

UNITED STATES PATENT AND TRADEMARK OFFICE

OBM, INC.

&

CHOLLA ENERGY LLC

Petitioners

v.

LANCIUM LLC

Patent Owner

Case: IPR2023-01407

Patent No. 10,608,433

PETITION FOR INTER PARTES REVIEW

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EX1003	Declaration of Andres E. Carvallo
EX1004	U.S. Patent App. Publication No. 2010/0088261 (“Montalvo”)
EX1005	Virginia S.C.C. Tariff No. 25, Appalachian Power Company (January 14, 2015) (“APC-Tariff”)
EX1006	U.S. Patent App. Publication No. 2016/0329708 (“Day”)
EX1007	U.S. Patent App. Publication No. 2019/0318327 (“Sowell”)
EX1008	Order, Dkt. 219, <i>Bearbox LLC et al. v. Lancium LLC et al.</i> , 1:21-cv-00534-GBW-CJB (D. Del.)
EX1009	California Independent System Operator, <i>Resource Testing Guidelines Procedure No. 5330</i> (July 6, 2015) (“the Guidelines”)
EX1010	New York Independent System Operator, <i>Emergency Demand Response Program Manual No. 7</i> (November 2022) (“NYISO Manual”)
EX1011	California Independent System Operator, <i>Overview of Reliability Demand Response Resource</i> (May 8, 2014) (“RDRR Overview”)
EX1012	California Independent System Operator, <i>Implementation Overview for PDR</i> (August 26, 2014) (“PDR Overview”)
EX1013	Office of Electricity, <i>Demand Response</i> , U.S. DEPARTMENT OF ENERGY (August 8, 2023), https://www.energy.gov/oe/demand-response#:~:text=Demand%20response%20provides%20an%20opportunity,other%20forms%20of%20financial%20incentives
EX1014	Rui Wang, Nagarajan Kandasamy, Chika Nwankpa, and David R. Kaeli, <i>Datacenters as Controllable Load Resources in the Electricity Market</i> (2013)
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EX1018	Ivy Main, <i>Who's afraid of a Carbon Rule?</i> , POWER FOR THE PEOPLE VA (May 29, 2014), https://powerforthepeopleva.com/2014/05/29/whos-afraid-of-a-carbon-rule/ .
EX1019	Final Order, Application of Appalachian Power Company, Commonwealth of Virginia State Corporation Commission, Case No. PUE-2014-00026 (Nov. 26, 2014).
EX1020	William T. Reisinger, <i>Public Utilities Law</i> , 49 U. RICH. L. REV. 137 (2014).
EX1021	Pitt & Michaud, <i>Assessing the Value of Distributed Solar Energy Generation</i> , 2 CURRENT SUSTAINABLE/RENEWABLE ENERGY REPORTS 105 (July 19, 2015).
EX1022	Pitt & Michaud, <i>Analyzing the Costs and Benefits of Distributed Solar Generation in Virginia</i> , VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY AND THE VIRGINIA DEPARTMENT OF MINES, MINERALS AND ENERGY, https://mdvseia.org/wp-content/uploads/2014/12/SSG-Value-of-Solar-Study-Final-10-31-14.pdf .
EX1023	Pitt & Wang, <i>Optimizing the Grid Integration of Distributed Solar Energy</i> , FINAL PRESIDENTIAL RESEARCH QUEST FUND GRANT REPORT VIRGINIA COMMONWEALTH UNIVERSITY (April 2018).
EX1024	Gilbert Michaud, <i>Community Shared Solar in Virginia: Political and Institutional Barriers and Possibilities</i> , 5 POLITICS BUREAUCRACY AND JUSTICE 6 (2016).
EX1025	<i>Documents List For Case Number: PUE-2014-00026</i> , COMMONWEALTH OF VIRGINIA STATE CORPORATION COMMISSION, https://scc.virginia.gov/DocketSearch#caseDocs/133300 (last accessed Sept. 5, 2023).
EX1026	Revised Draft Virginia S.C.C. Tariff No. 25, Appalachian Power Company (January 14, 2015) Part 1
EX1027	Revised Draft Virginia S.C.C. Tariff No. 25, Appalachian Power Company (January 14, 2015) Part 2

Exhibit No.	Description
EX1028	Revised Draft Virginia S.C.C. Tariff No. 25, Appalachian Power Company (January 14, 2015) Part 3
EX1029	Revised Draft Virginia S.C.C. Tariff No. 25, Appalachian Power Company (January 14, 2015) Part 4
EX1030	Revised Draft Virginia S.C.C. Tariff No. 25, Appalachian Power Company (January 14, 2015) Part 5
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EX1033	<i>Wayback Machine Screen Capture of “Public Comments/Notices”, COMMONWEALTH OF VIRGINIA STATE CORPORATION COMMISSION, https://web.archive.org/web/20140704163506/http://www.scc.virginia.gov/case/PublicComments.aspx (July 4, 2014).</i>
EX1034	Whited et al., <i>Caught in a Fix: The Problem with Fixed Charges for Electricity</i> , SYNAPSE ENERGY ECONOMICS, INC. (Feb. 9, 2016).
EX1035	Letter from Principal Regulatory Consultant William W. Hix to Secretary of the Indiana Utility Regulatory Commission, INDIANA MICHIGAN POWER (May 29, 2014) (https://www.in.gov/iurc/files/3249_052914.pdf).
EX1036	U.S. Patent App. Publication No. 2018/0101220 (“Mahindru”)
EX1037	U.S. Patent App. Publication No. 2015/0371328 (“Gabel”)
EX1038	U.S. Patent App. Publication No. 2018/0356770 (“ElBsat”)

CLAIM LISTING¹

Number	Limitation
[1.0]	1. A system comprising:
[1.1]	a set of computing systems, wherein the set of computing systems is configured to perform computational operations using power from a power grid;
[1.2.0]	a control system configured to: monitor a set of conditions;
[1.2.1]	receive power option data based, at least in part, on a power option agreement,
[1.2.2]	wherein the power option data specify: (i) a set of minimum power thresholds, and (ii) a set of time intervals, wherein each minimum power threshold in the set of minimum power thresholds is associated with a time interval in the set of time intervals;
[1.2.3]	responsive to receiving the power option data, determine a performance strategy for the set of computing systems based on a combination of at least a portion of the power option data and at least one condition in the set of conditions, wherein the performance strategy comprises a power consumption target for the set of computing systems for each time interval in the set of time intervals,
[1.2.4]	wherein each power consumption target is equal to or greater than the minimum power threshold associated with each time interval; and
[1.2.5]	provide instructions to the set of computing systems to perform one or more computational operations based on the performance strategy.
[2.0]	2. The system of claim 1, wherein the control system is configured to monitor the set of conditions comprising:
[2.1]	a price of power from the power grid; and
[2.2]	a plurality of parameters associated with one or more computational operations to be performed at the set of computing systems.
[3.0]	3. The system of claim 2, wherein the control system is configured to:

¹ All claim limitations are presented together here so the Board may easily view them in order and in context.

Number	Limitation
[3.1]	determine the performance strategy for the set of computing systems based on a combination of at least the portion option data, the price of power from the power grid, and the plurality of parameters associated with the one or more computational operations.
[4.0]	4. The system of claim 3, wherein the performance strategy further comprises:
[4.1]	an order for the set of computing systems to follow when performing the one or more computational operations, wherein the order is based on respective priorities associated with the one or more computational operations.
[5.0]	5. The system of claim 4, wherein the performance strategy further comprises:
[5.1]	at least one power consumption target that is greater than a minimum power threshold when the price of power from the power grid is below a threshold price during the time interval associated with the minimum power threshold.
[6.0]	6. The system of claim 1, wherein the control system is further configured to:
[6.1]	receive subsequent power option data based, at least in part, on the power option agreement,
[6.2]	wherein the subsequent power option data specify to decrease one or more minimum power thresholds of the set of minimum power thresholds.
[7.0]	7. The system of claim 6, wherein the control system is further configured to:
[7.1]	responsive to receiving the subsequent power option data, modify the performance strategy for the set of computing systems based on a combination of at least the portion of the subsequent power option data and at least one condition in the set of conditions,
[7.2]	wherein the modified performance strategy comprises one or more reduced power consumption targets for the set of computing systems.
[8.0]	8. The system of claim 7, wherein the control system is further configured to:
[8.1]	provide instructions to the set of computing systems to perform the one or more computational operations based on the modified performance strategy.

Number	Limitation
[9.0]	9. The system of claim 1, wherein the control system is a remote master control system positioned remotely from the set of computing systems.
[10.0]	10. The system of claim 1, wherein the control system is a mobile computing device.
[11.0]	11. The system of claim 1, wherein the control system is configured to receive the power option data while monitoring the set of conditions.
[12.0]	12. The system of claim 1, wherein the control system is further configured to:
[12.1]	provide a request to a qualified scheduling entity (QSE) to determine the power option agreement; and
[12.2]	receive power option data in response to providing the request to the QSE.
[13.0]	13. The system of claim 1, wherein the power option data specify:
[13.1]	(i) a first minimum power threshold associated with a first time interval in the set of time intervals, and
[13.2]	(ii) a second minimum power threshold associated with a second time interval in the set of time intervals, wherein the second time interval is subsequent to the first time interval.
[14.0]	14. The system of claim 13, wherein the control system is configured to: determine the performance strategy for the set of computing systems such that the performance strategy comprises:
[14.1]	a first power consumption target for the set of computing systems for the first time interval, wherein the first power consumption target is equal to or greater than the first minimum power threshold; and
[14.2]	a second power consumption target for the set of computing systems for the second time interval, wherein the second power consumption target is equal to or greater than the second minimum power threshold.
[15.0]	15. The system of claim 1, wherein a total duration of the set of time intervals corresponds to a twenty-four hour period.
[16.0]	16. The system of claim 1, wherein the set of conditions monitored by the control system further comprise:
[16.1]	a price of power from the power grid; and

Number	Limitation
[16.2]	a global mining hash rate and a price for a cryptocurrency; and
[16.3]	wherein the control system is configured to: determine the performance strategy for the set of computing systems based on a combination of at the portion of the power option data, the price of power from the power grid, the global mining hash rate and the price for the cryptocurrency,
[16.4]	wherein the performance strategy specifies for at least a subset of the set of computing systems to perform mining operations for the cryptocurrency when the price of power from the power grid is equal to or less than a revenue obtained by performing the mining operations for the cryptocurrency.
[17.0]	17. A method comprising:
[17.1]	monitoring, by a computing system, a set of conditions;
[17.2]	receiving, at the computing system, power option data based, at least in part, on a power option agreement,
[17.3]	wherein the power option data specify: (i) a set of minimum power thresholds, and (ii) a set of time intervals, wherein each minimum power threshold in the set of minimum power thresholds is associated with a time interval in the set of time intervals;
[17.4]	responsive to receiving the power option data, determining a performance strategy for a set of computing systems based on a combination of at least a portion of the power option data and at least one condition in the set of conditions, wherein the performance strategy comprises a power consumption target for the set of computing systems for each time interval in the set of time intervals,
[17.5]	wherein each power consumption target is equal to or greater than the minimum power threshold associated with each time interval; and
[17.6]	providing instructions to the set of computing systems to perform one or more computational operations based on the performance strategy.
[18.0]	18. The method of claim 17, wherein determining the performance strategy for the set of computing systems comprises:
[18.1]	identifying information about the set of computing systems; and
[18.2]	determining the performance strategy to further comprise instructions for at least a subset of the set of computing systems to operate at an increased frequency based on a combination of at least the portion of the power option data and the information about the

Number	Limitation
	set of computing systems.
[19.0]	19. The method of claim 17, further comprising:
[19.1]	receiving subsequent power option data based, at least in part, on the power option agreement,
[19.2]	wherein the subsequent power option data specify to decrease one or more minimum power thresholds of the set of minimum power thresholds;
[19.3]	responsive to receiving the subsequent power option data, modifying the performance strategy for the set of computing systems based on a combination of at least the portion of the subsequent power option data and at least one condition in the set of conditions,
[19.4]	wherein the modified performance strategy comprises one or more reduced power consumption targets for the set of computing systems; and
[19.5]	providing instructions to the set of computing systems to perform the one or more computational operations based on the modified performance strategy.
[20.0]	20. A non-transitory computer readable medium having stored therein instructions executable by one or more processors to cause a computing system to perform functions comprising:
[20.1]	monitoring a set of conditions;
[20.2]	receiving power option data based, at least in part, on a power option agreement,
[20.3]	wherein the power option data specify: (i) a set of minimum power thresholds, and (ii) a set of time intervals, wherein each minimum power threshold in the set of minimum power thresholds is associated with a time interval in the set of time intervals;
[20.4]	responsive to receiving the power option data, determining a performance strategy for a set of computing systems based on a combination of at least a portion of the power option data and at least one condition in the set of conditions, wherein the performance strategy comprises a power consumption target for the set of computing systems for each time interval in the set of time intervals,
[20.5]	wherein each power consumption target is equal to or greater than the minimum power threshold associated with each time interval; and
[20.6]	providing instructions to the set of computing systems to perform

Number	Limitation
	one or more computational operations based on the performance strategy.

I. INTRODUCTION

OBM, Inc. (“OBM”) and Cholla Energy LLC (collectively, “Petitioners”) respectfully request *Inter Partes* Review (“IPR”) of U.S. Patent No. 10,608,433 (“the ’433 Patent”) (EX1001) and the cancellation of claims 1-20 (the “Challenged Claims”) under (AIA) 35 U.S.C. § 103. The Challenged Claims relate to demand response programs that have long been available to shift and shed electricity demand and, thus, should be held unpatentable.

II. MANDATORY NOTICES

A. Real Parties-in-Interest

The real parties-in-interest are OBM, Inc. and Cholla Energy LLC.

B. Related Matters

The ’433 Patent is the subject of a pending litigation styled *OBM, Inc. v. Lancium LLC*, 4:23-cv-01798 (S.D. Tex.), served on Lancium on May 19, 2023. In the litigation, OBM is seeking a declaratory judgment that it does not infringe the ’433 Patent. At present, invalidity of the ’433 Patent is not at issue.

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D. Service Information

Petitioners consent to service by electronic mail to lead and back-up counsel at the e-mail addresses listed above.²

III. PAYMENT OF FEES

Petitioners authorize the Office to charge the fees specified by 37 C.F.R. §§42.203(a), 42.15(b) to Deposit Account 09-0528 as well as any additional fees that might be due in connection with this Petition.

IV. CERTIFICATION

Petitioners certify that the '433 Patent is available for *inter partes* review and that Petitioners are not barred from requesting review.

V. IDENTIFICATION OF CHALLENGE AND RELIEF REQUESTED

Petitioners request that the Board initiate review of claims 1-20 of the '433 Patent on the following grounds:

Ground	Claims	Basis
1	1-12, 17, 19, and 20	Obvious under 35 U.S.C. §103 over Montalvo in view of APC-Tariff
2	13-15	Obvious under 35 U.S.C. §103 over Montalvo in view of APC-Tariff and Day
3	16 and 18	Obvious under 35 U.S.C. §103 over

² For purposes of this IPR, the Petitioner parties have designated a lead counsel as a commitment to act as a single entity in the proceeding. This designation is not a representation of an attorney-client relationship.

Ground	Claims	Basis
		Montalvo in view of APC-Tariff and Sowell

Additional support is set forth in EX1003, the Declaration of Andres E. Carvallo, whose testimony is offered as evidence of the knowledge that one of ordinary skill in the art would have possessed at the time of the claimed invention.

VI. OVERVIEW OF THE TECHNOLOGY

A. Background

Independent System Operators (“ISOs”) and Regional Transmission Organizations (“RTOs”) are responsible for coordinating, controlling and monitoring the U.S. electricity grid in specific geographic areas. EX1003, ¶¶20-21. For instance, PJM Interconnection LLC (“PJM”) is a RTO that coordinates the movement of wholesale electricity in several states including, for example, Pennsylvania and Virginia. *Id.*, ¶22.

ISOs/RTOs interface with local utility companies to regulate the grid and deliver power to end users. For example, Appalachian Power Company (“APC”) is an investor-owned utility company in PJM’s jurisdiction that serves local areas including parts of Virginia. EX1005, 2, 7-10. APC is regulated by Virginia’s State Commission Corporation (“SCC”). *Id.*, 11.

For the grid to function properly, ISOs/RTOs maintain a real-time equilibrium between energy supply and demand with the utilities. EX1003, ¶21.

Striking this balance can be challenging, particularly when the collective amount of energy demanded by end-users exceeds the available supply, resulting in brownouts or possibly blackouts. *Id.*, ¶¶22-26. In an effort to combat these occurrences, many ISOs/RTOs have historically offered demand response programs that compensate end-users for reducing electricity usage when the price of power is high or when reliability of the grid is threatened, and have taken “curtailment” actions to reduce the demand for power on the grid. *Id.*, ¶¶27-35.

B. The '433 Patent

The '433 Patent is directed to systems for adjusting power consumption based on a power option agreement. EX1001, 6:43-6:65. Figure 12 below depicts a graph representing power option data based on a power option agreement. *Id.*, 50:53-55. Graph 1200³ shows power option data arranged according to power 1204 over time 1202, which differ based on the power option agreement. *Id.*, 50:55-56, 62-65.

³ All emphasis and color annotations added unless otherwise indicated.

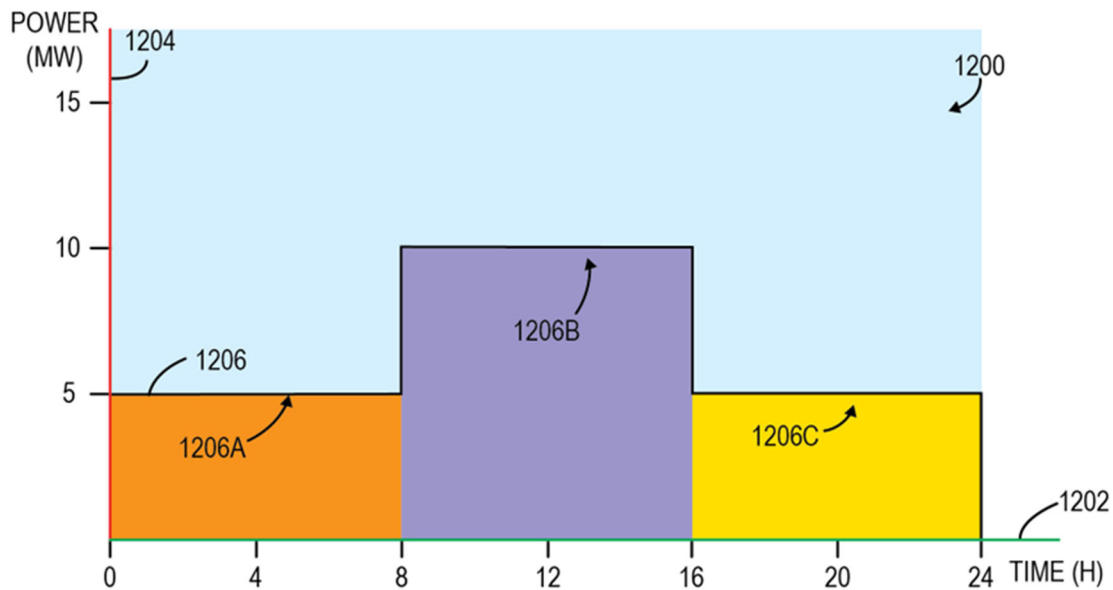


FIGURE 12

Line **1206** represents a set of minimum power thresholds (**1206A**, **1206B**, **1206C**) specified by power option data based on the power option agreement, (EX1001, 50:66-51:1), and is used to illustrate power consumption levels that load(s) operating according to the power option agreement may utilize during the 24-hour duration. *Id.*, 51:8-12. The power quantities above the graph line **1206** (light blue) represent power levels that the load(s) may consume from the power grid during the 24-hour duration that would satisfy the requirements set forth by the power option agreement. *Id.*, 51:12-17. In particular, the power quantities above graph line **1206** include any power quantity that meets or exceeds the minimum power threshold at that time. *Id.*, 51:17-19. The power quantities below the graph line **1206** (orange, purple, and yellow) represent the amount of power

that the load could be directed to reduce power consumption by per the power option agreement. *Id.*, 51:19-23, EX1003 ¶37-46.

C. Prosecution History

The application for the '433 Patent was filed on December 4, 2019, with a Track One request. EX1002, 1, 4. On January 27, 2020, the Examiner issued a Notice of Allowance without issuing an Office Action. *Id.*, 17. Montalvo (EX1004) and secondary references APC-Tariff (EX1005) and Day (EX1006) were not cited during prosecution. Sowell (EX1007), which is only relied on herein for a limitation found in two dependent claims, was cited in an information disclosure statement but was not discussed by the Examiner. EX1002, 11; EX1003, ¶36.

D. Prior Art

i. Montalvo

U.S. Patent Publication No. 2010/0088261 (“Montalvo”) was filed on October 8, 2009 and published on April 4, 2010, and thus qualifies as prior art under at least 35 U.S.C. §102(a)(1)-(2). Montalvo discloses a system for fully-automated demand response that reduces KW demand at end users who are supplied electricity over an electrical power grid upon the occurrence of a demand response event (“DR event”). EX1004, ¶[0041]. Montalvo further explains that the end users of the system enter into demand response agreements (“DR Agreements”) with ISOs, Energy Curtailment Service Providers (“ECSPs”) and/or

utility companies, who provide for the supply of electricity to the end users to reduce KW demand for DR event(s), and that the demand reduction actions are automatically implemented at the end users, per the terms of the DR Agreements. *Id.* EX1003, ¶47-55.

ii. APC-Tariff

Appalachian Power Company Tariff (“APC-Tariff”) is a certified copy of a revised tariff document associated with a public record of the Virginia State Corporation Commission (“SCC”), filed January 14, 2015 and made available pursuant to a Final Order dated November 26, 2014 in case number PUE-2014-00026. EX1005, 1; EX1016, 1; EX1019, 47; EX1025, 1.

Prior to PUE-2014-00026 being heard, the SCC gave public notice on its website. EX1019, 1; EX1033, 4; *see also* EX1017, 2; EX1018, 7; EX1020, 18, 22; EX1022, 17, 66; EX1025, 2. The Final Order after the hearing required that APC-Tariff be available “for public inspection in person and on the Commission’s website: <http://www.scc.virginia.gov/case>,” without an expectation of confidentiality or limitation. EX1019, 47. Pursuant thereto, a revised tariff document comprising six parts was filed on “01/14/2015” and made publicly available. EX1019, 47; EX1025, 1; EX1026-EX1031. The six parts correspond to the certified APC-Tariff. *See generally* EX1005. Because of notice and availability, persons of skill in the art (“POSA”) accessed and cited to the record of PUE-2014-

00026 in various energy related papers prior to the '433 Patent's earliest possible date. EX1021, 2, 7; EX1023, 62; EX1024, 19; EX1034, 47.

Thus, APC-Tariff was publicly available for in person inspection and on the SCC website as early as January 14, 2015. Further, the public was put on notice of PUE-2014-00026, the record including APC-Tariff. Finally, a POSA exercising reasonable diligence could easily obtain copies with no reasonable expectation of confidentiality or limitation. Accordingly, APC-Tariff qualifies as a printed publication and as prior art to the '433 Patent under at least 35 U.S.C. §102(a)(1)-(2). *See In re Klopfenstein*, 380 F.3d 1345, 1351 (Fed. Cir. 2004).

APC-Tariff is directed to the standard rate schedule and the terms and conditions of service governing APC's sale of electricity in Virginia. EX1005, 4; EX1003, ¶57. APC-Tariff describes the availability of demand response programs that APC offers to its end users, such as its Peak Shaving and Emergency Demand Response ("PSEDR") program. EX1005, 221. Program participants *must* have the ability to curtail load as set out by the provisions of the PSEDR schedule. *Id.* Participants further must "contract for a definite amount of PSEDR capacity, not to exceed the customer's normal demand capable of being curtailed." *Id.*; EX1003, ¶58. APC may also request customers to curtail their load when an Emergency Mandatory Load Management Reduction Action has been issued by PJM. EX1005,

221. The *minimum PSEDR capacity* that a customer is required to have under the PSEDR schedule is 100 kW. *Id.*, 222; EX1003, ¶56-61.

iii. Day

U.S. Patent Publication No. 2016/0329708 (“Day”) was filed on May 5, 2015 and published on November 10, 2016, and thus qualifies as prior art to the ’433 Patent under at least 35 U.S.C. § 102(a)(1)-(2).

Day is generally directed towards an electric load curtailment nominating system for a load facility. EX1006, ¶[0009]. The load nomination system includes a user interface configured to enable the plant engineer to define the load facility’s anticipated loads for the coming day, on an hour-by-hour basis. EX1006, ¶[0037]; EX1003, ¶¶62-65.

iv. Sowell

U.S. Patent Publication No. 2019/0318327 (“Sowell”) was filed on April 11, 2018 and published on October 17, 2019, and thus qualifies as prior art to the ’433 Patent under at least 35 U.S.C. §102(a)(2).

Sowell describes a system for using a blockchain marketplace that includes a distribution of hashing commands amongst available nodes and/or resources to mine such hashing commands. EX1007, ¶[0084]. The blockchain marketplace may provide recommendations to the miner as to which offers provide the greatest return on investment. *Id.* The blockchain marketplace further can forecast and

project revenue and recommend which blockchain to pursue. *Id.*, ¶[0087]; EX1003, ¶66-72.

VII. LEVEL OF ORDINARY SKILL IN THE ART

A POSA at the time of the claimed invention would have a degree in mechanical engineering, electrical engineering, or a similar field with at least 2 years of experience with power generation systems or other comparable hands-on experience. Additional education could substitute for professional experience, or vice versa. EX1003, ¶13.

VIII. CLAIM CONSTRUCTION

In *Bearbox LLC v. Lancium LLC*, 1:21-cv-00534-GBW-CJB (D. Del.), the Court construed “power option agreement” as “an agreement between a power entity associated with the delivery of power to a load and the load, wherein the load provides the power entity with the option to reduce the amount of power delivered to the load up to an agreed amount of power during an agreed upon time interval such that the load must use at least the amount of power subject to the option during the time interval unless the power entity exercises the option.” EX1008, 1. The Court construed “minimum power threshold” as “a minimum amount of power a load must use during an associated time interval.” *Id.* For this proceeding only, Petitioners do not contest these constructions.

IX. THE CHALLENGED CLAIMS ARE UNPATENTABLE UNDER 35 U.S.C. §103

A. GROUND 1: Claims 1-12, 17, 19 and 20 are rendered obvious over Montalvo in view of APC-Tariff.

i. Motivation to Combine

A POSA would have been motivated to combine Montalvo and the APC-Tariff for several reasons.

APC-Tariff and Montalvo are in the same field of endeavor of the '433 Patent. The '433 Patent states that the “specification relates to power consumption adjustments when using grid power and/or intermittent behind-the-meter power.” EX1001, 1:16-18. The Challenged Claims focus on a set of computing systems that use power from a power grid, and a control system that monitors conditions, receives power option data based on a power option agreement, determines a performance strategy based on the monitored conditions and power option data, and provides instructions to the computing systems based on the performance strategy. *Id.*, 59:2-28 (claim 1). Thus, the '433 Patent is in the field of adjusting power consumption for loads to maintain the integrity of a power grid. EX1003, ¶¶74-75.

Montalvo describes an approach for curtailing energy demand to maintain the stability of a power grid. EX1004, ¶[0002]. Montalvo achieves this via a fully-automated energy demand curtailment system that communicates monitoring data

between monitored devices (such as computing systems) and demand response (DR) agreements. EX1004, ¶¶[0026], [0041]. Thus, Montalvo is in the same field of endeavor of adjusting power consumption for loads to maintain the integrity of the power grid. EX1003, ¶76.

APC-Tariff explains that “optional rider PSEDR [Peak Shaving and Emergency Demand Response Rider]” is focused on demand response end users that will be enrolled in PJM’s demand response program through the Company. EX1005, 221. APC-Tariff sets the minimum power consumption threshold necessary to contract with the company to participate in the demand response program. *Id.* Thus, APC-Tariff is in the same field of endeavor of adjusting power consumption for loads to maintain the integrity of the power grid. APC-Tariff is also reasonably pertinent to the problem the ’433 Patent is addressing, that of grid stability/integrity. EX1003, ¶77.

Montalvo describes automated energy curtailment for end users to reduce energy demand during demand response events dictated by DR agreements with ISOs, ECSPS and/or utility companies. EX1004, ¶[0041]. Montalvo explains that the DR agreements “set forth the amount of electrical load to be reduced, and when such load will be reduced, for a DR event(s) by the respective end users.” *Id.*, ¶[0003]. Further, Montalvo explains that “ISOs ... typically require that an end user have the capability of reducing at least about 100 KW-200 KW demand

during a DR event” to even be allowed to become a party to a DR agreement. *Id.*, ¶[0022]. But Montalvo does not provide sample agreement terms citing specific tariffs, for example. EX1003, ¶78.

A POSA would have been motivated to turn to APC-Tariff, which provides detail about what certain aspects of a DR agreement look like. Particularly, APC-Tariff includes the “Optional Rider PSEDR,” which describes the terms of participation in the Company’s demand response program. EX1005, 221. APC-Tariff includes the conditions of service, defines how customer baseline load is calculated, how curtailed load is calculated, how credits are determined, and terms for non-compliance. *Id.*, 221-225. A POSA would have been motivated to turn to APC-Tariff for insight into the implementation details for a contract rider to participate in a demand response program, particularly with respect to the “DR Agreements” taught in Montalvo which are, themselves, contracts for demand response participation. EX1003, ¶79.

Further, APC-Tariff is a tariff approved by Virginia for use in 2015. EX1005, 2-3. APC-Tariff, in its demand response rider, explains that contracting with APC for demand response enrolls the participant in the PJM demand response program through the Company. *Id.*, 221. Montalvo recognizes that DR Agreements would typically involve utilities in various ISOs, and gives as a specific example PJM serving east coast states including Virginia. EX1004, ¶[0004]. Thus, a POSA

would have had a reasonable expectation of success in combining APC-Tariff with Montalvo, since both envision operation within PJM, with APC-Tariff being nothing more than an implementation detail for the general DR Agreements taught by Montalvo. EX1003, ¶¶79-80.

A POSA would have further been specifically motivated to combine APC-Tariff's minimum power consumption requirements with Montalvo's teaching of a minimum KW reduction in demand requirement. For example, APC-Tariff teaches that "[e]ach customer electing to participate in the program shall contract for a definite amount of PSEDR capacity, not to exceed the customer's normal demand capable of being curtailed." EX1005, 221. Similarly, Montalvo teaches that ISOs, such as PJM of which APC is a part, require being able to reduce at least 100 KW to 200 KW in load to participate. EX1004, ¶[0022]. APC-Tariff, therefore, provides a specific teaching demonstrating the knowledge a POSA would have from Montalvo's requirement, that an end user must be consuming at least the amount of load for which the end user contracts to curtail. EX1003, ¶81.

Beyond APC-Tariff demonstrating what a POSA would have understood a DR Agreement to provide as a contract term (i.e., contracting for a definite amount of demand) from Montalvo's teachings, a POSA would be motivated to turn to APC-Tariff to obtain the benefits outlined in the rider for participation in the DR program. *E.g.*, EX1005, 223-225 (credits from participation). Indeed, combining

APC-Tariff with Montalvo would be nothing more than the combination of known elements (Montalvo's DR Agreements with minimum requirements for participation, and APC-Tariff's contract minimum requirement) according to known methods (using Montalvo's implementation of DR Agreements for load reduction, with APC-Tariff's minimum participation requirement) to yield the predictable result of loads consuming at least the contracted-for amount in order to be able to curtail up to that contracted-for amount. EX1003, ¶82.

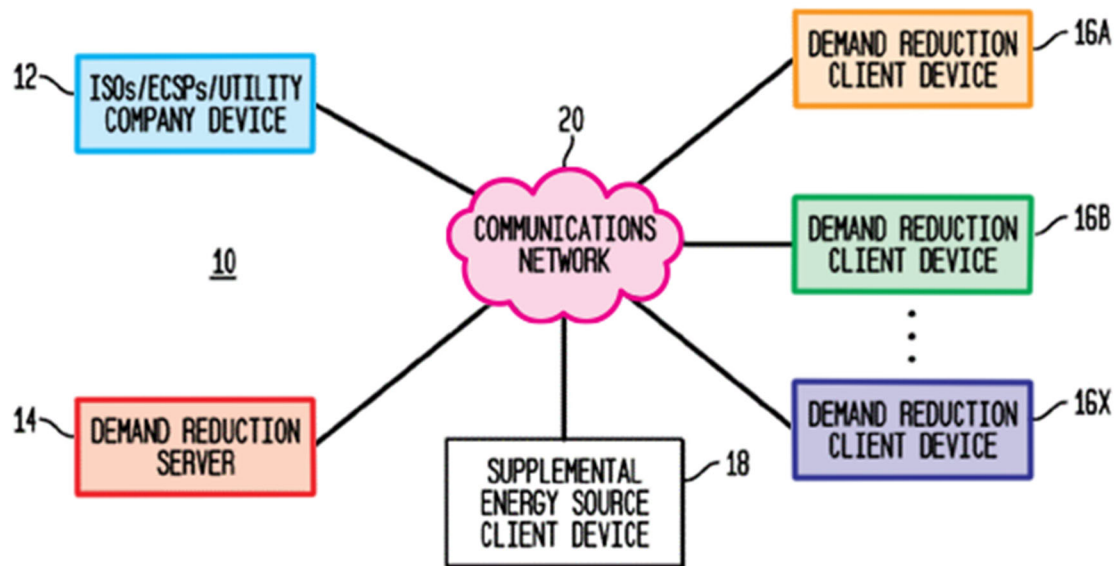
ii. Claims 1, 17, and 20

Montalvo in view of the APC-Tariff renders obvious all limitations of independent claims 1, 17, and 20. EX1003, ¶83.

a) [1.0], [17.0], [20.0]

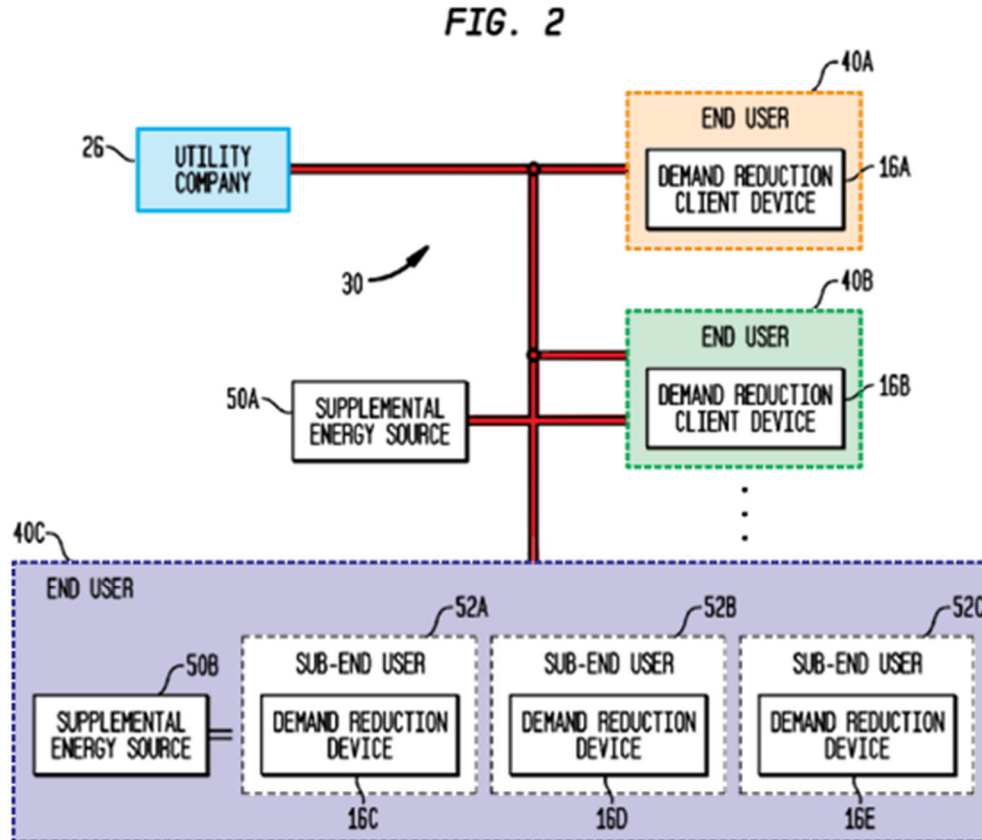
To the extent the preambles are limitations, Montalvo discloses an “inventive system and method” that implements demand response actions to reduce end user KW demand. EX1004, ¶[0041]. Montalvo's Figure 1 “is an exemplary system” of the demand response system. EX1004, ¶[0055], FIG. 1:

FIG. 1



EX1003, ¶84.

The system 10 includes “a computer 12, a demand reduction server computer (‘DR server’) 14, demand reduction client devices (‘DR clients’) 16A, 16B, and 16X.” *Id.* In particular, as illustrated in Figure 2, Montalvo discloses a utility company 26 that supplies electrical power over a power grid to the end users 40A, 40B, and 40C that include the demand reduction client devices 16:



EX1004, ¶[0057]; EX1003 ¶85.

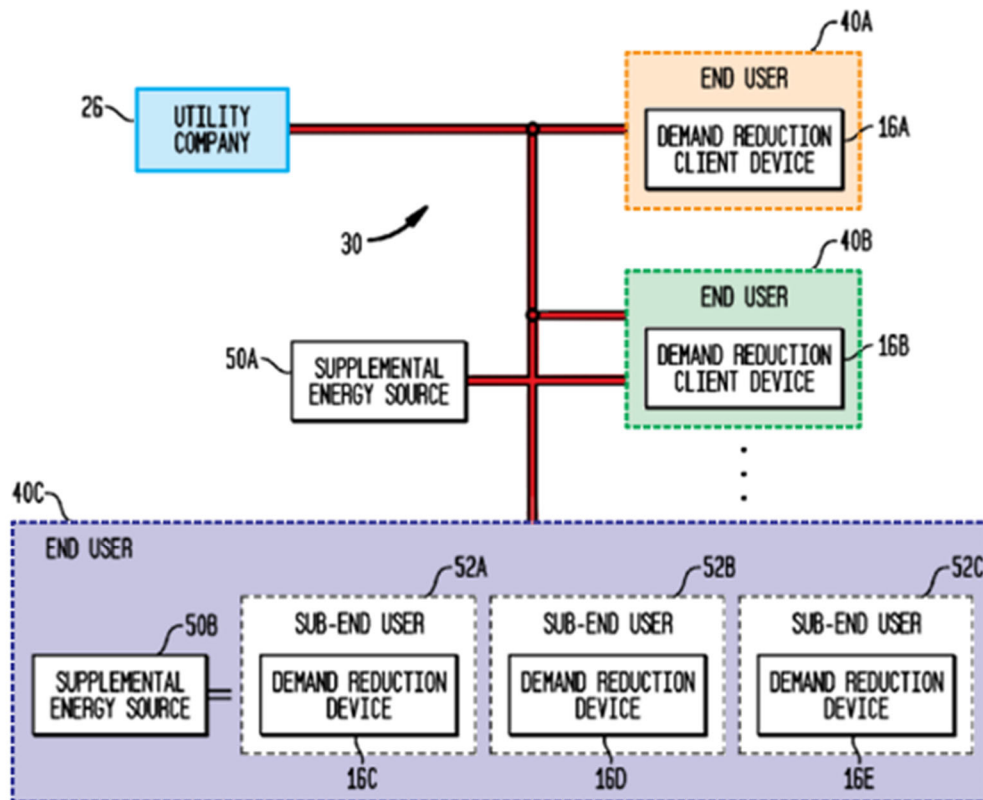
Montalvo illustrates an example of the method in Figure 5. EX1004, ¶[0036]. Montalvo further discloses a non-transitory computer readable medium having stored therein instructions executable by one or more processors to cause a computing system to perform functions for the overall system disclosed in Figures 1 and 2, including the method of Figure 5. *Id.*, ¶¶[0055], [0060-0065], [0075]-[0079] (instructions for execution by processors), [0084]-[0091] (similar, for DR clients). EX1003 ¶¶83-86.

b) [1.1]

Montalvo discloses a set of computing systems, wherein the set of computing systems is configured to perform computational operations using power from a power grid. EX1003 ¶87.

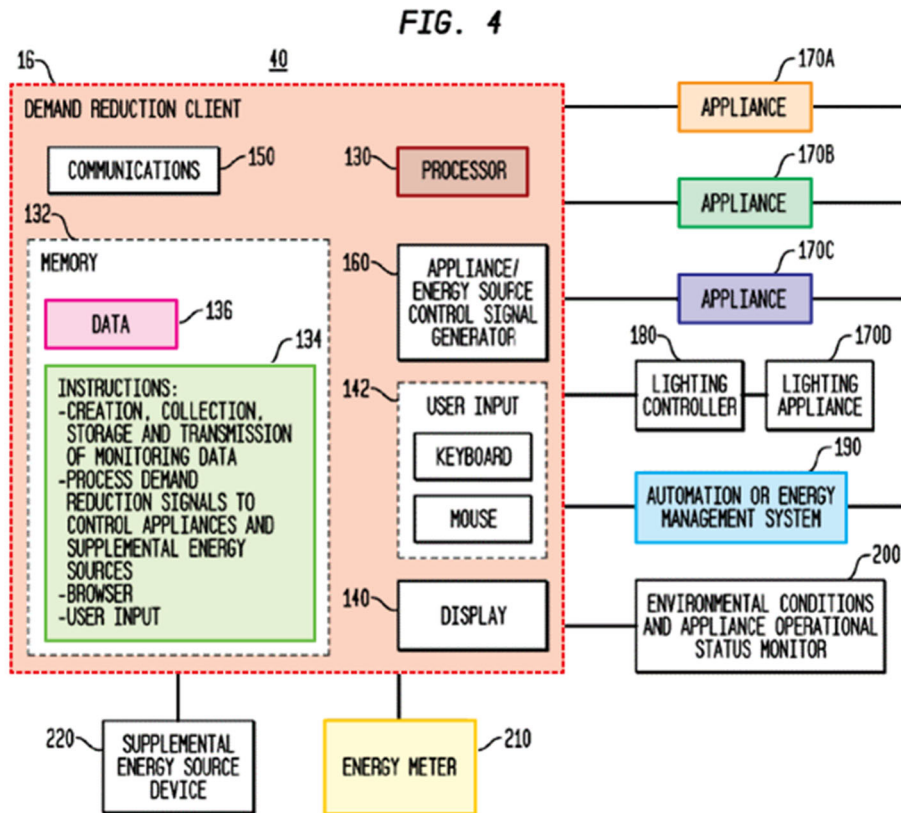
As demonstrated with the Preambles, Montalvo's system includes a DR server, computer, and DR clients. EX1004, ¶[0055]; Figs. 1 and 2. The DR clients "for purposes of the exemplary illustrated embodiments are computers." *Id.*; *see also* ¶[0084] (DR clients **16** can be personal computers). Montalvo further discloses that each of the computers (including DR server **14**, computer **12**, and DR clients **16**) "has communication capabilities and may be communicatively coupled to a communications network **20**." *Id.*, ¶[0055]; EX1003 ¶88. This includes the DR server and DR clients transmitting and receiving electronic messages between each other to implement demand response at end users per the terms of DR Agreements. *Id.*, ¶[0056]; EX1003 ¶89. The DR clients **16** monitor data from end user appliances, transmit that data to a DR server **14**, receive commands from the DR server, and send appropriate control signals to the end user appliance(s) in response to those commands. EX1003 ¶89; EX1004, ¶¶[0056], [0086], [0099], [0122]-[0125]; *see also* Figure 2:

FIG. 2



Montalvo’s “appliances 170” disclose the “*set of computing systems*” A DR client “is electrically and/or communicatively connected to appliances 170.” EX1004, ¶[0082]; EX1003, ¶90. Appliances are “any device of an end user that consumes electrical power to operate, such as a computer.” EX1004, ¶[0044]; EX1003 ¶90. The DR actions that may be taken include “reducing or eliminating consumption of electricity from the power grid at an appliance(s) of the end user.” EX1004, ¶[0054]; EX1003, ¶90. Indeed, Montalvo describes a DR action impacting such appliances at “a computer operation center” where operations usually need to be operating continuously, which a POSA would understand to mean that the

appliances include multiple computers performing computing operations, such as at a data center. EX1003, ¶¶91; EX1004, ¶¶[0074]; *see also* Figure 4:

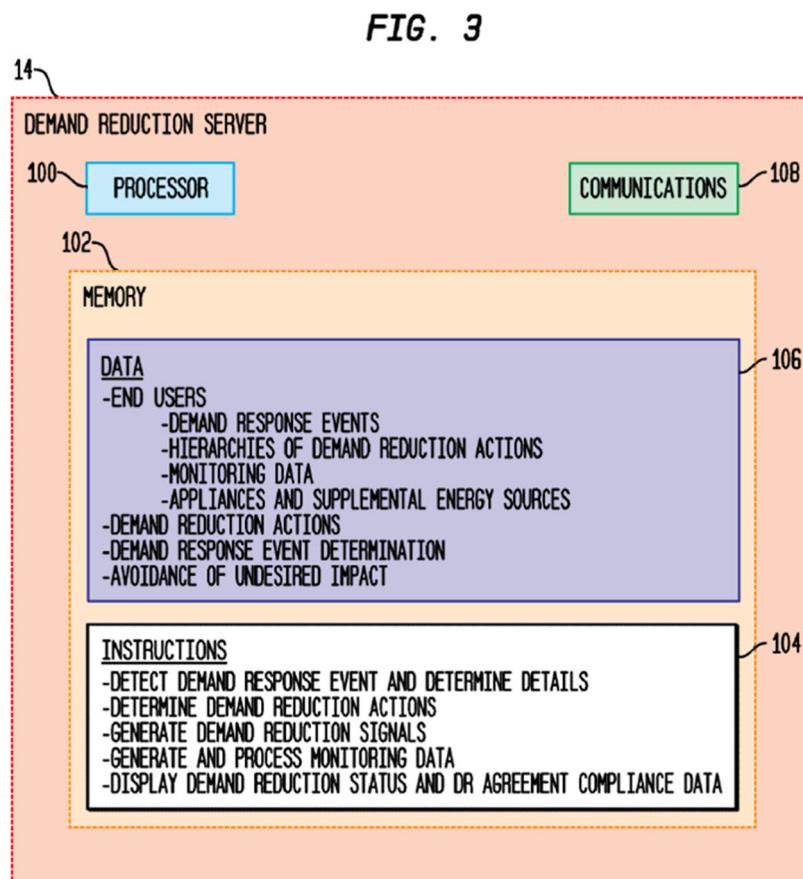


Finally, Montalvo discloses that the appliances “consume electrical power supplied over the electrical power grid.” EX1004 ¶¶[0044]. Thus, the “appliances” (computing systems) use power from a power grid for their computational operations. EX1003, ¶¶87-92. *Id.*

c) [1.2.0], [17.1], [20.1]

Montalvo discloses a control system configured to monitor a set of conditions. EX1003, ¶¶93.

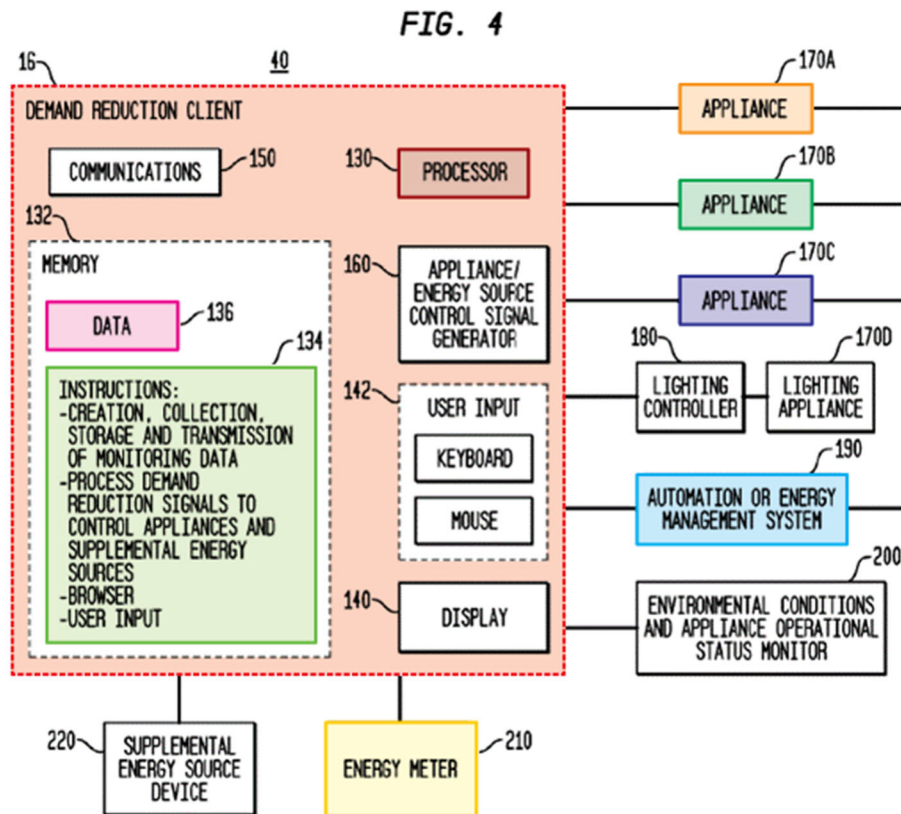
Montalvo's DR server **14** and DR client **16**, independently or in combination, are examples of a “*control system*.” EX1003 ¶94. The DR server includes “a processor **100**, a memory **102**, a communications network interface device **108** and other components typically present in a general purpose computer.” EX1003, ¶95; EX1004, ¶[0060]; *see also* FIG. 3:



The DR server **14**'s memory **102** stores data including “information describing the terms of DR Agreements between end users and an ISO, utility company and/or ECSP” for DR goals. EX1004, ¶[0068]. The memory further

stores “monitoring data” for each end user to determine what “demand reduction action” should be “taken for a DR event.” *Id.*, ¶[0069]. Monitoring data includes “[a]pppliance operation data,” such as end user power consumption, energy device operation information (including historical and real-time energy generation data), interior environmental data (such as temperature within a facility), appliance operation data (including status or mode of operation), electricity pricing limits, and supplemental energy sources, among other data. *Id.*, ¶¶[0047]-[0051], [0069]-[0071], [0152] (price of power consumed). EX1003, ¶96.

These are analogous to various conditions monitored in the ’433 Patent, including “monitored power system conditions” (e.g., amount of power generated from different energy sources), environment conditions, and economic conditions (e.g., price of power, availability of power, sources of power). EX1001, 20:40-55, 24:61-66, 35:57-62, 54:41-52. Any two or more of the examples from Montalvo, together, constitute a “*set of conditions*”; additionally, the same data type from multiple DR clients **16** (and corresponding appliance(s)) together also constitutes a “*set of conditions*.” EX1003, ¶97.



The DR client 16 (above), which sends the monitoring data to the DR server 14, similarly includes a processor, a memory containing instructions, and monitoring data for one or more appliances. EX1004, ¶[0084], FIG. 4. The DR client 16 is electrically and/or communicatively connected to appliances 170, appliance operating status monitor 200, and electrical power consumption meter 210. EX1004, ¶¶[0082]-[0083]. The DR client 16 creates monitoring data from information supplied/acquired to the DR client 16 from the monitor 200, the meter 210, and/or the appliances 170. *Id.*, ¶[0086]; *see also id.* ¶[0102] (monitoring data continuously created at DR client 16). The monitoring data is “transmitted, in real

time or substantially real time,” to the DR server **14**. *Id.*; *see also id.* ¶[0102], Figures 6-9 (inputs to DR client device from different appliances). The DR server **14** “continuously evaluates the monitoring data” thus acquired (by the server **14**’s processor 100). *Id.*, ¶[0128]. With this monitoring/evaluation, the DR server **14** “generates, and transmits over the network **20**, a demand reduction action signal to implement the demand reduction action(s)” the DR server **14** previously decided upon. *Id.*, ¶[0122]. Thus, the DR server and DR client, independently or in combination, serve as a “*control system*” that monitors the “*set of conditions.*” EX1003, ¶¶93-98.

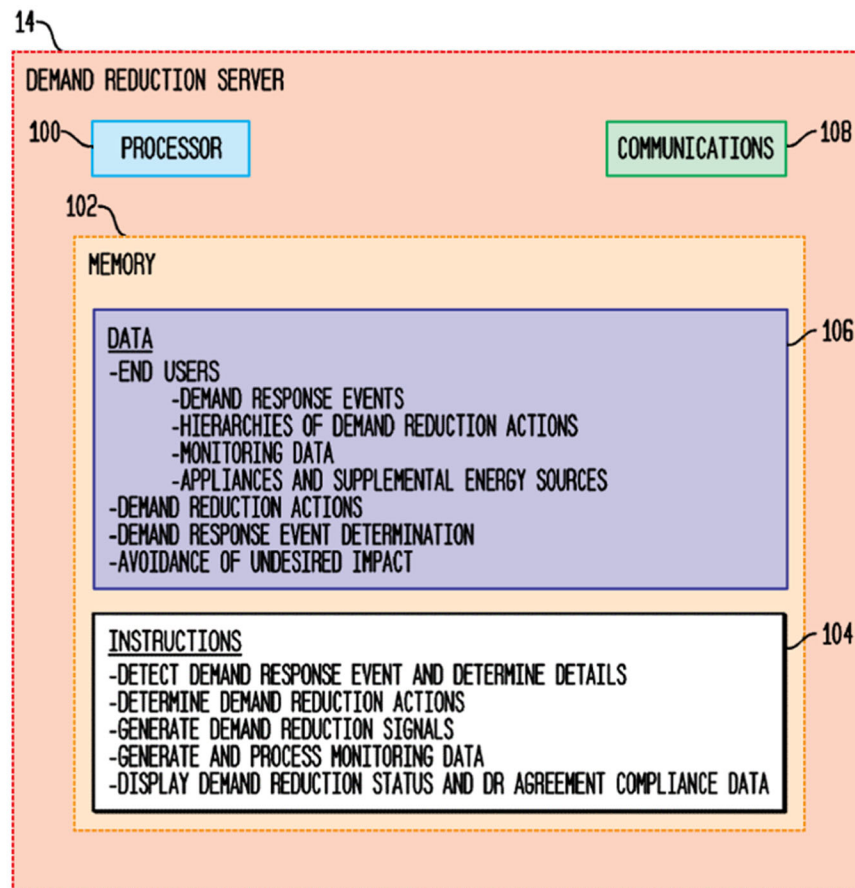
d) [1.2.1], [17.2], [20.2]

Montalvo discloses the control system configured to receive power option data based, at least in part, on a power option agreement. EX1003, ¶99.

Upon the occurrence of a demand response event (“DR event”), Montalvo’s system employs fully-automated demand response actions to reduce KW demand at end users. *Id.*, ¶[0041]. The end users in Montalvo have entered into DR Agreements with ISOs, ECSPS, and/or utility companies, to automatically reduce KW demand for DR event(s) per the terms of the DR Agreements. *Id.* The DR Agreements “set forth the amount of electrical load to be reduced, and when such load will be reduced, for a DR event(s) by the respective end users.” *Id.*, ¶[0003]. Montalvo further discloses that, for end users enrolled in DR Agreements, ISOs

and/or their affiliates transmit electronic message data via a computer over a communications network to the DR server and the DR clients. *Id.*, ¶[0056]; FIG. 3 (below); EX1003, ¶100.

FIG. 3



The data in Montalvo’s DR server includes information describing the terms of DR Agreements between end users and an ISO, utility company and/or ECSP to achieve KW demand reduction goals for particular DR events set forth in the DR Agreement. EX1004, ¶[0068]. For each DR Agreement, the DR Agreement data “describes those demand response events for which the end user agrees to reduce

KW demand by implementation of one or more demand reduction actions [and] the demand reduction actions that the end user agrees may be implemented for a specific DR event” *Id.*, ¶[0068]; EX1003, ¶101.

Montalvo teaches the computer **12**, “operated by ISOs and/or their affiliates, such as ECSPs, utility companies,” transmitting “electronic message data to the DR server **14** and the DR clients **16**.” *Id.*, ¶[0056]; *see also* ¶[0075]. This is received without first passing through DR client(s) **16** (*e.g. id.*, ¶[0056]), or after receipt by DR client(s) **16**. *See id.*, ¶[0099]. The electronic message data describes or indicates a “DR event” and DR event details (such as “timing and demand load reduction requirements”). *Id.*, ¶[0075]. Thus, the “electronic message data” discloses “*power option data*.” EX1003, ¶102.

The electronic message data is “*based on*” the DR agreement (*e.g.*, “*power option agreement*”). The instructions and data **106** in Montalvo’s DR server **14** enable the processor **100** to determine, “from the *received*, electronic message data, the details of the DR event, such as the start time, stop time and how much KW demand is to be reduced during, and also at what times during, the event.” *Id.*, ¶[0073]. The DR client similarly includes instructions **134** that the processor **130** may execute to process data included in demand reduction action signals received from the DR server and/or that the processor **130** execute to process signals and/or

electronic data received from an ISO, utility company and/or ECSP. *Id.*, ¶¶[0087]-[0088]. EX1003, ¶103.

The DR server's processor "determine[s] one or more demand reduction actions to be implemented for a detected DR event at an end user, *based on the end user DR Agreement data 106 included in the memory 102.*" *Id.*, ¶[0076]. Thus, Montalvo's control system is "*configured to receive power option data based, at least in part, on a power option agreement.*" EX1003, ¶¶99-104.

e) [1.2.2], [17.3], [20.3]

Montalvo combined with APC-Tariff renders obvious the power option data of Montalvo specify: (i) a set of minimum power thresholds (or "minimum amount of power a load must use during an associated time interval"), and (ii) a set of time intervals, wherein each minimum power threshold in the set of minimum power thresholds is associated with a time interval in the set of time intervals. EX1003, ¶105.

Montalvo teaches that the demand reduction (DR) server stores the "data **106**" that describes the demand response *events* to which the end user has agreed to perform a demand reduction action, as well as the demand reduction *actions* the end user has agreed to perform in response to particular DR events. EX1004, ¶[0068]. Montalvo also teaches that the information in the data **106** kept at the DR server enables the DR server's processor to determine the details for DR events

“such as the start time, stop time and how much KW demand is to be reduced during, and also at what times during, the event.” *Id.*, ¶[0073]. This information arises from the “terms of DR agreements between end users and an ISO, utility company and/or ECSP to achieve KW demand reduction goals” and the electronic message data. *Id.*, ¶[0068]; EX1003, ¶106.

Montalvo teaches that ISOs (*e.g.*, PJM), utility companies, and/or ECSPs enter into DR Agreements with end users. *Id.*, ¶[0003]. Montalvo further notes that these entities typically require that an end user have the capability of reducing at least about 100 KW-200 KW demand during a DR event to become a party to these DR agreements. *Id.*, ¶[0022]. EX1003, ¶107

It would have been obvious to a POSA that Montalvo’s minimum demand reduction requirements imposed for an end user to enter into a DR agreement correspond to a commitment for the minimum amount of power the end user will use in order to be able to curtail the promised amount. EX1003, ¶108. This was well-understood by POSAs to be a requirement for entering into DR agreements. *Id.*

APC-Tariff’s teachings combined with Montalvo’s further renders obvious requiring a minimum amount of power consumption corresponding to the promised curtailment amount. APC is a utility company in PJM’s jurisdiction and offers a demand response program with its PSEDR program. EX1005, Part 1, 2, 7-

10, 221-225. APC's PSEDR program, like in Montalvo, similarly has committed demand reduction capacity requirements. *See, e.g., id.*, 222 (the minimum "capacity contracted for under this Rider will be 100 kW," with aggregation allowed to reach that). APC-Tariff specifically teaches that "[e]ach customer electing to participate in the program shall contract for a definite amount of PSEDR capacity, *not to exceed the customer's normal demand capable of being curtailed.*"). *Id.*, 221; EX1003, ¶109; *see also supra* § IX.A.i.

A POSA would understand from these combined teachings that Montalvo's end user with a DR agreement would be consuming at least the amount of load (the "normal demand capable of being curtailed") for the end user to be able to implement the necessary DR action (e.g., Montalvo's demand reduction amount). EX1003, ¶110. A POSA would have thus recognized that the "amount of electrical load to be reduced" taught in Montalvo identifies a "*minimum power threshold*" corresponding to the amount at or above 100-200 KW. *Id.*

This is consistent with how the '433 Patent understands the concept of the "*minimum power threshold.*" According to the '433 Patent, the "minimum power threshold" refers to "the load need[ing] to use at least the amount of power subject to the option" to reduce the amount of power delivered. EX1001, 43:50-60. In a specific example corresponding to Figure 12, the '433 Patent illustrates a minimum power threshold of 5 MW, such that "the loads must be able to operate at a target

power consumption level that is equal to or greater than the 5 MW minimum power threshold ... in order to be able to satisfy the power option if it is exercised.” EX1001, 51:24-34. Because the load is operating at the target power consumption level (or greater), the power entity can reduce the load’s power consumption by any value from zero to 5 MW. *Id.*, 51:34-36. For example, the power entity can exercise the option and “reduce the power consumed by the loads by 3 MW as a way to load balance.” EX1001, 51:36-47. EX1003, ¶111.

Montalvo further teaches that the minimum power thresholds (Montalvo’s amount of load reduction for event(s) that must be used, in view of APC-Tariff’s teachings) are associated with respective time intervals (when the load maybe reduced). The “DR Agreements set forth the amount of electrical load to be reduced, and when such load will be reduced, for a DR event(s) by the respective end users.” EX1004, ¶[0003]. Montalvo describes plural “event(s),” which a POSA would understand to mean that the DR agreements relate to not just a load reduction amount for one DR event period, but for multiple DR event periods. EX1003, ¶112.

Thus, Montalvo’s minimum power thresholds (the amount of load to be reduced) teach a “minimum amount of power a load must use during an associated time interval” (when such load will be reduced) according to the proposed construction. Indeed, even apart from this explicit teaching in Montalvo, in order

for Montalvo to reduce the proper amount of load at the appropriate time(s) (“when such load will be reduced,” EX1004, ¶[0003]) a POSA would have recognized that the DR agreement would associate the load reduction amounts (which impose a minimum use requirement) with the times for reduction. EX1003, ¶113; *generally* ¶¶105-113.

f) [1.2.3], [17.4], [20.4]

Montalvo combined with APC-Tariff renders obvious the control system configured to, responsive to receiving the power option data, determine a performance strategy for the set of computing systems based on a combination of at least a portion of the power option data and at least one condition in the set of conditions, wherein the performance strategy includes a power consumption target for the set of computing systems for each time interval in the set of time intervals. EX1003, ¶114.

Montalvo teaches that the DR server **14** executes instructions by its processor **100** “to determine one or more demand reduction actions to be implemented for a detected DR event at an end user, based on the end user DR Agreement data **106** included in the memory **102**.” EX1004, ¶[0076]; *see also id.* ¶[0103]. The determination for the DR actions is specifically “based on the objectives and details included in the electronic message data for the DR event, ... the monitoring data, and the appliance and supplemental energy source data, and

the end user specified objectives or thresholds for KW demand reduction.” *Id.*, ¶[0076]. Moreover, Montalvo teaches that the DR client includes instructions **134** that the processor **130** execute to process data included in demand reduction action signals received from the DR server and/or that the processor **130** execute to process signals and/or electronic data received directly from an ISO, utility company and/or ECSP. *Id.*, ¶¶[0087]-[0088]. In turn, the DR client provides for the generation of energy device control signals to control the operation of selected appliances **170**. *Id.*; EX1003, ¶115.

Thus, Montalvo teaches the determination of a “*performance strategy*” (the one or more DR actions) that is “*based on a combination of at least a portion of the power option data*” (“based on the end user DR Agreement data”) and “*at least one condition*” (the “monitoring data”). The determination is also in response to receipt of the power option data, since in Montalvo the determination is “based on the end user DR agreement data **106**” and, particularly, “the objectives and details included in the electronic message data” the DR server received identifying the DR event (thus, “*responsive to receiving the power option data*”). EX1004, ¶[0076]; EX1003, ¶116.

Further, Montalvo teaches that the DR server determines its performance strategy “*for the set of computing systems.*” The DR action(s) that Montalvo’s server **14** determines includes “reducing or eliminating consumption of electricity

from the power grid at an appliance(s) of the end user.” EX1004, ¶[0054]. The DR client similarly performs actions upon the receipt of data from the DR server 14 and/or an ISO to control the operation of selected appliances. *Id.*, ¶¶[0087]-[0088]. As explained with respect to [1.1], the appliances are an example of a “*set of computing systems*.” EX1004, ¶¶[0044], [0054]; EX1003, ¶117.

Finally, Montalvo’s performance strategy includes a “*power consumption target*.” When Montalvo’s DR server 14 determines one or more DR actions, the determination includes achieving “a KW demand reduction goal for a DR event at an end user.” EX1004, ¶[0076]. The “KW demand reduction goal” is implemented to “reduce KW demand during a DR event based on the terms for the end user 16 (FIG. 4) set forth in the DR agreement.” *Id.*, ¶[0126]. The demand reduction goal identifies a target power consumption (*e.g.*, the amount of load the end user commits to consume for day-ahead and/or day-of events in order to then reduce by the goal, as identified by the electronic message data). *See* EX1004, ¶¶[0015]-[0016], [0073]. And as discussed with respect to [1.2.2], [17.3], [20.3], a POSA in view of APC-Tariff would understand Montalvo’s goals to include a commitment to consume at least enough power to meet the promised curtailment amount (which the DR goal would be within). Ex.1005, 221. Montalvo teaches plural “DR event(s)” that a POSA would recognize to mean that the DR actions corresponding

to the events would be related to the different time intervals of the respective events. EX1004, ¶¶[0003], [0068]; EX1003, ¶118.

As another example that separately renders obvious the “*power consumption target for the set of computing systems for each time interval*,” Montalvo teaches determining “demand reduction actions ... during time periods not within a DR event.” EX1004, ¶[0149]. The DR actions for each time period of the “time periods” demonstrates another power consumption target corresponding to the amount of demand reduction performed per DR action. *See id.* It would have been obvious, given that “appliances” include many examples in Montalvo including computing systems, *see* EX1004, ¶[0044], that the DR actions would also apply to the multiple computing system appliances taught in Montalvo. EX1003, ¶119; *generally* ¶¶114-119.

g) [1.2.4], [17.5], [20.5]

Montalvo combined with APC-Tariff renders obvious each power consumption target is equal to or greater than the minimum power threshold associated with each time interval. EX1003, ¶120.

As discussed with respect to [1.2.2], [17.3], and [20.3], Montalvo combined with APC-Tariff renders obvious minimum power thresholds associated with time intervals. It would have been obvious to a POSA that the minimum demand requirements imposed for an end user to enter into a DR agreement corresponds to

a commitment for the minimum amount of power the end user will use in order to curtail the promised amount. *See* EX1004, ¶[0003] (setting forth the amount of load to be reduced); EX1005, 221-222 (contracting for definite demand reduction capacity corresponding to normal demand); EX1003, ¶¶120-121.

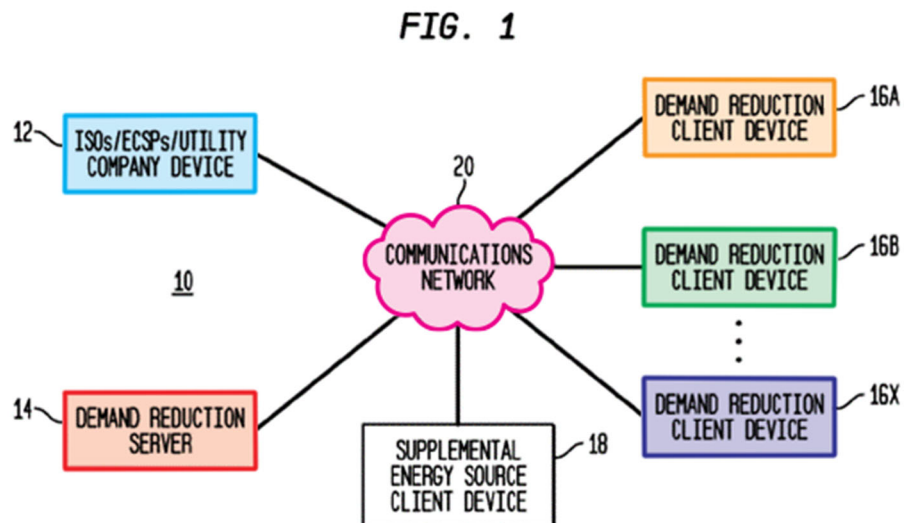
In other words, an end user commits to consume (its “*power consumption target*”) at least that amount of load for Montalvo’s end user to be able to implement the necessary DR action in response to receipt of a DR event notification. *See* EX1005, 221-222; EX1003, ¶122. A POSA would have thus recognized that Montalvo’s “amount of electrical load to be reduced” identifies a “*minimum power threshold*,” as clarified and demonstrated by APC-Tariff, namely the amount at or above 100 kW (e.g., APC-Tariff’s “minimum PSEDR capacity”). EX1003, ¶122.

Because the combination of Montalvo and APC-Tariff teaches committing to a minimum amount of demand reduction, based on actual demand, it would have been obvious to a POSA that the combined teachings render obvious that each “*power consumption target is equal to*,” if not also “*greater than*,” the “*minimum power threshold associated with each time interval*.” EX1003, ¶123.

h) [1.2.5], [17.6], [20.6]

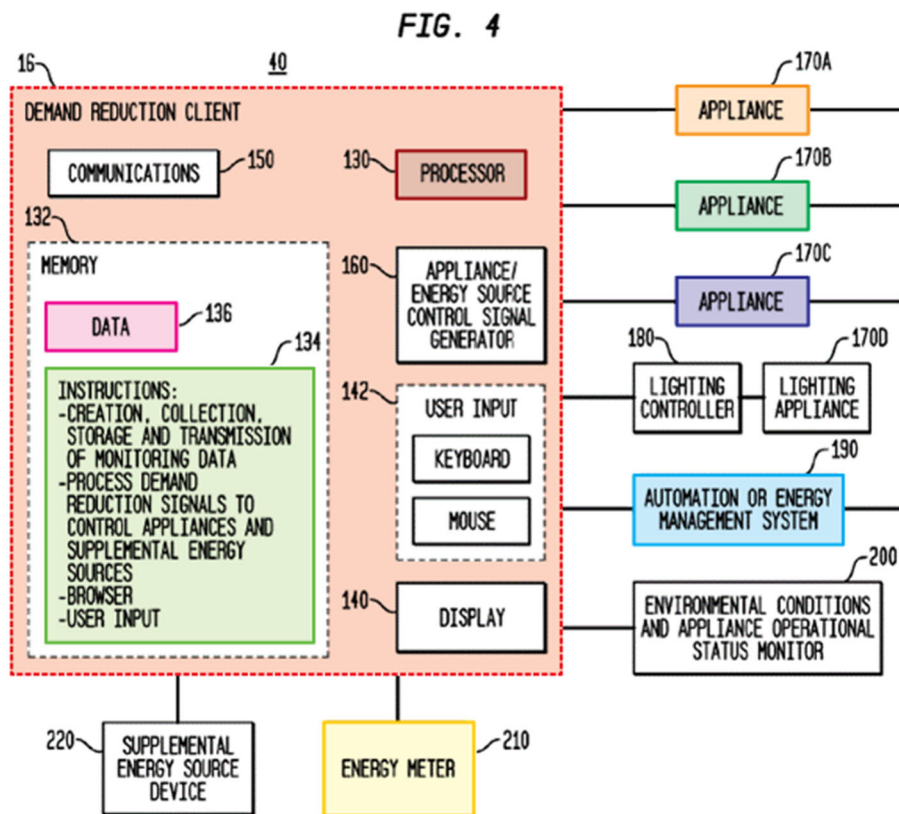
Montalvo renders obvious the control system configured to provide instructions to the set of computing systems to perform one or more computational operations based on the performance strategy. EX1003, ¶124.

As discussed with respect to [1.2.3], [17.4], [20.4], Montalvo teaches the DR server **14** determining a “*performance strategy*” (the DR actions to be taken, and corresponding commitment to consume load to be able to take those DR actions, such as for day-ahead and/or day-of events, *see* EX1004, ¶¶[0015]-[0016]). Montalvo further teaches that the DR server **14**, after generating the DR actions to take, generates “demand reduction action signals to be transmitted by the communications device **108** ... to ... a DR client **16** to provide for control operation of appliances at an end user... during the course of a DR event.” EX1004, ¶[0077]; *see also* ¶[0122], FIG. 1:



EX1003, ¶125.

The DR client, upon receipt of the control signal, in turn generates “energy device control signals and/or control data” to control operation of “the appliances 170” according to the DR action (e.g., ensuring sufficient load for reduction, and reducing load). EX1004, ¶[0087]; *see also id.*, ¶[0124], Figure 4:



EX1003, ¶126.

Again, Montalvo’s appliances exemplarily include appliances at “a computer operations center” where operations typically operate continuously, which a POSA would understand to mean that the appliances include multiple computers

performing computing operations, such as at a data center. *Id.*, ¶[0074]; EX1003, ¶127.

Montalvo teaches that different appliances reduce load in response to the control signaling in a variety of ways, including turning them on or off, changing their set points, changing the frequency at which a device with a variable frequency drive operates, rescheduling load, and other actions. EX1004, ¶¶[0116]-[0120]. It would have been obvious to a POSA to apply these same teachings to computers (which have known adjustable characteristics including frequency of operation, fan speed/frequency, turn on/off components or entire systems). *See* EX1003, ¶128; *generally* ¶¶124-128.

iii. Claims 2-5

Claim 2 adds the limitation that the control system is configured to monitor the set of conditions including (i) a price of power from the power grid; and (ii) a plurality of parameters associated with one or more computational operations to be performed at the set of computing systems. EX1003, ¶129.

First, as demonstrated with respect to [1.2.0], Montalvo's DR server and DR client, independently or in combination, disclose the "*control system*." As further demonstrated with respect to [1.2.0], the DR server and DR client monitor a "*set of conditions*." Montalvo teaches that these conditions include "electricity pricing limits" relating to an upper threshold with respect to price for the end user. *See*

EX1004, ¶¶[0070] (pricing limit), [0129] (pricing limit is a threshold that is monitored). EX1003, ¶130.

It would have been obvious to a POSA that the DR server and/or DR client would receive the current price of power from the electrical grid in order to be able to compare against the pricing limit threshold. EX1003, ¶131. Indeed, Montalvo teaches that the DR server does in fact receive the “rate of electricity” as “the price per KWH hourly” from the “ISO, utility company, and/or ECSP.” EX1004, ¶[0152]. It would have been obvious to a POSA for the “electricity pricing limits” that the DR server monitors to further include monitoring of this price per KWH. EX1003, ¶131.

Second, as demonstrated with respect to [1.2.0], the DR server monitors conditions including end user power consumption, energy device operation information, interior environmental data, and appliance operation data. EX1004, ¶¶[0047]-[0051], [0069]-[0071]. It would have been obvious to a POSA that examples of appliance operation data include an appliance’s electrical power usage operating frequency or speed. *See, e.g., id.*, ¶¶[0081], [0116]-[0120]; EX1003, ¶132. Such appliance operation data monitored by the DR server teaches the “*plurality of parameters associated with one or more computational operations to be performed at the set of computing systems.*” EX1003, ¶¶129-132.

Claim 3 adds the limitation that the control system is configured to determine the performance strategy for the set of computing systems based on a combination of at least the “portion” option data, the price of power from the power grid, and the plurality of parameters associated with the one or more computational operations. EX1003, ¶133.

As demonstrated with respect to [1.2.3], Montalvo’s performance strategy is based at least on a portion of the power option data. And, as demonstrated with respect to claim 2, Montalvo’s monitoring data includes both the price of power (per KWH) and multiple conditions associated with the appliances’ operations, including power consumption, environmental data, and appliance operation data such as status or mode of operation (e.g., including operating frequency or speed). EX1004, ¶¶[0047]-[0051], [0069]-[0071], [0081], [0116]-[0120]; EX1003, ¶133.

As further explained with respect to [1.2.3], Montalvo’s DR server determines one or more “demand reduction actions” based on the data derived from the DR Agreement (“*power option data*”), the monitoring data, and appliance data. EX1004, ¶[0076]. Thus, Montalvo’s teachings demonstrate that the DR action (“*performance strategy*”) is determined based on a combination of the claimed information. EX1003, ¶133.

Claim 4 adds the limitation that the performance strategy includes an order for the set of computing systems to follow when performing the one or more

computational operations, wherein the order is based on respective priorities associated with the one or more computational operations. EX1003, ¶134.

Montalvo teaches that the DR server stores, for the DR events “for which the end user agrees to reduce KW demand by implementing one or more demand reductions,” a “hierarchy or hierarchies indicating an order in which demand reduction actions are to be implemented for a specific DR event.” EX1004, ¶[0068]; *see also id.* ¶¶[0098], [0103]-[0106]. The hierarchy information is “used to prioritize reducing KW demand” by first reducing loads of appliances at the end user with lower power loads, and “progressively reducing KW demand by appliances” with higher power loads. *See id.*, ¶[0074]; EX1003, ¶135.

Further, as demonstrated with respect to [1.1], Montalvo teaches a “*set of computing systems*” that is “*configured to perform computational operations*” with its appliances **170** (including computers at computer operations centers). *See, e.g.*, EX1004, ¶¶[0044], [0074]. It would have been obvious to a POSA based on these combined teachings of Montalvo for the set of computing systems (the appliances as computers, at end users including data centers) to perform those computing operations according to Montalvo’s hierarchical teachings. EX1003, ¶¶134-136.

Particularly, Montalvo already demonstrated that it was known to prioritize demand reduction actions to achieve a particular result (like minimizing impact on the end user’s operations, *see* EX1004, ¶[0068]). In addition to Montalvo’s

examples of how to prioritize various DR actions, a POSA would have recognized that the operations performed on the computers would also have impacts of varying magnitudes on the amount of power consumed (and, therefore, the amount of demand reduction). EX1003, ¶137.

Claim 5 adds the limitation that the performance strategy includes at least one power consumption target that is greater than a minimum power threshold when the price of power from the power grid is below a threshold price during the time interval associated with the minimum power threshold. EX1003, ¶138.

First, Montalvo combined with APC-Tariff renders obvious setting a power consumption target to be equal to or greater than the minimum power threshold, as demonstrated with respect to [1.2.4]. EX1003, ¶139.

Second, it would have been obvious to a POSA in view of Montalvo's teachings for the power consumption target to specifically be greater than the minimum power threshold in view of the price of power being below a threshold price. EX1003, ¶¶138-140. For example, Montalvo teaches the desirability of maintaining "thresholds associated with appliance operation at an end user that may be supplied from the end user." EX1004, ¶[0070]. An example threshold Montalvo provides is an "electricity pricing limit[]." *Id.*; *see also id.*, ¶[0129] (threshold pricing limit); EX1003, ¶140.

A POSA would have understood from this teaching to correlate the load with the price of electricity. EX1003, ¶141. In Montalvo's example, this results in one or more DR actions when the price of electricity reaches an upper threshold. *See* EX1004, ¶[0129]. It follows that if the price of electricity falls below that threshold/limit, a POSA would understand the desirability of conversely *increasing* load with more advantageous pricing. EX1003, ¶141. Indeed, it was known for an end user's load to be above the minimum amount of power consumption required to meet a curtailment (load reduction) obligation. *See, e.g.*, EX1006, ¶[0038] (bidding out an amount of curtailable load that is greater than a minimum load requirement at the end user); EX1003, ¶141.

Accordingly, it would have been obvious from Montalvo's teachings correlating price of power with load amount for a power consumption target to be above the minimum power threshold (e.g., as taught by the Montalvo-APC-Tariff combination) when the price of power is below a threshold price. EX1003, ¶142.

iv. Claims 6-8 and 19

Montalvo in view of APC-Tariff renders obvious all limitations of dependent claims 6-8 and 19. EX1003, ¶143.

a) [6.0], [7.0], [8.0], [19.0]

To the extent the preambles are limitations, Montalvo discloses a control system. Specifically, Montalvo discloses a DR server and DR clients. EX1004, ¶[0055]; EX1003, ¶¶143-144.

b) [19.1], [6.1]

Montalvo discloses a control system configured to receive subsequent power option data based, at least in part, on the power option agreement. For example, Montalvo discloses that its end users have entered into DR Agreements with ISOs, ECSPS, and/or utility companies, to automatically reduce KW demand for **DR event(s)** per the terms of the DR Agreements. EX1004, ¶[0041]. The DR Agreements “set forth the amount of electrical load to be reduced, and when such load will be reduced, for a **DR event(s)** by the respective end users.” *Id.*, ¶[0003]. As noted with respect to [1.2.2], this describes plural “event(s).” EX1003, ¶145.

Montalvo’s electronic message data received by the DR server “indicates one **of a plurality** of demand response events including the first demand response event.” EX1004, ¶[0026]. Montalvo further teaches the DR server receiving electronic message data to implement a “**second** demand reduction action in a predetermined hierarchy of demand reduction actions to be implemented in place of, or together with, the previously determined first demand reduction action of the same or another hierarchy.” *Id.*, ¶[0136]. Exemplary DR events include “day

ahead” and “day of” events, for which the end user agrees to *reduce KW demand* the day following or day of receipt of a DR event request from, for example, the ECSP. *Id.*, ¶[0015]. For “day of” DR events, the DR Agreements can require reduction in KW demand to occur within 10 minutes or less of receiving notice. *Id.*, ¶[0017]; EX1003, ¶146.

Montalvo further discloses that the DR server stores “electrical power consumption data included in the monitoring data received from the DR clients in 15 minute increments, and also data representative of *all requests received* from a utility Company and/or ECSP *for energy demand curtailment.*” *Id.*, ¶[0080]. Montalvo teaches the DR server implementing a demand reduction action by using “demand rolling.” *Id.*, ¶[0151]. In demand rolling, the DR server provides that the DR client “reduce[] a percentage of the KW electrical load for the end user every 15 minutes, and on the 16th minute restores those electrical loads and reduces the same percentage of other electrical loads at the end user so that the total KW demand does not ... exceed a pre-established threshold.” *Id.*; EX1003, ¶147.

Thus, a POSA would understand that Montalvo’s teachings are not limited to a single transmission of electronic message data for a single plurality of DR events. EX1003, ¶148. For example, in embodiments where the electronic message data reaches the DR client, which then sends it on to DR server (the “*control system*”), Montalvo teaches that the DR client “continuously monitors whether

electronic message data ... is received” in order for the DR server to “process[] the electronic message data to identify the type and details of a DR event.” EX1004, ¶[0099]; *see also id.*, ¶[0101] (bypassing DR client for DR server); EX1003, ¶148.

Thus, a POSA would understand that the control system of Montalvo is configured to receive subsequent power option data (e.g., subsequent electronic data) based, at least in part, on the power option agreement for a second plurality of demand response events (e.g., subsequent “day of” DR events occurring over different 15-minute time intervals). EX1003, ¶149. A POSITA would have understood from Montalvo’s demand rolling teachings (involving the 15-minute time intervals) that the DR server sends instructions (i.e., data based on the DR agreement) to the DR client regarding what KW electrical load to change either all at once (one transmission with instructions for multiple time periods) or spread out over time. *Id.*. Indeed, it was known to POSAs for instructions (e.g., commands) about controllable loads to be exchanged according to a desired granularity, ranging up to the granularity of the demand response program itself (e.g., per hour, per 15-minutes, etc.). *See, e.g.*, EX1037, ¶¶[0054] (energy and control data tracked per time intervals aligned with the utility’s demand response schedule), [0058], [0125] (sending time-based set of control commands to loads at start of time period, for DR event or regular operation). EX1003, ¶149.

In addition to Montalvo's example with the DR server sending the instruction to the DR client demonstrating "*subsequent power option data*," a POSA would have understood that this teaching is also applicable to one or more electronic message data transmissions to the DR server from the ISO, utility, and/or ECSP (another demonstration of "*subsequent power option data*"). See EX1004, ¶[0088]; EX1003, ¶150.

c) [19.2], [6.2]

Montalvo discloses subsequent power option data specifying to decrease one or more minimum power thresholds of the set of minimum power thresholds. EX1003, ¶151. As discussed with respect to [19.1], [6.1], Montalvo discloses receiving subsequent power option data for a second plurality of demand response events. For example, Montalvo discloses that, in "demand rolling," the DR server provides that the DR client "reduce[] a percentage of the KW electrical load for the end user every 15 minutes, and on the 16th minute restores those electrical loads and reduces the same percentage of other electrical loads at the end user so that the total KW demand does not []exceed a pre-established threshold." EX1004, ¶[0151]; EX1003, ¶1152.

Each minimum power threshold associated with the second (e.g., second 15 minute) plurality of demand response events is either (i) greater than, (ii) less than, or (iii) equal to each minimum power threshold associated with the first (e.g., first

15 minute) plurality of demand response events. Thus, a POSA would understand that the subsequent power option data of Montalvo can specify to decrease one or more minimum power thresholds, for example, in response to a second plurality of demand response events calling for lower minimum power thresholds than the first plurality of demand response events. EX1003, ¶¶151-153. These teachings, as understood by a POSA, alone renders obvious this limitation. EX1003, ¶153.

Additionally, it would have been obvious to a POSA based on the Montalvo-APC-Tariff teachings that a contracted-for amount of load reduction varies based on the changing needs and/or capabilities over time between the contracting parties. EX1003, ¶154; EX1004, ¶[0059]; EX1005, 221-222. Thus, the combination teaches a minimum power threshold that changes based on what the contracted-for curtailment amount per the DR agreement. EX1003, ¶154. For example, it was known already to POSAs for a load (single or aggregated) to have different amounts of load available for curtailment across different time intervals (e.g., broken down according to the utility's scheduling breakdown). *See, e.g.*, EX1037, FIG. 4, ¶[0082]; *see also* EX1006, FIGs. 3-8; EX1003, ¶154. This includes the amount of curtailable load dropping from one hour to the next, resulting in a corresponding drop in the “*minimum power threshold*” at the load in order to meet the curtailable load commitment. *See* EX1037, FIG. 4 (transition between 1 and 2 PM including a drop in load amount). EX1003, ¶154.

d) [19.3], [7.1]

Montalvo combined with APC-Tariff renders obvious, responsive to receiving subsequent power option data, determining a performance strategy for a set of computing systems based on a combination of at least a portion of the power option data and at least one condition in the set of conditions. *See* [1.2.3], [17.4], and [20.4]. Montalvo discloses that the DR server “may evaluate monitoring data representative of temperature and/or humidity in the interior space of a facility of an end user impacted by demand rolling, so that the demand reduction action may provide the appliances with certain electric loads are reinstated (turned ON) and other appliances already closest to temperature and/or humidity set points agreed upon by the end user are turned OFF, where different spaces or facilities impacted by the demand rolling may have different set points.” EX1004, ¶[0151]. EX1003, ¶¶155-157.

A POSA would understand that, in the case of a second plurality of demand response events (e.g., second 15-minute DR events in “demand rolling” as well as the additional example of receiving additional electronic message data at subsequent time intervals based on a granularity of the utility’s demand response schedule, *see supra* claim 6 analysis), a new performance strategy would be determined and implemented for each second demand response event within the second plurality of demand response events (e.g., turning appliances on and/or off

in order in the second 15-minute “demand rolling” DR events), thus modifying the performance strategy for the set of computing systems based on at least a portion of the subsequent power option data and at least one condition in the set of conditions, particularly committing to consume at least enough power to meet the promised curtailment amount as APC-Tariff teaches. EX1003, ¶¶155-158. This is nothing more than the mere duplication of the determination demonstrated at [1.2.3]. *Id.*

e) [19.4], [7.2]

Montalvo combined with APC-Tariff renders obvious wherein each power consumption target is equal to or greater than the minimum power threshold associated with each time interval. *See* [1.2.4], [17.5], [20.5]. In demand rolling, “the processor **100** may provide that the DR client **16** reduces a percentage of the KW electrical load for the end user every **15** minutes, and on the 16th minute restores those electrical loads and reduces the same percentage of other electrical loads at the end user so that the total KW demand does not [] exceed a pre-established threshold.” EX1004, ¶[0151]. A POSA would understand that, in the example above, each reduction in the percentage of KW electrical load constitutes a reduced power consumption target for the set of computing systems. EX1003, ¶160. Moreover, as explained in [1.2.4], it would have been obvious that an end user in Montalvo commits to at least the minimum amount of power the end user

will use in order to curtail the promised amount. *See* EX1004, ¶[0003]; EX1005, 221-222; EX1003, ¶¶159-160.

f) [19.5], [8.1]

Montalvo discloses providing instructions to the set of computing systems to perform one or more computational operations based on the performance strategy. EX1003, ¶161. *See* [1.2.5], [17.6], [20.6]. A POSA would understand that when a percentage of the KW demand load is reduced in demand rolling, the DR client/server would account for the reduction and provide the set of computing systems with further instructions to perform the one or more computational operations based on the modified performance strategy. EX1003, ¶¶161-162. This would also be nothing more than a mere duplication of the provision of instructions demonstrated at [1.2.5] from Montalvo, in response to the subsequent power option data received in the form of either the demand rolling instructions or the electronic message data. *Id.*

v. Claim 9

Claim 9 adds the limitation that the control system is a remote master control system positioned remotely from the set of computing systems. Montalvo teaches locating the DR server **14** “remotely from the DR client **16**,” where the DR client **16** is “typically located at or near a facility of the end user.” EX1004, ¶[0099]. Moreover, the “facility of the end user” is where appliances, like computers, are

located. *Id.*, ¶¶[0044], [0074]. Thus, since the DR server **14** is remote from the DR client **16**, and the DR client is at or near the end user appliances including computers, then the DR server (a master control system) is positioned remotely from the appliances (computers). EX1003, ¶163.

vi. Claim 10

Claim 10 adds that the control system is a mobile computing device. Montalvo teaches that the DR server does not have to be a “full-sized personal computer,” but instead “may be used in connection with mobile devices capable of wirelessly exchanging data with a server over a network such as the Internet.” EX1004, ¶[0096]. A POSA would have recognized from this that Montalvo also teaches the DR server being a “mobile device” that communicates over a network with a server such as would be located at one or more of the ISO, ECSP, and/or utility. *See id.*, ¶¶[0096], [0097]; EX1003, ¶164.

vii. Claim 11

Claim 11 adds that the control system is configured to receive the power option data while monitoring the set of conditions. Montalvo’s system provides for a “fully automated demand response, in real time or substantially real time, at one or more end users without human involvement[.]” EX1004, ¶[0055]. This includes receiving “electronic message data” (“*power option data*”) by “continuously monitor[ing]” for receipt of electronic message data (which when received, is

“immediately” transmitted to the DR server). *Id.*, ¶[0099]. This also includes “monitoring data” with “real time status of operation of appliances 170” that is “continuously created.” *Id.*, ¶[0102]. Together, a POSITA would have understood that Montalvo teaches receiving electronic message data while likewise monitoring the conditions (by “continuously” monitoring the appliances). *See id.*; EX1003, ¶165.

viii. Claim 12

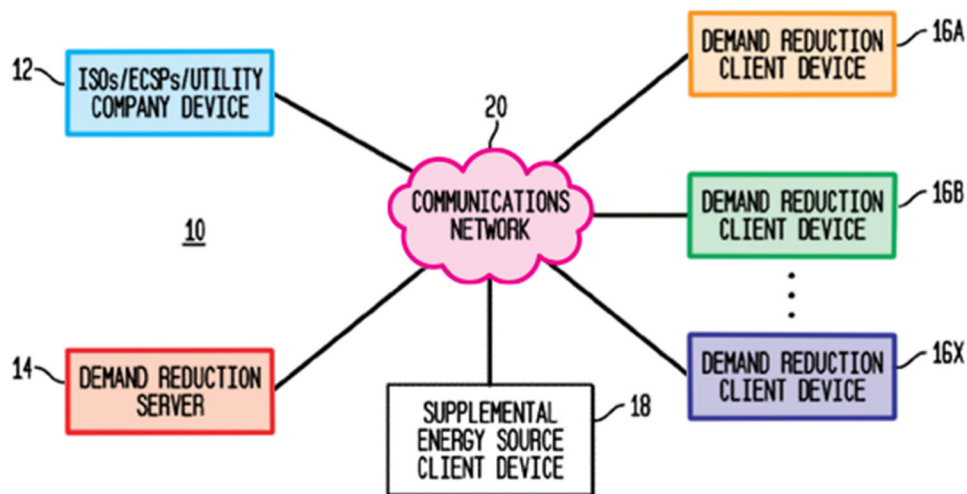
Montalvo renders obvious the control system configured to provide a request to a qualified scheduling entity (QSE) to determine the power option agreement. EX1003, ¶166.

The '433 Patent describes the QSE as a power entity that manages and schedules the power option data per the power purchase agreement, in both day-ahead and real-time markets. EX1001, 46:20-30, 57:49-53; EX1003, ¶167. Montalvo’s “ECSPs” perform the same functions as the “QSEs” from the '433 Patent. Montalvo explains that the ECSP (energy curtailment service provider) typically has a DR agreement with the ISO (e.g., PJM), and then the ECSP in turn has DR agreements with end users. EX1004, ¶[0004]; *see also* ¶[0005]. ECSPs operate as an intermediary between ISOs and end users for both “day ahead” DR events and “day of” events. *Id.*, ¶¶[0015]-[0016]. Indeed, it was well-known to POSAs that “curtailment service providers,” like Montalvo’s ECSPs, “act as a

medium between customers and the RTO [regional transmission organization] and/or ISO,” with the CSP submitting bids for the day-ahead and real-time markets. EX1003, ¶¶166-168; EX1038, ¶¶[0102] (CSP), [0292] (day-ahead), [0295] (real-time).

In view of Montalvo’s teaching of ECSPs having DR agreements with the utility/ISO and with the end users, it would have been obvious to a POSA for the DR server to request the DR agreement details to ascertain the details of the DR agreements (e.g., “*power option agreement*”). Indeed, Montalvo teaches that the ECSPs (operating computer **12**) “transmit, over the network **20**, electronic message data to the DR server **14**,” which in turn stores terms of the DR agreement(s) in place. *See* EX1004, ¶¶[0056], [0068] (DR server storing terms of the DR agreement); *see also* FIG. 1:

FIG. 1



EX1003, ¶169.

Thus, since Montalvo teaches the ECSP transmitting data to the DR server and the DR server stores agreement terms, it would have been obvious to a POSA that the DR server sending a request to the ECSP is one option by which to ensure the DR agreement terms reach the DR server. EX1003, ¶¶169-170. This is one option from among a finite number of options to choose from (others including the ECSP transmitting the DR agreement when it is in place without requiring a request from the DR server, or having periodically scheduled transmissions between the two). *Id.*

It would be obvious for a POSA to try configuring Montalvo's control system to obtain power option data prompted with a request—that is, obtaining power option data via providing a request to a ISOs/ECSPs/Utility Company—given the limited number of options for receiving power option data and given that the devices (e.g., Montalvo's computer 12 operated by ISOs and/or their affiliates, such as ECSPs, utility companies and the like, to transmit electronic message data to the DR server and the DR clients) are already configured to communicate over a communications network. EX1003, ¶171.

A POSA would have recognized that designing Montalvo's system to have the DR server transmit a request to the ECSP for the DR agreement would be a well-known “pull” option that gives the DR server control over when

communication occurs, relative to the other “push” options. EX1003, ¶172. Thus, a POSA would have been motivated to design Montalvo’s system to pull the DR agreement when in place. *Id.*

Montalvo further renders obvious the control system configured to receive power option data in response to providing the request to the QSE. As demonstrated above, Montalvo teaches the ECSP transmitting the electronic message data (“*power option data*”) to the DR server, and that the DR server requesting the data in a “pull” fashion was a well-known option POSAs would have been motivated to choose to maintain control over when communication occurs. *See* EX1004, ¶[0056]; EX1003, ¶173.

B. GROUND 2: Claims 13-15 are rendered obvious over Montalvo in view of APC-Tariff and Day.

i. Motivation to Combine

A POSA would have been motivated to combine Montalvo and the APC-Tariff with Day for several reasons.

Day, like Montalvo and the APC-Tariff, is in the same field of endeavor as the ’433 Patent. Each reference is in the field of adjusting power consumption for loads to maintain the integrity of a power grid: Day achieves this via an electric load curtailment nominating system. EX1006, ¶[0009]. Day notes that its load nomination system “provides a safety net which further encourages plant operator

to participate in demand response or other demand side management programs.” EX1006, ¶¶[0034], [0038]. In view of these similarities, Day is also reasonably pertinent to the problem the ‘433 Patent is addressing, that of grid stability/integrity. EX1003, ¶¶174-175.

A POSA would have further been specifically motivated to combine Day’s teachings of first and second time intervals and first and second minimum power thresholds with Montalvo’s teachings of “sets” of the same. For example, as discussed in to Ground 1, Montalvo combined with APC-Tariff renders obvious (1) “a set of minimum power thresholds” and (2) “a set of time intervals.” Through Day’s load nomination system, plant engineers define the load facility’s anticipated loads (each constituting a minimum power threshold) for the coming day on an hour-by-hour basis (each hour constituting a time interval). Day, therefore, provides a specific teaching demonstrating how a POSA would implement Montalvo’s teachings of minimum power thresholds and time intervals. EX1003, ¶176.

ii. Claims 13-15

Montalvo combined with APC-Tariff and Day renders obvious all limitations of dependent claims 13-15.

iii. Claim 13

Montalvo combined with APC-Tariff alone, further in combination with Day, renders obvious wherein the power option data specify: (i) a first minimum power threshold associated with a first time interval in the set of time intervals, and (ii) a second minimum power threshold associated with a second time interval in the set of time intervals, wherein the second time interval is subsequent to the first time interval. EX1003, ¶178.

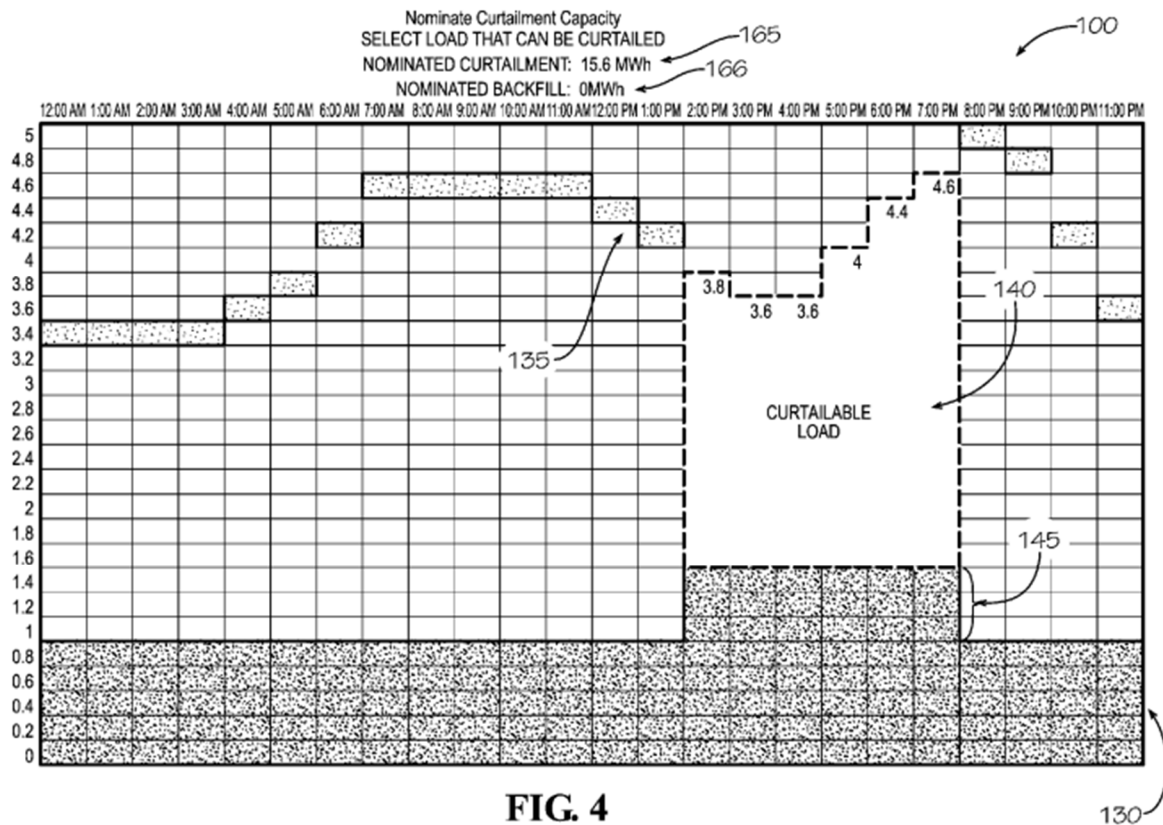
As discussed with respect to [1.2.2], [17.3], and [20.3], Montalvo combined with the APC-Tariff renders obvious power option data specifying: (i) a set of minimum power thresholds, and (ii) a set of time intervals, wherein each minimum power threshold in the set of minimum power thresholds is associated with a time interval in the set of time intervals. *See* EX1004, ¶¶[0056], [0068]. As Montalvo describes a first demand response event of a plurality of demand response events, *id.*, ¶[0026], a POSA would understand that a plurality of demand response events would further include a second demand response event (e.g., a second 15 minute time interval) as discussed with respect to [6.1]. EX1003, ¶¶177-179.

Indeed, Montalvo teaches continuously monitoring for electronic message data for the DR server to process, demonstrating that Montalvo's "*power option data*" includes "*subsequent*" data in the form of later electronic message data. *See* EX1004, ¶[0099]; *see also* ¶[0101] (bypassing DR client for DR server). Montalvo

also teaches that the minimum power thresholds are associated with time intervals, namely “when such load will be reduced.” *See, e.g., id.*, ¶[0003]. In combination with APC-Tariff’s teachings, this means that the end user is consuming at least the amount of load (the “normal demand capable of being curtailed”) for the end user to be able to implement the necessary DR action (e.g., Montalvo’s demand reduction amount) corresponding to the subsequent electronic message data. EX1003, ¶180.

This is further rendered obvious by Montalvo’s teachings that the DR server “may provide for implementation of a demand reduction action in form of demand rolling, which may occur during a DR event.” EX1004, ¶[0151]. In demand rolling, the DR server provides that the DR client “reduce[] a percentage of the KW electrical load for the end user every 15-minutes, and on the 16th minute restores those electrical loads and reduces the same percentage of other electrical loads at the end user so that the total KW demand does not ... exceed a pre-established threshold.” *Id.*. A POSA would understand that the second demand response event (e.g., second “demand rolling” DR events occurring after the first 15-minute time interval) would include its own minimum power threshold (e.g., second pre-established threshold). EX1003, ¶181.

Claim 13 is further rendered obvious in combination with Day. *Id.*, ¶182.



As shown above, the user interface in Day illustrates at least two time intervals (i.e., from the 1:00-2:00 PM, and 2:00-3:00 PM), each associated with a unique anticipated load **135** (i.e., different amounts available for curtailment). In view of the Montalvo-APC-Tariff teachings, a POSA would understand that Day's curtailable load amounts corresponds to the APC-Tariff's commitment for minimum power consumption. EX1003, ¶183. Thus, it would be obvious to a POSA to modify the control system in Montalvo, which discloses a time incremental demand reduction action in the form of demand rolling (and, in another example, subsequent electronic message data), to account for unique

anticipated loads as taught by Day. *Id.* A POSA would be motivated to do so “to participate in demand response or other demand side management programs,” as taught by Day. EX1006, ¶[0034]; EX1003, ¶183.

iv. Claim 14

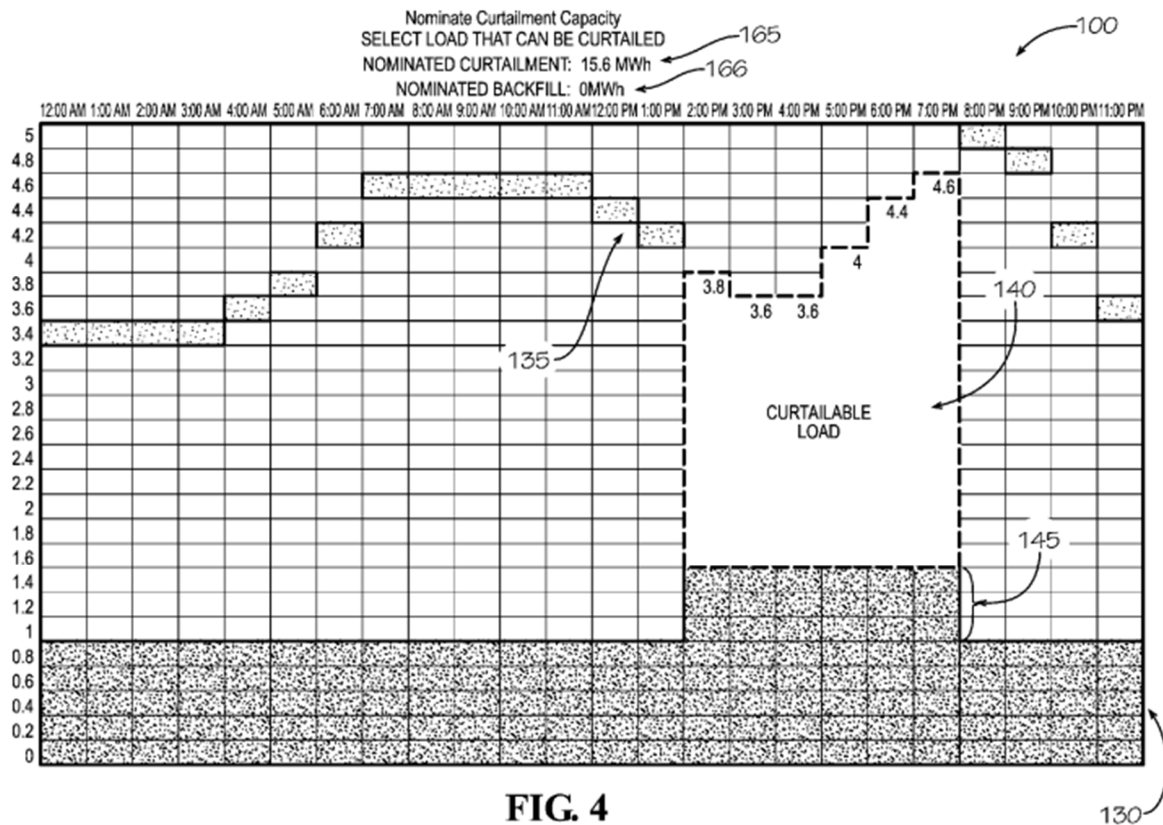
Montalvo combined with APC-Tariff alone, further in combination with Day, renders obvious wherein the control system is configured to determine the performance strategy for the set of computing systems such that the performance strategy includes: a first power consumption target for the set of computing systems for the first time interval, wherein the first power consumption target is equal to or greater than the first minimum power threshold; and a second power consumption target for the set of computing systems for the second time interval, wherein the second power consumption target is equal to or greater than the second minimum power threshold. EX1003, ¶184.

As discussed with respect to [1.2.4], [17.5], and [20.5], Montalvo combined with APC-Tariff renders obvious each power consumption target (for each time interval) being equal to or greater than the minimum power threshold associated with each time interval. This claim merely expands the concept of [1.2.4], [17.5], and [20.5] by applying it to first and second power consumption targets/time intervals/minimum power thresholds, as opposed to referring to the same as “each” in a “set.” In other words, by showing that “*each*” is greater than the threshold

associated with each time interval, the Montalvo-APC-Tariff combination likewise renders obvious claim 14's limitations, which are a subset of those demonstrated with respect to [1.2.4]. EX1003, ¶¶184-185.

Further, the discussion at [19.3] describes how Montalvo discloses modifying a performance strategy based on subsequent power option data and wherein the modified performance strategy comprises one or more reduced power consumption targets for the set of computing systems via Montalvo's teachings of demand rolling. EX1004, ¶[0151]. Montalvo's teachings of demand rolling include two or more power consumption targets (i.e., one target for the first 15-minute interval and one target for the second 15-minute interval). *Id.* A POSA would understand that each power consumption target for each time interval is above a minimum power threshold. EX1003, ¶186.

Moreover, Figure 4 of Day features the claimed performance strategy:



EX1003, ¶187.

Day teaches an anticipated load **135** of 4.2 MW for the first time interval (e.g., between 1:00-2:00 PM), as well as a second anticipated load **135** of 3.8 MW for the second time interval (e.g., between 2:00-3:00 PM). In view of the Montalvo-APC-Tariff teachings, a POSA would understand that in order for the load facility to have the ability to satisfy accepted curtailment bids, the load must operate at or above the anticipated load **135** for each time interval to have enough capacity to curtail as directed. It would be obvious to a POSA to modify the control system in Montalvo to account for unique minimum power thresholds,

specifically to have unique performance strategies for different demand response events calling for different minimum power thresholds as taught by Day. EX1003, ¶¶187-188. A POSA would be motivated to do so “to participate in demand response or other demand side management programs,” as taught by Day. EX1006, ¶[0034]; EX1003, ¶188.

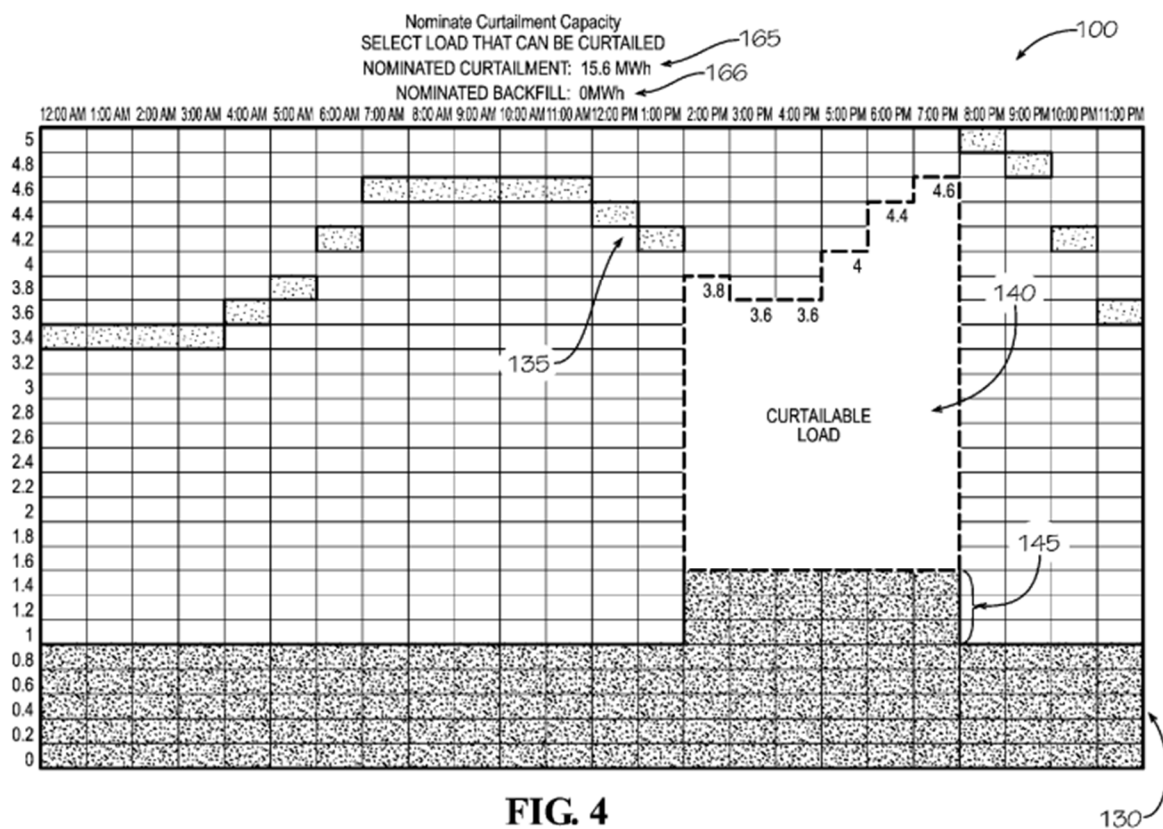
v. Claim 15

Montalvo combined with APC-Tariff and Day renders obvious wherein the total duration of the set of time intervals corresponds to twenty-four hours.

In addition to teaching time incremental demand rolling, Montalvo explains that the data in the DR server can include information describing “day ahead” DR events and “day of” DR events. EX1004, ¶¶[0072], [0151]. Montalvo also explains that demand reduction actions, such as resetting the A/C system temperature setpoint, can be determined based on the monitoring of weather conditions throughout various times (e.g., morning and afternoon) of day. *Id.*, ¶[0121]. Montalvo further explains that the DR server obtains “price per KWH hourly for the next 24 hours” from the ISO, utility company, and/or ECSP in order to “automatically determine which hours the price for electricity is higher than the average price the end user pays” and then implement demand reduction actions. *Id.*, ¶[0152]. A POSA would understand, therefore, that the total time of the

plurality of DR events in Montalvo includes twenty-four hours. EX1003, ¶¶189-190.

This is further obvious in view of Day. Similar to Montalvo, Day discloses a set of time intervals. For example, the total duration of the set of time intervals in Day corresponds to twenty-four hours (12 AM to midnight below):



EX1003, ¶191.

A POSA would have been motivated to combine the teachings of Montalvo and Day to have the set of time intervals to correspond to twenty-four hours, as taught by Day. EX1003, ¶¶191-192. As a result, the Montalvo control system

would monitor and implement demand reduction actions during a total duration of the set of time intervals corresponding to a twenty-four hour period. EX1006, ¶[0034]; EX1003, ¶192.

C. GROUND 3: Claims 16 and 18 are rendered obvious over Montalvo in view of APC-Tariff and Sowell.

i. Motivation to Combine

A POSA would have been motivated to combine Montalvo and the APC-Tariff with Sowell for several reasons.

First, Sowell is reasonably pertinent to problems the '433 Patent claims to have addressed, including problems arising from the increases in power required for growing blockchain operations. EX1001, 58:3-6. Sowell aids in solving this problem. Sowell describes a blockchain marketplace where action items (e.g., offers) are uploaded and miners can bid for work. EX1007, ¶¶[0002], [0024]-[0025]. Sowell further describes monitoring nodes engaged in mining, including hashing power (or rate), electricity consumption rate, processor load, and/or price per hashing power. *Id.*, ¶¶[0030]-[0031]. Thus, with Sowell's teachings of the blockchain marketplace to facilitate mining operations, and especially monitoring of mining operations, a user would have additional mining information to manage the increases in power required per the '433 Patent. EX1003, ¶¶193-194.

Second, a POSA would have been motivated to turn to Sowell for additional monitoring data teachings. Montalvo teaches that the set of conditions includes a “rate of electricity” in the form of “the price per KWH” from the “ISO, utility company, and/or ECSP.” EX1004, ¶[0152]. However, Montalvo leaves it up to the POSA with respect to all conditions that its DR server monitors. A POSA would have therefore been motivated to turn to Sowell, which provides additional examples of conditions to monitor, including a global mining hash rate and a price for a cryptocurrency. Combining Sowell’s teachings of additional conditions to monitor with Montalvo’s system teachings would result in a system that is able to better manage the appliances’ operations when required to undertake a DR action in response to a DR event, including guiding the DR server in determining what DR action(s) to instruct the appliances to take. EX1003, ¶195.

Third, a POSA would have been motivated to combine Sowell’s teachings of cryptocurrency mining with Montalvo’s teachings of hierarchies. The system in Montalvo uses monitoring data to determine which demand reduction actions should be taken in response to a DR event. EX1004, ¶[0069]. The monitoring data of Montalvo includes electricity pricing limits and real time energy consumption data. *Id.* Montalvo’s demand reduction actions are determined based on a hierarchy of predetermined demand reduction actions for the demand response event, which

are ordered to minimize undesired impact at the end user. *Id.*, ¶[0026]; EX1003, ¶196..

Similarly, the blockchain marketplace of Sowell manages nodes (e.g., engages with new nodes, allocates more or retracting hashing power from a node) and can distribute hashing commands amongst available nodes and/or resources to mine such hashing commands. EX1007, ¶¶[0030], [0084]. When managing nodes, the blockchain marketplace of Sowell takes into account progress metrics, such as hashing power (or hash rate), an electricity consumption rate, a processor load, and/or a price per hashing power. *Id.*, ¶[0031]. The blockchain marketplace of Sowell can further be configured to provide recommendations to a miner of which blockchain a miner should pursue, taking into account the difficulty of the blockchain and the current or projected value of coins. *Id.*, ¶¶[0087]-[0088]; EX1003, ¶197.

As such, a POSA would be motivated to combine Sowell's cryptocurrency mining monitoring teachings with Montalvo's teachings of hierarchies. EX1003, ¶¶196-198. Specifically, an end user in Montalvo that employs "appliances" (e.g., computers) to mine cryptocurrencies would be required to reduce its KW demand upon the occurrence of a DR event. A POSA would be motivated to incorporate Sowell's teachings of analyzing the difficulty of the blockchain and the value of coins into Montalvo's hierarchies to "maximize the financial reward" of the end

user and “minimize undesirable impacts.” EX1003, ¶198; EX1004, ¶[0026]; EX1007, ¶[0088].

ii. Claims 16 and 18

Montalvo combined with APC-Tariff and Sowell renders obvious all limitations of dependent claims 16 and 18. EX1003, ¶¶199-200.

iii. Claim 16

As discussed with respect to Claim 2, Montalvo discloses a set of conditions including a price of power from the power grid. Moreover, as discussed with respect to Claim 3, Montalvo discloses a control system configured to determine the performance strategy for the set of computing systems based on a combination of the portion of the power option data and the price of power from the power grid. EX1003, ¶200.

Further, as explained in the Reasons to Combine for Sowell, while Montalvo teaches multiple conditions to monitor, Montalvo leaves it up to POSA for all conditions that the DR server monitors. A POSA would have therefore been motivated to turn to Sowell, which provides additional examples of conditions to monitor, including a global mining hash rate and a price for a cryptocurrency. EX1003, ¶201.

Sowell describes a system for using a blockchain marketplace. EX1007, ¶[0005]. The blockchain marketplace manages nodes and can distribute hashing

commands amongst available nodes and/or resources to mine such hashing commands. *Id.*, ¶¶[0030], [0084]. Sowell teaches (1) a set of conditions including a global mining hash rate and a price for a cryptocurrency. Specifically, the blockchain marketplace is configured to make recommendations to miners, which can be automated to include “analyzing the difficulty of the blockchain” which a POSA understands to be a global mining hash rate. *Id.*, ¶[0088]; EX1003, ¶202. Sowell further teaches analyzing “the current of projected value of coins.” *Id.*

Sowell further teaches (2) a control system configured to determine the performance strategy for the set of computing systems further based the global mining hash rate and the price for the cryptocurrency. Sowell’s automated recommendations described above (which are based on a global mining hash rate and a price of cryptocurrency) constitute the claimed performance strategy, which teachings would be combined with Montalvo’s DR server teachings. Indeed, Sowell already teaches the blockchain marketplace is a “central repository whereby miners and developers can interact.” EX1007, ¶[0025]. Thus, a POSA reading Sowell would understand that Sowell already contemplated operation with a centralized system, of which Montalvo’s DR server provides an example. EX1003, ¶203.

Lastly, Sowell teaches (3) a performance strategy for at least a subset of the set of computing systems to perform mining operations for the cryptocurrency

when the price of power from the power grid is equal to or less than a revenue obtained by performing the mining operations for the cryptocurrency. For instance, Sowell teaches that the blockchain marketplace provides recommendations to a miner as to which offers may provide the greatest return on investment based on the hardware configuration of the node and/or resource. EX1007, ¶[0084]. Sowell further describes that, if electricity rates for a particular node increase, the blockchain marketplace can automatically allocate the hashing power for the associated blockchain offer to another node. *Id.*, ¶[0032]. Sowell further teaches that the nodes of the blockchain marketplace are managed based on progress metrics, which include an electricity consumption rate. *Id.*, ¶[0030]. Thus, a POSA would understand that Sowell's blockchain marketplace is configured to avoid mining cryptocurrency unprofitably (e.g., when the price of power from the power grid is greater than the revenue obtained by performing the mining operations). EX1003, ¶204.

It would be obvious to a POSA to modify the Montalvo-APC-Tariff teachings with these teachings of Sowell. EX1003, ¶205. Specifically, it would be obvious to a POSA to modify Montalvo's control system (DR server and/or client) to include with its monitoring the various prices of cryptocurrencies, compare the cost of mining to the cost of power consumption, and direct mining to the most profitable cryptocurrencies at particular times. *Id.* A POSA would be motivated to

do so to “maximize the financial reward for the miner” as taught by Sowell. EX1007, ¶[0088]; EX1003, ¶205.

iv. Claim 18

The monitoring data in Montalvo may include “historical and real time energy consumption data describing consumption of electrical power supplied from the power grid,” as well as “real time energy device operation information describing the operating status of appliances at the end user,” which teach the claimed identification of information about the set of computing systems. EX1004, [0069]; EX1003, ¶206.

Montalvo discloses determining a performance strategy based on power option data. *See supra* analysis of [1.2.3], [17.4], and [20.4]. This includes having different appliances reduce load in response to the control signaling in a variety of ways, including turning them on/ off, changing set points, and changing the frequency at which a device with a variable frequency drive operates. *See* EX1004, ¶¶[0116]-[0120]. It would be obvious to a POSA to apply these teachings to computers (which have known adjustable characteristics including frequency of operation, fan speed/frequency, cooling set points, turn on/off components or entire systems). *See* EX1003, ¶207.

Thus, a POSA would have found it obvious based on Montalvo’s teachings to include, as part of the performance strategy, instructions for at least some of the

appliances (e.g., computers) to operate at a different frequency based on the power option data (Montalvo's electronic message data) and the monitored data from the appliances. EX1003, ¶208. And the only two options to change an operating frequency of a computer would be to increase or decrease the operating frequency, and thus it would have been obvious to a POSA to try both alternatives depending on the status of the monitoring data Montalvo's DR server receives. *Id.*

Claim 18 is obvious in further view of Sowell's teachings. Sowell's blockchain marketplace is configured to manage one or more nodes based on progress metrics associated with each of the one or more blockchain offers. EX1007, ¶[0030]. Managing the one or more nodes includes allocating more, or retracting, hashing power, from a node which a POSA would understand means requiring the node to operate at an increased or decreased frequency. *See Id.*, ¶[0030]; EX1003, ¶209. Sowell further teaches dictating the "processing speed" of a miner. *See* EX1007, ¶[0089]. Moreover, the nodes are managed based on progress metrics, which include information about the nodes (e.g., hashing power, electricity consumption rate, processor load). *Id.*, ¶[0031]; EX1003, ¶209.

It would be obvious to a POSA to modify the control system of Montalvo, in view of APC-Tariff's teachings, with Sowell's teachings to determine a performance strategy for at least a subset of the appliances (i.e., set of computing systems) to operate at an increased frequency based further on the information

about the set of computing systems. EX1003, ¶210. For example, when a second DR event per Montalvo dictates a higher minimum power threshold than a first DR event (e.g., due to an agreed-upon higher curtailment amount), a POSA would understand that increasing the operating frequency of Montalvo's appliances would effectively increase the KW demand of the end user to reach the higher minimum power threshold associated with the second DR event. *Id.*

X. NO SECONDARY CONSIDERATIONS

The Examiner did not rely on secondary considerations when allowing the Challenged Claims. Therefore, this Petition is not required to address any purported secondary considerations. The Board should institute trial to address any new evidence Lancium might offer. *Zurn v. Sioux Chief*, IPR2018-00975, Paper 9, 39 (PTAB Nov. 8, 2018).

XI. DISCRETIONARY DENIAL IS INAPPROPRIATE

Discretionary denial is inappropriate because Montalvo and most of the secondary references were not cited during prosecution of the '433 Patent, nor was "the same or substantially similar" art presented. *Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6, 8 (PTAB Feb. 13, 2020). Although secondary reference Sowell was cited, it was not applied by the Examiner to reject any claims. In fact, no arguments concerning patentability of the Challenged Claims were ever presented during prosecution because no

Office Action was issued. Thus, the arguments of unpatentability that incorporate Sowell, Day, APC-Tariff, and Montalvo were not considered by the Office.

XII. CONCLUSION

Petitioners therefore request *inter partes* review of the Challenged Claims.

Respectfully submitted,

Dated: September 13, 2023

/Rodney R. Miller/

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Lead Counsel for Petitioners

CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. §42.24(d), the undersigned certifies that this Petition complies with the type-volume limitation of 37 C.F.R. §42.24(b). The word count application of the word processing program used to prepare this Petition indicates that the Petition contains 13,982 words, excluding the parts of the Petition exempted by 37 C.F.R. §42.24(a).

Dated: September 13, 2023

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CERTIFICATE OF SERVICE

The undersigned certifies service pursuant to 37 C.F.R. §§42.6(e) and 42.105(b) on the Patent Owner by Express Mail of a copy of this Petition for *Inter Partes* Review and supporting materials at the current known correspondence address for the Patent Owner:

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