

**BEFORE THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF CALIFORNIA**

Order Instituting Rulemaking to Create a  
Consistent Regulatory Framework for the  
Guidance, Planning, and Evaluation of Integrated  
Distributed Energy Resource.

Rulemaking 14-10-003  
(Filed October 2, 2014)

**OPENING COMMENTS OF THE NATURAL RESOURCES DEFENSE  
COUNCIL (NRDC) ON RESOLUTION E-5150**

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**I. Introduction**

Pursuant to Rule 14.5 of the CPUC Rules of Practice and Procedure, The Natural Resources Defense Council (NRDC) submits the following opening comments on Resolution E – 5150. NRDC is a non-profit membership organization with more than 95,000 California members who have an interest in receiving affordable energy services while reducing the environmental impact of California’s energy use.

**II. Discussion**

The Natural Resources Defense Council (“NRDC”) supports the updates to the Avoided Cost Calculator (“ACC”) proposed by the Energy Division in Draft Resolution E-5150. Through the 2020 major ACC update, Staff undertook the laudable and complex task of aligning the ACC with the integrated resource planning (IRP) process. This requires forecasting avoided costs of energy savings and emissions through production cost modeling, as opposed to extrapolating CAISO market data as was done for previous ACC. This new process requires time intensive data validation; Staff have taken the opportunity of the 2021 ACC update to conduct this validation and refine the analyses that underpin the ACC without making changes to the approved methodology.

NRDC recommends that the Commission adopt the updated ACC as proposed because:

- The updates are minor in scope.
- The 2021 ACC makes necessary data updates and corrects obvious errors:
  - Main drivers of change between 2020 and 2021 ACC are more accurate energy prices, updated GHG prices, and improved emissions forecasts, and

- The 2021 ACC correctly updates GHG prices and overestimates of mid-day thermal generation in the 2020 ACC.
- These updates bring the ACC in line with market conditions, and recent market trends.

### **A. Updates are Minor in Scope**

The ACC updates proposed by Energy Division Staff are in the nature of “minor changes,” which the Commission in Decision (“D.”) 19-05-019 indicated that it would consider in odd-numbered years through this informal Resolution process. These changes are limited to updating models based on most recent data, and refining analysis to correct errors and improve the ACC. While minor in scope, errors in the data, modeling, and format of the ACC were identified and should be addressed. The modifications contained in Draft Resolution E5150 will help achieve the overarching goal articulated by the Commission in D.19-05-019, namely, “to better enable the Commission to meet the State’s environmental policies in a consistent and cost-effective manner.”<sup>1</sup>

As the Commission observed in D.19-05-019, “[t]he Commission’s responsibilities include ensuring that ratepayers are not unfairly burdened.”<sup>2</sup> NRDC agrees with the finding in Draft Resolution E-5150 (at pp. 6-7) that the proposed ACC updates are “necessary to more accurately reflect Commission policies and priorities related to resource planning, as well as to better reflect market conditions, trends, and prices.” We further explain how the 2021 ACC better reflects market conditions, trends, and prices in Section II.B.

NRDC also agrees with Energy Division Staff that the updates and corrections proposed in Draft Resolution 5150 are not the kind of “major” changes the Commission considers only in formal proceedings in even-numbered years. In D.19-05-019, the Commission adopted a more expansive approach to making “minor” updates to the ACC, contingent upon greater transparency and opportunity for participation in the informal Resolution process.<sup>3</sup> The Commission found that “this expansion of what constitutes a minor change to be reasonable as it allows for real-life needs while maintaining due process and transparency.”<sup>4</sup>

Consistent with the Commission’s direction in D.19-05-019, the Energy Division Staff

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<sup>1</sup> D.19-05-019, p. 2.

<sup>2</sup> D.19-05-019, p. 47.

<sup>3</sup> D.19-05-019, p. 53.

<sup>4</sup> Id.

undertook a participatory stakeholder process, commencing in December 2020 with a public workshop where these proposed changes were initially discussed, to afford interested parties the opportunity to review and comment on the changes Staff was contemplating. The ACC updates proposed in Draft Resolution E5150 reflect the input and feedback from this stakeholder process. The corrections identified by Energy Division Staff are necessary and appropriate and should be adopted by the Commission.

**B. Main Drivers of Change between 2020 and 2021 ACC are Improved Energy Prices, Updated GHG Prices, and More Accurate Emissions Forecasts**

Figure 1 illustrates this through the example of 25 year levelized avoided cost values for an SCE and a PG&E climate zone. The last column, total decrease in levelized value, is the unweighted sum of 25 year levelized avoided costs for a sample PG&E and SCE climate zone for the year 2020. All other columns show the contribution of each component of avoided cost toward that total difference.

Figure 1 Drivers of Decrease in 25 Year Levelized Avoided Cost Values Between 2020 ACC and 2021 ACC<sup>5</sup>

	Cap and Trade	GHG Adder	GHG Rebalancing	Energy	Generation Capacity	Transmission Capacity	Distribution Capacity	Ancillary Services	Losses	Methane Leakage	Total Decrease in Levelized Value
PG&E CZ3A	30%	46%	-14%	13%	10%	0%	0%	0%	1%	14%	\$ (646,197)
SCE CZ 6	28%	42%	-13%	19%	9%	0%	0%	0%	1%	13%	\$ (659,077)

There are no changes to ancillary services, transmission capacity, and distribution capacity. Generation capacity reduces somewhat due to decrease in forecasts of battery storage prices; battery storage is the capacity resource in the ACC.

GHG avoided costs are a function of (1) GHG price, which includes cap and trade price forecasts and the GHG Adder, and (2) the forecast of thermal operation in the CAISO wholesale markets. Higher thermal operation in the wholesale markets means more emissions per MWh traded in the market. Thermal operation forecasts also in-part determine energy prices; as thermal operation is more expensive than renewable operation, thermal generator energy bids usually set the clearing price in the wholesale market.

A change in GHG prices – due to routine data updates from the CEC IEPR which changed cap and trade price forecasts and RESOLVE updates that changed the GHG Adder – and a change in GHG emissions amounts have a multiplicative effect on GHG avoided costs. E.g., if one were to reduce GHG prices by a factor of two and reducing GHG emissions amounts

<sup>5</sup> Source: NRDC calculations using avoided cost data. All NRDC analysis files available [here](#).

by a factor of two mean that GHG related avoided costs would decrease by a factor of 4. We explain both updates and why they are justified below.

### **C. The 2021 ACC Correctly Updates GHG Prices and Corrects Overestimates of Mid-Day Thermal Generation in the 2020 ACC**

The CPUC ACC documentation clearly states that the change in cap and trade prices is from a CEC IEPR update; the decrease in GHG Adder prices is due to a RESOLVE update.<sup>6</sup> The CPUC routinely updates the RESOLVE model each year to reflect the latest data, updated Commission Decisions in the IRP proceeding, and to correct minor errors. These updates should flow into the ACC each year to ensure that the CPUC uses best possible estimates to value all distributed energy resources. Application of incorrect and outdated estimates will lead to sub-optimal investments and mis-application of ratepayer funds.

The rest of this section focuses on illustrating that the 2020 ACC incorrectly forecasts increasing amounts of much thermal generation in the middle of the day even though solar generation will keep increasing, and that the 2021 ACC better reflects recent market trends. This is likely due to improvements in production simulation and better calibration with recent CAISO market data in the 2021 ACC.

#### Avoided Energy Costs and Avoided Emissions Values Should Reflect CAISO Wholesale Market Trends

Distributed energy resources (DER) collectively save multiple GWh of energy each year. Energy efficiency itself saved approximately 3.9 GWh of energy in 2020<sup>7</sup> and approximately 1.27 GW of rooftop solar were installed in 2020.<sup>8</sup> Incremental energy savings from DER mean that load serving entities have to buy less energy from the wholesale market (among other benefits). This reduced energy procurement from the CAISO wholesale market means that avoided costs of energy savings from DER should reflect wholesale energy prices, and avoided GHG emission due to DER should reflect average emissions from the mix of generation in the wholesale market.

Recent research by Dr. James Bushnell shows that as renewable penetration in the CAISO wholesale market increases, thermal operator generation in the wholesale market changes accordingly. This is illustrated in Figure 2 which explains how the increase in solar

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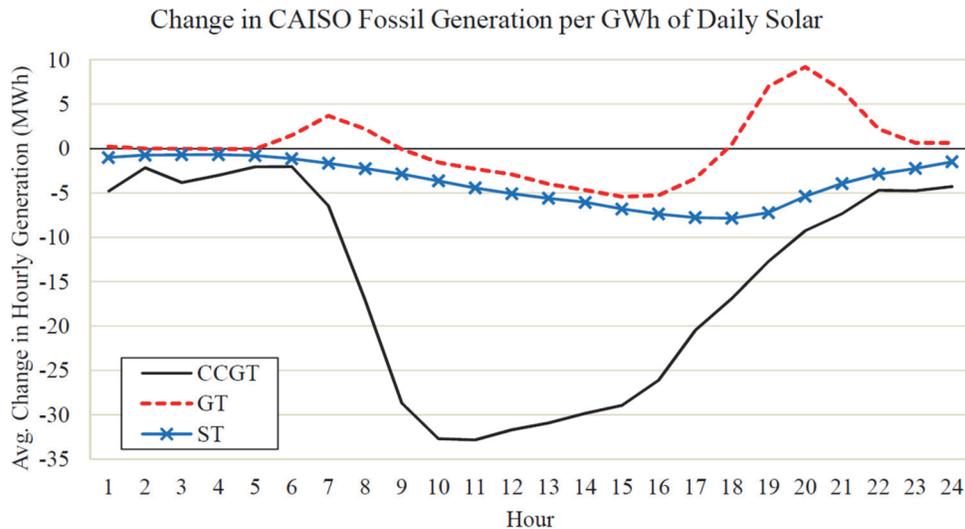
<sup>6</sup> CPUC, [2021 Distributed Energy Resources Avoided Cost Calculator Documentation](#), at 30.

<sup>7</sup> See CPUC's CEDARS [website](#).

<sup>8</sup> <https://www.californiadgstats.ca.gov/>

penetration causes a decrease in all thermal generation in the middle of the day and small increase in thermal generation from solely gas turbines (GT) in the morning and the evening to meet fast ramping load due to the duck curve effect.

Figure 2 CAISO Fossil Generation Changes Due to Increased Solar Penetration<sup>9</sup>



As more renewables, predominantly solar, come online to meet California’s renewable portfolio standard (RPS) and carbon reduction goals, this trend should continue. The CPUC’s Reference System Plan, adopted in the Integrated Resources Planning Proceeding (R-20.05-003), affirms that California will be adding more than 13 GW grid scale solar in the next ten years.<sup>10</sup> This means that we should further expect decreased thermal generation in the middle of the day and peakier GT operation in the mornings and the evenings.

The 2020 ACC Forecasts were Counter to Recent Market Trends; the 2021 ACC Better Reflects Wholesale Market Operation with Increasing Renewables and Solar

Figures 3 through 5 compare trends in forecasts of thermal generator operation and emissions in the 2020 and the 2021 ACC. Figure 3 shows average hourly heat rates, a good proxy for amount of thermal generation in the wholesale market, for zone SP15, taken from the “Emissions” tab in the 2020 and 2021 ACC, by season for a sample of years through 2030.<sup>11</sup>

<sup>9</sup> James Bushnell and Kevin Novan, *Setting With The Sun: The Impacts Of Renewable Energy On Wholesale Power Markets* Energy Institute WP 292 (August 2018), at 34.

<sup>10</sup> CPUC D21-02-008, *Decision Transferring Electric Resource Portfolios to California Independent System Operator for 2021-2022 Transmission Planning Process* (February 2021), at 20, 21.

<sup>11</sup> Seasons are defined as: Spring = March, April, May; Summer = June, July, August; Fall = September, October, November; Winter = December, January, February.

Figure 3 Comparison of Heat Rates by Season in the 2020 and 2021 ACC for Zone SP15<sup>12,13</sup>

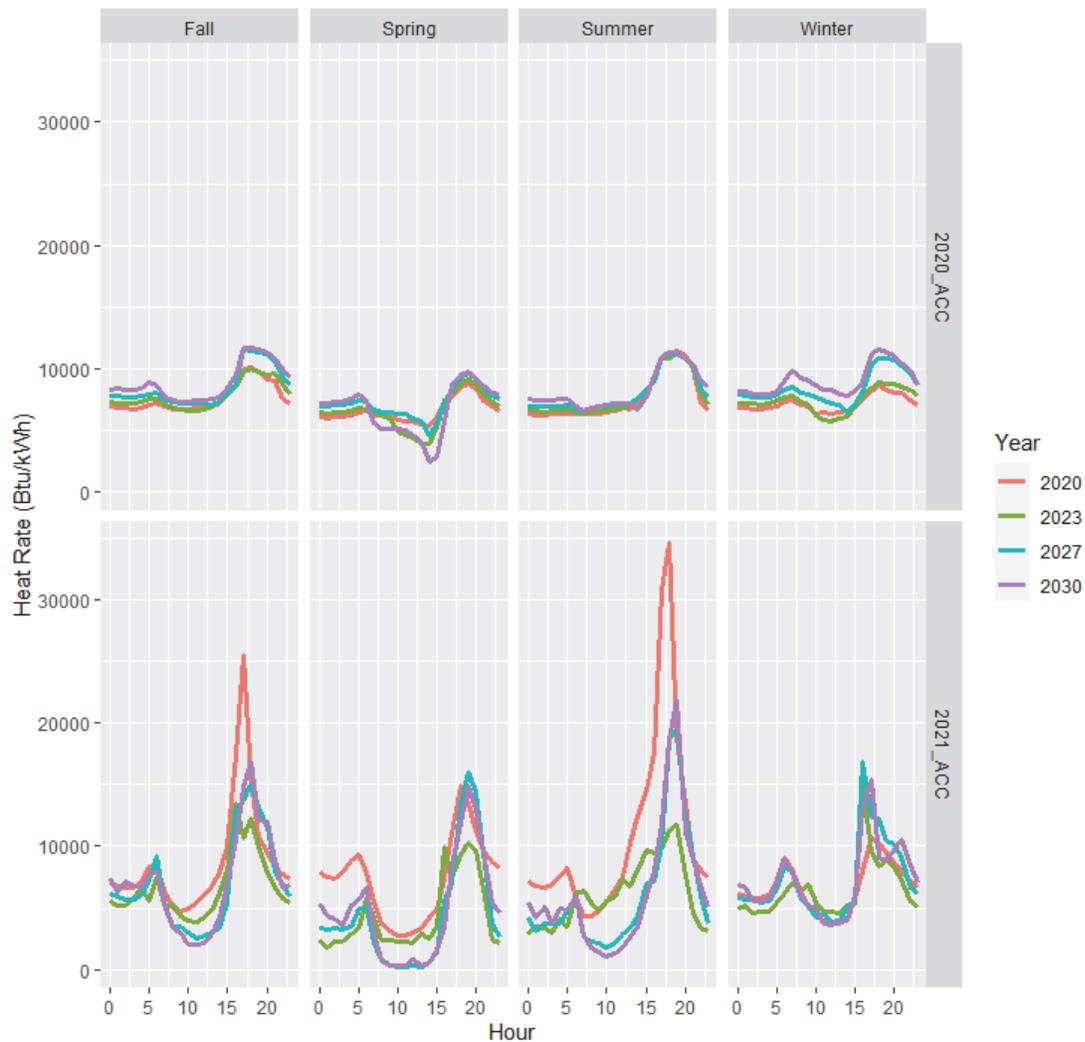


Figure 3 clearly shows that the 2020 forecasted heat rates run counter to the trends to date and what research shows would happen as more solar generation comes online. The 2020 ACC forecasts fairly flat heat rates across the day all seasons. As explained above, more solar on the grid should mean decreasing amounts of thermal generation in the CAISO wholesale market and thus decreasing emissions during the middle of the day. This trend is corrected in the 2021 ACC which shows heat rates changing consistent with adding more solar and a more extreme duck curve. The heat rates in the 2021 ACC correctly keep decreasing in the middle of the day and become peakier in the evenings and in the mornings.

This correction results in a more realistic forecast of total emissions in each hour

<sup>12</sup> Source: NRDC analysis of ACC data. All NRDC analysis files available [here](#).

<sup>13</sup> NRDC Analysis. Available for download [here](#).

associated with energy in the wholesale market. Figure 4 presents a comparison of average hourly emission rates<sup>14</sup> by season; Figure 4 shows that the 2021 ACC's average emission rate (tonnes/ MWh) estimates better track the expected profile of thermal generation in the wholesale market than the 2020 ACC; for the same reasons that the heat rates in the 2021 ACC better track thermal generation performance as explained above.

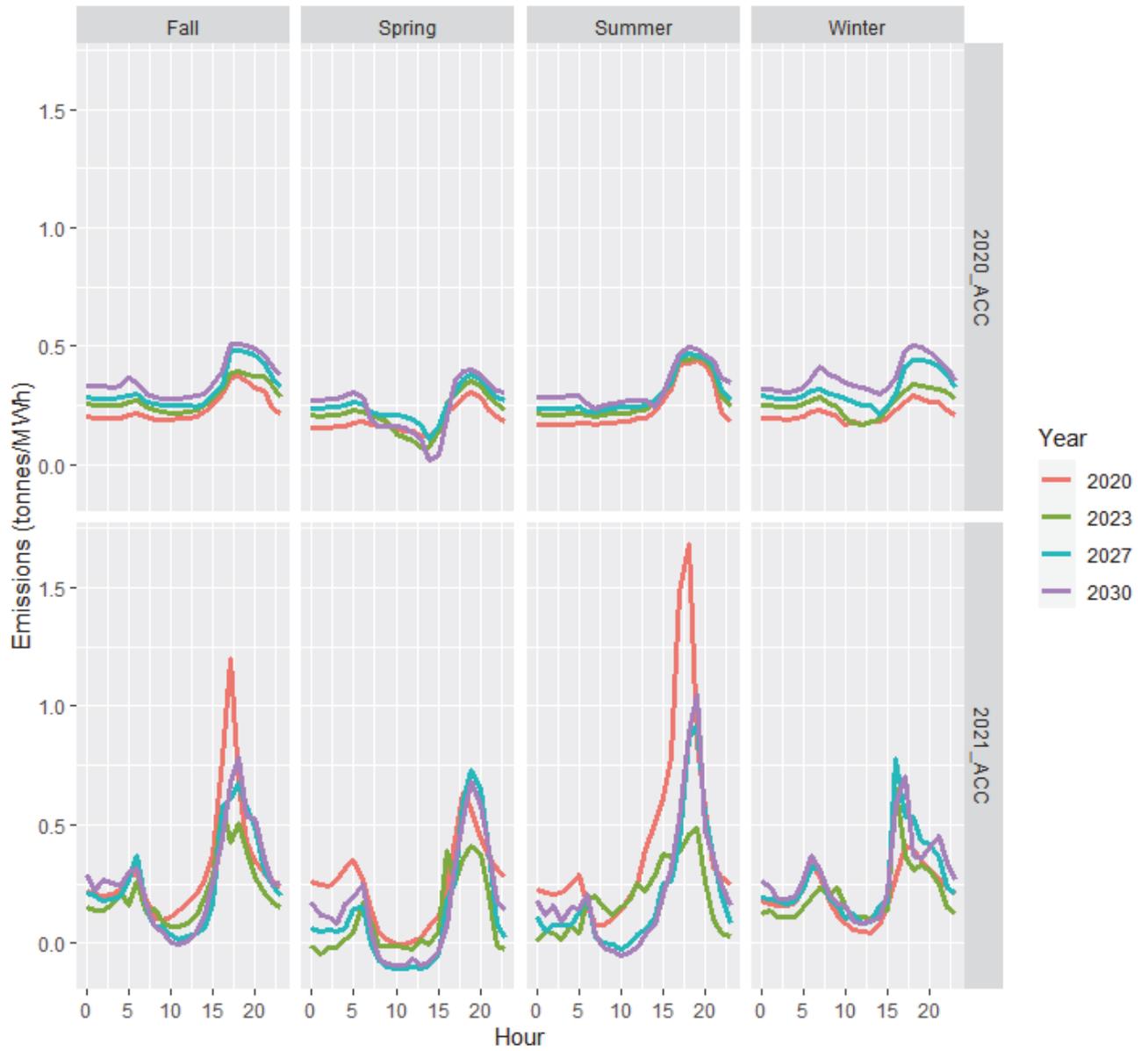
Figure 5 presents an unweighted average of daytime emissions broken out by season for the same set of years. Each dot in the figure represents average daytime (6 A.M. to 6 P.M) emissions rate (tonnes/ MWh). The color of each dot represents a future year. Figure 5 summarizes data in Figure 4 to show how the 2020 ACC incorrectly estimates increasing amounts of daytime emissions over time in all seasons (even as solar penetration will increase). The 2021 ACC corrects for this error. It accurately shows that average emissions intensity of wholesale power in the daytime will decrease as more renewables and solar are adopted in all seasons except for winter, when solar is more limited.

Figures 3 through 5 are created using data provided in the 2020 and 2021 ACC. NRDC did not manipulate the data; these comments simply analyze, aggregate, and present these data.

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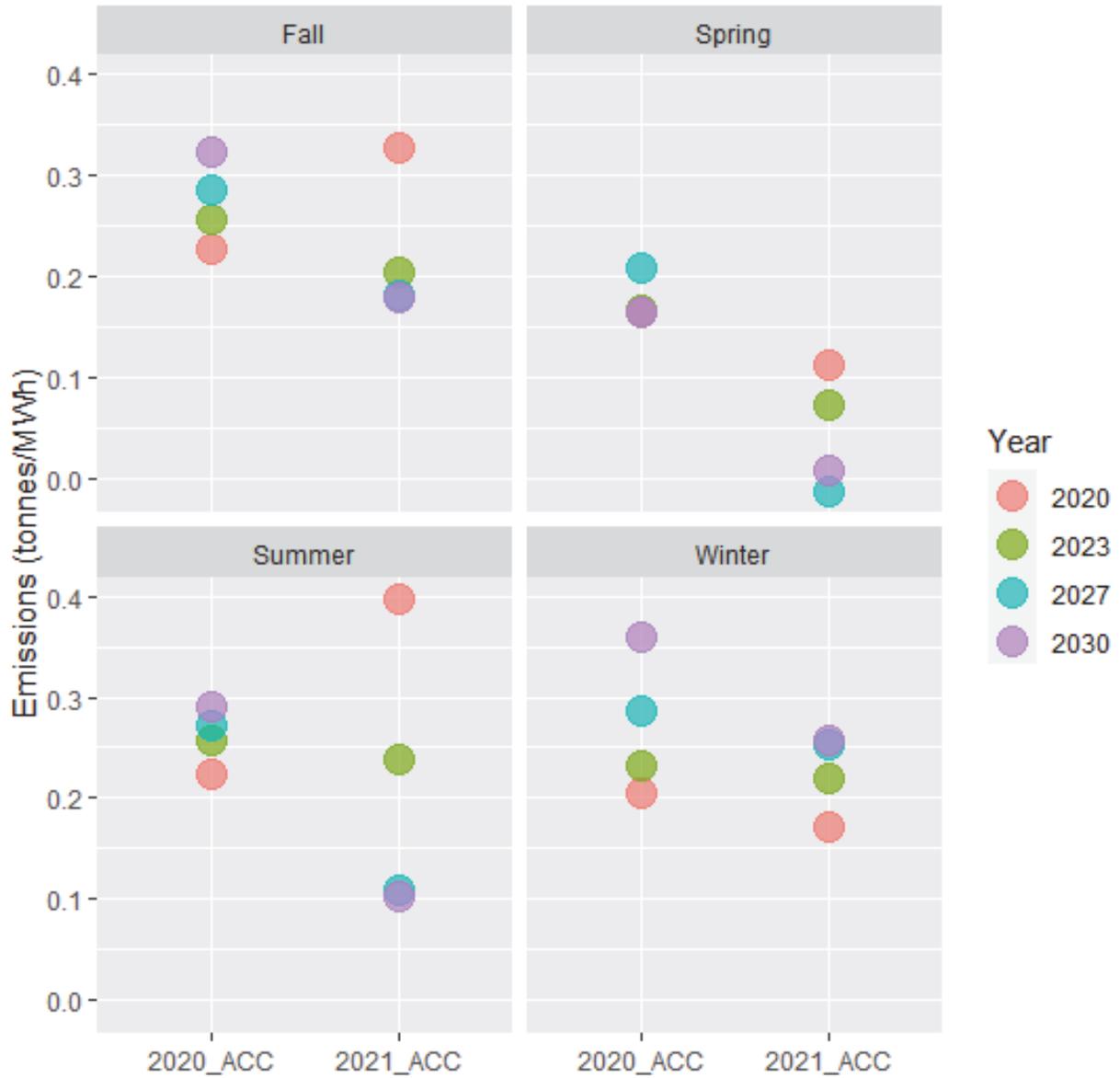
<sup>14</sup> Average tonnes/MWh for each hour in the 2020 and the 2021 ACC, taken from tab "Detailed Output"

Figure 4 Comparison of Heat Rates by Season in the 2020 and 2021 ACC for Zone SP15<sup>15</sup>



<sup>15</sup> Source: NRDC analysis of ACC data. All NRDC analysis files available [here](#).

Figure 5 Comparison of Mean Daytime (6 AM to 6 PM) Emissions by Season in the 2020 and 2021 ACC for Zone SP15<sup>16</sup>



<sup>16</sup> Source: NRDC analysis of ACC data. All NRDC analysis files available [here](#).

### **III. Conclusion**

NRDC appreciates the opportunity to provide comments on this Draft Resolution.

Dated: May 24, 2021

Respectfully submitted,

/s/ Mohit Chhabra

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