PUBLIC SERVICE COMPANY
OF COLORADO

2022 All-Source Solicitation
30-Day Report

2021 ELECTRIC RESOURCE PLAN AND
CLEAN ENERGY PLAN

PHASE II
CPUC Proceeding No. 21A-0141E
March 31, 2023

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Highly Confidential Attachment D – Summary of Bids with 2023-2025 In-Service Dates

Section 1. Regulatory Context and Introduction

Public Service Company of Colorado ("Public Service" or the "Company") files this 2022 All-Source Solicitation 30-Day Report in compliance with Electric Resource Planning Rule 3618(b)(I). The 2022 All-Source Solicitation ("Solicitation") is the resource acquisition phase ("Phase II") of the Company's 2021 Electric Resource Plan and Clean Energy Plan ("2021 ERP & CEP") in Proceeding No. 21A-0141E filed on March 31, 2021.

On August 3, 2022, the Commission issued Decision No. C22-0459 addressing the Company's Application for approval of its 2021 ERP & CEP and approving in part, the Updated Non-Unanimous Partial Settlement Agreement filed on April 27, 2022. On September 21, 2022, the Commission issued Decision No. C22-0559 addressing Applications for Rehearing, Reargument, or Reconsideration of Commission Decision No. C22-0459 (collectively, the "Phase I Decision").

Consistent with the Phase I Decision, on November 29, 2022, the Company filed the Updated Modeling Inputs & Assumptions to be used in Phase II. The Company issued its All-Source Solicitation Request for Proposals ("RFPs") on December 1, 2022, including a Company Ownership RFP, a Dispatchable Resources RFP, and a Renewable Resources RFP. The bid submission deadline was March 1, 2023.[1]

Rule 3618(b)(I) states:

> Within 30 days after bids are received in response to the RFP(s), the utility shall report: the identity of the bidders and the number of bids received; the quantity of MW offered by bidders; a breakdown of the number of bids and MW received by resource type; and a description of the prices of the resources offered.

In addition to the information required by Rule 3618(b)(I), the Company also identifies bids that claim Section 123 status and meet the criteria established by the Commission's Phase I Decision.

Finally, for informational purposes given the Commission's ongoing evaluation of resource adequacy issues in multiple forums, the Company also provides a summary of bids received with in-service dates in 2023-2025.

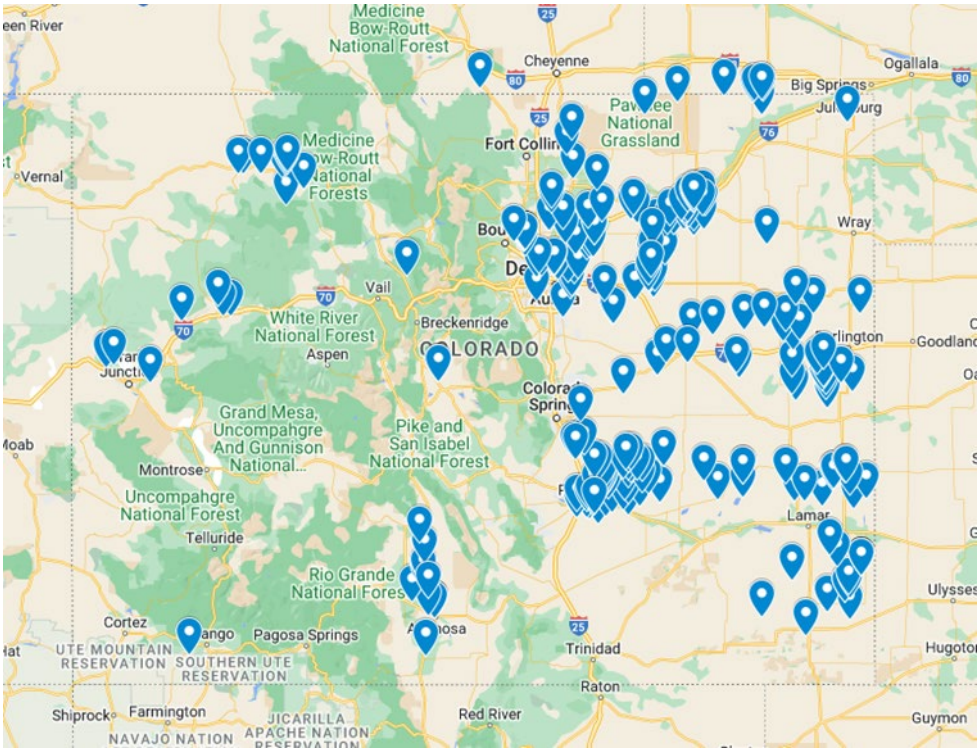
At the time of this report, the Company is continuing to evaluate eligibility of all bids received and has begun initial due diligence reviews.

[1] Company self-build proposals were due by 4:00 P.M. Mountain Time on February 28, 2023.

Section 2. Response to the 2022 All-Source Solicitation

The response to this Solicitation is unprecedented with 1,073 total proposals (approximately 170 individual projects) received from bidders. Over 900 of these individual proposals are renewable energy proposals or renewable energy with storage proposals. For comparison, the Company received approximately 430 total proposals (238 individual projects) in the 2017 All-Source Solicitation as part of the 2016 ERP and 55 bids in the 2013 All-Source Solicitation as part of the 2011 ERP. Figure 1 below shows the general geographic diversity of bids received.

Figure 1 – Geographic Diversity of Bids Received



Attachment A provides summary information of the bids received (number of bids, total MW of bids, and the median price or equivalent) organized by generation type. Many developers provided multiple bids for a single project resulting in significantly more bids than projects. Differing bid information such as different proposed in-service dates, different power purchase agreement ("PPA") terms (e.g., term length), and different ownership structures (e.g., PPA versus Company ownership) resulted in multiple bids from a single proposed project (though each distinct bid has its own distinct bid pricing stream or purchase price). In Attachment A, the Company has not included median pricing information for those generation types in which a small sample size of bids was received.

Attachment B includes individual bidder company names, project names, generation type, size and duration (if appliable) for bids claiming and meeting Commission Rule Section 123 status. Bidder company and project name are redacted in the public version of the attachment.

Bidder identity along with the number of bids proposed by generation type is provided in Highly Confidential Attachment C. Bidder names are redacted in the public version of the attachment.

Of the 1,073 proposals, 262 proposals included Company ownership plus an additional 13 bundled proposals that are not included in these totals. Such ownership can include, without limitation: (1) a self-build proposal, (2) a build-own-transfer ("BOT") proposal, (3) a sale of an existing asset, or (4) a joint PPA/Company-ownership proposal.

In describing the prices of resources offered, the Company presents the median levelized price of the bids received for each generation type, and this median value represents the mid-point of the pricing such that 50% of the bids are lower priced and 50% are higher priced. Levelized pricing for PPAs is based on information presented by developers in their bids, while pricing for Company-ownership is a preliminary calculation that is the proposed initial construction costs, not including potential tax incentives. Levelized costs for the Company ownership proposals are still under development.

Pricing is provided in $/kW-mo terms for those generation types that can be viewed as dispatchable and likely to provide high levels of generation capacity credit. Pricing is provided in $/MWh terms for those generation types or resources that are non-dispatchable. Hybrid proposals that include a storage component with a non-dispatchable base generation resource have the option to provide energy pricing, capacity pricing, or a combination of both. For these proposals both the $/MWh and $kW-mo are provided. Pricing is provided on an "as bid" basis and does not include other costs such as additional transmission network upgrade costs for interconnection or deliverability; that is, these are not based on "all in" costs. Bid ranking for purposes of computer-based modeling will be conducted on all-in costs.

Section 3. Section 123 Resources

A. Phase I Background

Section 40-2-123, C.R.S., requires the Commission give the fullest possible consideration to the cost-effective implementation of new energy technology or demonstration projects. In an ERP context, the Commission defines such projects as "Section 123 Resources" as set forth in Rule 4 CCR 723-3-3602(q).

In Paragraph 493 of its Phase I Decision in this Proceeding, the Commission referenced Decision No. C13-0094, in which the Commission held that a Section 123 Resource must be both new and clean pursuant to the statute and defined the terms "new" and "clean" as follows:

> A new project shall either: (1) incorporate one or more technologies, representing a substantial portion of its overall installed cost, that have not been regularly commercially demonstrated, up to the point in time that the resource is formally bid, or if not bid, acquired; or (2) be a project used to demonstrate the feasibility of a technology not before implemented in its proposed configuration. A clean project must demonstrate that it would likely cause a decrease in greenhouse gas emissions (e.g., carbon dioxide) or significantly reduce other pollutants. A clean project may also result in reduced water usage.[2]

In Phase I of this 2021 ERP & CEP Proceeding, Public Service suggested that the Commission focus on the requirement that Section 123 resources be "new" and specifically that a new technology is one that incorporates "technologies… that have not been regularly commercially demonstrated." The Company further suggested this would specifically "not include any standalone wind, solar, or lithium-ion based battery storage of any duration and any combination of those technologies together with other resources (*e.g.*, combined solar and wind projects, and solar and wind hybrids)" as these technology combinations are well commercialized and would provide negligible innovation benefits.[3]

In Phase I, Public Service reiterated that Commission clarity on the issue of determining Section 123 resources is necessary and pointed to the Company's 2017 All-Source Solicitation where it received 72 bids claiming Section 123 status and all but two of those included wind, solar, or short-duration battery storage. The Company offered an illustrative list of technologies that it contends merit Section 123 status, including:

> • Long-duration (10 hours or more) storage that can be held in a fully charged state for multiple days without losses or negatively impacting the short and long-term operating characteristics. Flow batteries or similar technologies would likely meet such a definition; and

[2] Consolidated Proceeding Nos. 11A-869E, 12A-782E, and 12A-785E, Decision No. C13-0094, p. 34 (mailed January 24, 2013) (footnote 41 omitted).
[3] Hrg. Exhibit 130 (Scholl Rebuttal), pp. 63-64.

• Dispatchable generation projects employing low or no carbon-containing fuels on a firm supply basis.[4]

In Phase I, the Company also offered two options (Option A and Option B) by which Section 123 resources could move forward to computer modeling in the Phase II process. In Option A, Public Service proposed to rank eligible Section 123 bids by technology and cost, and lock one or two lowest-cost resources into the EnCompass model for re-optimization and let them "compete" for placement in the preferred portfolio. In Option B, the Company proposed to identify Section 123 bids below a MW level cap (*e.g.,* 20 MWs), sort and rank them, and add each least-cost bid by technology directly to the Company's preferred portfolio without re-optimization. Under this option, compliant Section 123 bids would simply be added to the Company's preferred portfolio with the added costs and impacts isolated for Commission consideration.

B. Commission's Directives on Evaluating Section 123 Resources

In Paragraph 501 of its Phase I Decision, the Commission adopted the criteria Public Service suggested in Phase I regarding determining Section 123 resources. Specifically, the Commission stated that Section 123 resources must be new, innovative, not commercialized technology, and provide unique, scalable and beneficiation attributes as to future costs, emissions reduction, or reliability benefits. In addition, the Commission stated that standalone wind, solar, or lithium-ion based battery storage of any duration and any combination of those technologies together with other resources are not Section 123 Resources.[5]

In Paragraph 502 of its Phase I Decision, the Commission directed the Company to apply the Company's proposed Option A in which it will rank Section 123 bids by technology and cost and forward them to EnCompass modeling for portfolio re-optimization and presentation in the 120-Day Report with the least-cost Section 123 bids by technology "locked in."[6]

C. Section 123 Bids

Of the 1,073 individual projects included in Attachment A, 6 projects claim Section 123 status. However, only 5 of the total number of projects that claim Section 123 status meet the criteria established by Paragraph 501 of the Commission's Phase I Decision. Section 123 claims were received from the following generation technology types listed in Attachment A: Gas, Biomass, and Storage.

In Highly Confidential Attachment B, the Company provides a list of Bid IDs of projects that claim Section 123 status and that are consistent with the criteria established by Paragraph 501 of the Phase I Decision as described further below. The Company notes

[4] *Id.* at p. 66.
[5] *See* Decision No. C22-0459, at ¶501.
[6] *See* Decision No. C22-0459, at ¶502.

that regardless of whether a bid qualifies for Section 123 status or not, it will still be evaluated in the Phase II bid evaluation process.

Linear Generator (Gas Thermal): Recommended for Section 123 Status

The Company received one Linear Generator proposal that claimed Section 123 status. The project is proposed as “a fundamentally new power generation technology” and would be deployed as a dispatchable resource with future fuel flexibility. The proposal lists Hydrogen and Ammonia as alternative fuels compatible with their generator. The Company believes this technology is not regularly commercially demonstrated and should be evaluated as a Section 123 resource.

Hydrogen Fuel Cell (Long Duration Storage): Recommended for Section 123 Status

The Company received one Hydrogen Fuel Cell proposal that claimed Section 123 status. The project is a long duration storage fuel cell that also incorporates the electrolysis, liquefaction, and cryogenic storage of Hydrogen onsite. The Company believes the combination of this technology for power generation is not regularly commercially demonstrated and should be evaluated as a Section 123 resource.

Adiabatic Compressed Air Energy Storage (Long Duration Storage): Recommended for Section 123 Status

The Company received one Adiabatic Compressed Air Energy Storage (“ACAES”) proposal that claimed Section 123 status. This project proposes to improve the efficiency of typical CAES systems by adding thermal energy storage that will remove the need to use gas thermals to reheat the stored air for turbine operations. The Company believes this technology is not regularly commercially demonstrated and should be evaluated as a Section 123 resource.

Geothermal: Recommended for Section 123 Status

The Company received one Geothermal proposal that claimed Section 123 status. While geothermal technology has been commercially demonstrated, this project seeks to demonstrate the mining of Hot Sedimentary Aquifers ("HSA") for the generation of electricity using a closed loop Organic Rankine Cycle ("ORC") plant. As geothermal technologies are included in § 40-2-123(3), C.R.S., the Company believes this project should be evaluated as a Section 123 resource.

Biomass: Recommended for Section 123 Status

The Company received one Biomass proposal that claimed Section 123 status. The project proposes to utilize supporting plant infrastructure at Hayden Station, a bubbling fluidized bed boiler and a steam turbine to provide renewable dispatchable generation. The plant would use biomass material produced by forest management and provide emissions reductions compared to open burning as well as gas thermal dispatchable generation. As biomass technologies are included in § 40-2-123(3), C.R.S., and this

project is a potential HB 21-1324 resource, the Company believes this project should be evaluated as a Section 123 resource.

Molten Salt Storage (Long Duration Storage): Not Recommended for Section 123 Status

The Company received one Molten Salt Storage proposal that claimed Section 123 status. However, the bid was provided as "information only," and therefore the Company does not recommend this project for Section 123 status.

Section 4. Summary of Bids Received with 2023-2025 In-Service Dates

For informational purposes given the Commission's ongoing evaluation of resource adequacy issues in multiple forums, the Company provides a summary of bids received with in-service dates of 2023-2025 in Highly Confidential Attachment D. Bidder names are redacted in the public version of the attachment.

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Company Ownership RFP Bids

Generation Technology	# of Bids*	Bid MW**	Median Bid Price ($/kW Installed)
Gas	25	10,397	$965
Biomass	1	19	small sample
Solar	66	19,493	$1,635
Solar/Storage	61	28,712	$1,628
Storage	11	2,065	$1,627
Wind	96	36,206	$1,822
Wind/Solar	2	601	small sample

Renewable and Dispatchable RFP Bids

Generation Technology	# of Bids*	Bid MW**	Median Bid Price ($/MWh levelized)	Median Bid Price ($/kW-mo levelized)
Gas	13	3,347	-	$10.65
Other***	3	163	small sample	small sample
Solar	210	55,212	$32.73	-
Solar/Storage	223	110,119	$39.89	$ 9.69
Storage	80	14,833	-	$12.14
Wind	210	84,533	$21.99	-
Wind/Solar	10	15,801	$28.67	-
Wind/Solar/Storage	40	19,703	$38.20	$6.94
Wind/Storage	6	3,156	$19.62	$12.61

* # of Bids reflects number of proposals, the unique projects are less than this value
** Bid MW column provides total MW bid across all proposals, the MWs of unique projects are less than this value
*** Includes biomass and compressed air storage.

Bid ID	Bidder	Project	Generation Type	Size (MW)	Duration (Hours)
002_001	[redacted]	[redacted]	Linear Generator (Gas Thermal)	49.5	N/A
008_001	[redacted]	[redacted]	Hydrogen Fuel Cell (Long Duration Storage)	48	10
030_001	[redacted]	[redacted]	Adiabatic Compressed Air Energy Storage (Long Duration Storage)	150	10
049_001	[redacted]	[redacted]	Geothermal	5	N/A
063_049	[redacted]	[redacted]	Biomass	20	N/A

Bidder	Biomass	Gas	Gas + Storage	Geothermal	Compressed Air Storage	Solar	Solar + Storage	Storage	Wind	Wind + Solar	Wind + Solar + Storage	Wind + Storage	TOTAL
[redacted]	-	-	-	-	-	13	7	-	-	-	-	-	20
	-	1	-	-	-	-	-	-	-	-	-	-	1
	-	-	-	-	-	6	-	3	5	-	-	-	14
	-	-	-	-	-	2	6	-	-	-	-	-	8
	-	-	-	-	-	1	2	2	-	-	-	-	5
	-	-	-	-	-	3	9	-	-	-	-	-	12
	-	-	-	-	-	3	6	-	-	-	-	-	9
	-	-	-	-	-	-	3	-	-	-	-	-	3
	-	-	-	-	-	2	-	-	1	-	-	-	3
	-	-	-	-	-	-	-	-	1	-	-	-	1
	-	-	-	-	-	10	4	-	-	4	-	-	18
	-	-	-	-	-	1	1	-	-	-	-	-	2
	-	5	-	-	-	19	26	13	6	-	-	-	69
	-	-	-	-	-	-	1	-	-	-	-	-	1
	-	-	-	-	-	-	5	2	-	-	-	-	7
	-	-	-	-	-	-	-	-	2	-	-	-	2
	-	-	-	-	-	3	-	-	1	-	-	-	4
	-	-	-	-	-	4	4	-	-	-	-	-	8
	-	-	-	-	-	-	8	-	-	-	-	-	8
	-	-	-	-	-	-	4	-	-	-	-	-	4
	-	-	-	-	-	6	6	1	-	-	-	-	13
	-	-	-	-	-	3	2	-	1	-	-	-	6
	-	-	-	-	-	-	2	-	-	-	-	-	2
	-	-	-	-	-	-	5	-	2	-	-	3	10
	-	-	-	-	-	-	-	-	3	-	2	3	8
	-	-	-	-	-	-	-	4	-	-	-	-	4
	-	-	-	-	-	-	-	1	-	-	-	-	1
	-	-	-	-	-	-	-	3	-	-	-	-	3
	-	-	-	-	-	-	4	-	-	-	-	-	4
	-	-	-	-	-	-	6	-	-	-	-	-	6
	-	-	-	1	-	-	-	-	-	-	-	-	1
	-	3	2	-	-	-	-	-	-	-	-	-	5
	-	-	-	-	-	1	-	-	-	-	-	-	1
	-	-	-	-	-	1	-	-	-	-	-	-	1
	-	-	-	-	-	4	16	-	-	-	-	-	20
	-	-	-	-	-	1	1	2	1	-	-	-	5
	-	-	-	-	-	36	-	-	-	-	-	-	36
	-	-	-	-	-	-	6	-	-	-	-	-	6
	-	-	-	-	-	2	2	2	2	-	-	-	8
	-	-	-	-	-	20	36	4	-	-	-	-	60
	-	-	-	-	-	2	2	-	2	-	-	-	6
	-	1	-	-	-	-	-	-	-	-	-	-	1
	-	-	-	-	-	-	6	3	-	-	-	-	9
	-	-	-	-	-	-	-	1	-	-	-	-	1
	-	-	-	-	-	1	1	1	1	-	-	-	4
	-	-	-	-	-	5	8	6	230	-	38	-	287
	-	-	-	-	-	-	-	-	2	-	-	-	2
	-	4	-	-	-	29	10	15	30	8	-	-	96
	-	-	-	-	-	2	-	-	-	-	-	-	2
	-	-	-	-	-	1	3	1	-	-	-	-	5
	-	-	-	-	-	-	-	7	-	-	-	-	7
	-	-	-	-	-	-	3	-	-	-	-	-	3
	-	-	-	-	-	4	4	-	-	-	-	-	8
	-	-	-	-	-	-	2	-	-	-	-	-	2
	-	-	-	-	-	2	-	-	2	-	-	-	4
	-	-	-	-	-	1	-	-	-	-	-	-	1
	-	-	-	-	-	7	1	-	-	-	-	-	8
	-	-	-	-	-	1	-	-	-	-	-	-	1
	-	-	-	-	-	2	-	9	-	-	-	-	11
	-	-	-	-	-	-	2	-	-	-	-	-	2
	-	-	-	-	-	-	-	1	-	-	-	-	1
	-	-	-	-	-	-	44	-	-	-	-	-	44
	-	-	-	-	-	-	-	3	-	-	-	-	3
	1	20	-	-	-	10	5	1	13	-	-	-	50
	-	-	-	-	-	6	4	-	-	-	-	-	10
	-	-	-	-	-	20	-	-	-	-	-	-	20
	-	-	-	-	-	-	2	-	-	-	-	-	2
	-	-	-	-	-	-	-	2	-	-	-	-	2
	-	-	-	-	1	-	-	-	-	-	-	-	1
	-	-	-	-	-	1	5	5	-	-	-	-	11
	-	-	-	-	-	-	8	-	-	-	-	-	8
	-	-	-	-	-	11	5	-	-	-	-	-	16
	-	-	-	-	-	2	-	-	-	-	-	-	2
	-	-	-	-	-	-	2	-	-	-	-	-	2
	-	-	-	-	-	3	3	-	-	-	-	-	6
	-	-	-	-	-	4	6	-	-	-	-	-	10
	-	-	-	-	-	18	-	-	-	-	-	-	18
	-	-	-	-	-	-	-	-	1	-	-	-	1
[redacted]	-	2	-	-	-	-	-	-	-	-	-	-	2
	-	-	-	-	-	1	-	-	-	-	-	-	1
	-	-	-	-	-	1	1	-	-	-	-	-	2
	1	-	-	-	-	-	-	-	-	-	-	-	1
	-	-	-	-	-	1	-	-	-	-	-	-	1
TOTAL	**2**	**36**	**2**	**1**	**1**	**276**	**299**	**92**	**306**	**12**	**40**	**6**	**1,073**

*[redacted] *also has 13 bundled bids (multiple projects) that are not included in this table.*

Bidder	PPA/Own	Generation Type	Nameplate (MW)	Nameplate II (MW)	Accredited Capacity (MW)	Commercial Operation Date	PPA Term (Years)
[redacted]	PPA	Wind	29.7	-	4.7	1/1/2023	10
[redacted]	PPA	Biomass	3	-	3.0	8/1/2023	5
[redacted]	PPA	Solar PV	13.6	-	4.6	7/15/2024	25
[redacted]	PPA	Gas Thermal	75.5	-	75.5	1/1/2025	5
[redacted]	PPA	Solar PV + Storage	30	30	30	4/1/2025	25/18
[redacted]	PPA	Solar PV + Storage	100	35	46.6	5/1/2025	25/18
[redacted]	PPA or BOT	Wind	400.5	-	49.2	5/31/2025	15