, Attachment entitled "Scenario 1: 1.5% savings target, 0.20%/year ramp rate, and 3% real discount rate," available at regulations.gov/contentStreamer?objectId=090000648173e345&disposition=attachment&contentType=excel12book.

C. Consistent with Ohio's state-level policy, incremental and cumulative energy savings are calculated as a percentage of the average previous three years' electricity sales. Load growth is based on EIA 2012 sales projected through 2030 using AEO 2013 growth factors, as described in EPA's "Annual Energy Savings and Generation – AEO 2013 02-10-14."