

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~~

TABLE OF CONTENTS

I.INTRODUCTION	1
II.MANDATORY NOTICES	1
A.Real Parties in Interest	1
B.Related Matters	1
C.Lead and Back-Up Counsel	1
D.Service Information	3
III.PAYMENT OF FEES	3
IV.CERTIFICATION	3
V.IDENTIFICATION OF CHALLENGE AND RELIEF REQUESTED	3
VI.OVERVIEW OF THE TECHNOLOGY	4
A.Background	4
B.The '433 Patent	5
C.Prosecution History	7
D.Prior Art	7
i.Montalvo	7
ii.APC Tariff	8
iii.Day	10
iv.Sowell	10
VII.LEVEL OF ORDINARY SKILL IN THE ART	11
VIII.CLAIM CONSTRUCTION	11
IX.THE CHALLENGED CLAIMS ARE UNPATENTABLE UNDER 35 U.S.C.	
§103	12

DECLARATION OF ANDRES E. CARVALLO

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

~~i.Motivation to Combine~~.....12

~~ii.Claims 1, 17, and 20~~.....16

~~iii.Claims 2-5~~.....39

~~iv.Claims 6-8 and 19~~.....44

~~v.Claim 9~~.....52

~~vi.Claim 10~~.....53

~~vii.Claim 11~~.....53

~~viii.Claim 12~~.....54

~~B.GROUND 2: Claims 13-15 are rendered obvious over~~I, Andres Carvallo, hereby declare as follows:

~~Montalvo in view of APC Tariff and Day.~~.....57

~~i.Motivation to Combine~~.....57

~~ii.Claims 13-15~~.....58

~~iii.Claim 13~~.....59

~~iv.Claim 14~~.....62

~~v.Claim 15~~.....65

~~C.GROUND 3: Claims 16 and 18 are rendered obvious over~~

~~Montalvo in view of APC Tariff and Sowell.~~.....67

~~i.Motivation to Combine~~.....67

~~ii.Claims 16 and 18.~~.....70

~~iii.Claim 16~~.....70

~~iv.Claim 18~~.....73

~~X.NO SECONDARY CONSIDERATIONS.....75~~

~~XI.DISCRETIONARY DENIAL IS INAPPROPRIATE.....75~~

~~XII.CONCLUSION.....76~~

TABLE OF AUTHORITIES

Cases

<i>Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH</i> , IPR2019-01469, Paper 6 (PTAB Feb. 13, 2020)	75
<i>In re Klopfenstein</i> , 380 F.3d 1345 (Fed. Cir. 2004)	9
<i>Zurn v. Sioux Chief</i> , IPR2018-00975, Paper 9 (PTAB Nov. 8, 2018)	75

Statutes

35 U.S.C. §102	4
35 U.S.C. §102(a)(1)	7, 9, 10
35 U.S.C. §102(a)(2)	7, 9, 10
35 U.S.C. §103	3
37 C.F.R. §42.15(b)	3
37 C.F.R. §42.203(a)	3

EXHIBIT LIST

Exhibit No.	Description
EX1001	~~U.S. Patent No. 10,608,433 (“the ’433 Patent”)~~
EX1002	~~File History for U.S. Patent No. 10,608,433~~
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	<del>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</del>
EX1014	~~Rui Wang, Nagarajan Kandasamy, Chika Nwankpa, and David R. Kaeli, <i>Datacenters as Controllable Load Resources in the Electricity Market</i> (2013)~~
EX1015	~~Pennsylvania New Jersey Maryland Interconnection (PJM), <i>PJM Manual 11: Energy & Ancillary Services Market Operations</i>, Rev. 88 (May 11, 2017) (“PJM Manual”)~~
EX1016	~~Ivy Main, <i>Virginia regulators approve Appalachian Power’s ‘solar tax’</i>”, POWER FOR THE PEOPLE VA (December 1, 2014), https://powerforthepeopleva.com/2014/12/01/virginia-regulators-approve-appalachian-powers-solar-tax/.~~
EX1017	~~Mike Gangloff, <i>Appalachian Power's proposed fee targets users</i>~~

	<i>of solar panels</i> , ROANOKE TIMES (Sept. 8, 2014), https://roanoke.com/news/local/appalachian-powers-proposed-fee-targets-users-of-solar-panels/article_16597740-e251-5e3a-99e9-135de19ae42e.html .
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://sec.virginia.gov/DocketSearch#caseDoes/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
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

EX1031	~~Revised Draft Virginia S.C.C. Tariff No. 25, Appalachian Power Company (January 14, 2015) Part 6~~
EX1032	~~Wayback Machine Screen Capture of “CLK Case Information”, COMMONWEALTH OF VIRGINIA STATE CORPORATION COMMISSION; https://web.archive.org/web/20150214172415/http://www.scc.virginia.gov/clk/casefile.aspx (Feb. 14, 2015).~~
EX1033	~~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).~~
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 LISTING[†]

Number	Limitation
~~{1.0}~~	~~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}~~	~~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}~~	~~The system of claim 2, wherein the control system is configured to:~~

[†] ~~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}~~	~~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}~~	~~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}~~	~~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}~~	~~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}~~	~~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.
~~{9.0}~~	~~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}~~	~~The system of claim 1, wherein the control system is a mobile computing device.~~
~~{11.0}~~	~~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}~~	~~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}~~	~~The system of claim 1, wherein the power option data specify:~~
~~{13.1}~~	~~a first minimum power threshold associated with a first time interval in the set of time intervals, and~~
~~{13.2}~~	~~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}~~	~~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}~~	~~The system of claim 1, wherein a total duration of the set of time intervals corresponds to a twenty-four hour period.~~
~~{16.0}~~	~~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~~
~~{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}~~	~~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}~~	~~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~~
	~~set of computing systems.~~
~~{19.0}~~	~~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}~~	~~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 one or more computational operations based on the performance strategy.~~

I. INTRODUCTION

1. I have been retained by OBM, Inc. (~~“OBM”~~) and Cholla Energy LLC (collectively, “Petitioners”) ~~respectfully request~~ in connection with the above-captioned *Inter Partes* Review (“IPR”) ~~of~~ proceeding involving U.S. Patent No. 10,608,433 (“the ’433 Patent”) (EX1001), which is owned by Lancium LLC (“Patent Owner”).

2. I have been asked by Petitioners to offer opinions regarding the ’433 Patent 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.~~

~~H. 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.~~ of the ’433

Patent, as set forth in the Petition for IPR (the “Petition”). This declaration sets forth the opinions I have reached to date regarding these matters.

3. I am being compensated by Petitioners at my standard hourly consulting rate of \$500 per hour for my time spent on this matter. My compensation is not contingent on the outcome of the IPR or on the substance of my opinions.

4. I have no financial interest in Petitioners or Patent Owner.

II. EDUCATION AND QUALIFICATIONS

5. I am the CEO and Founder of CMG Consulting LLC, a strategy consulting and advisory company focused on enabling Smart Grids, Smart Utilities, Smart Cities, and Smart Buildings. CMG’s mission is to help define and accelerate the digitalization and transformation of its customers, offering world-class expertise in Energy, Water, Transportation, IoT, Telecommunications, Manufacturing, and Software markets and technologies. As the CEO, I am responsible for overseeing the company’s strategy, growth, and day-to-day operations. I am also actively involved in leading and co-leading various practices and projects for customers of all sizes.

6. Along with my role at CMG, I hold multiple key positions at Texas State University. I am a Materials Applications Research Center (“MARC”)

Fellow, Professor of Innovation in the College of Science and Engineering,
Co-Director of Connected Infrastructure for Education, Demonstration and
Applied Research (“CIEDAR”), and Industry Advisory Board Member to the
Ingram School of Engineering.

7. I am an award-winning engineer, speaker, author, and executive with
over 34 years of experience in the Energy, Telecommunications, Computers, and
Software industries. My work has led to global recognition by the Institute of
Electrical and Electronics Engineers (“IEEE”) as one of the early developers of
the smart grid concept and technology. In fact, I coined the term “Smart Grid” on
March 5, 2004. I am the author of three books and the editor of 47 titles in Power
Engineering, Telecom/IoT, and Building Technologies. I am also the co-author of
the best-selling book “The Advanced Smart Grid.” Additionally, I have received
36 industry awards since 2005.

8. During my tenure as the Chief Information Officer of Austin Energy
and member of the Innovation & Opportunity Development Council, I led Austin
Energy’s industry leading smart grid program design and implementation. I
additionally co-led over \$4 billion in investments into two wind farms, a solar
farm, a biomass power plant, a natural gas power plant, two cogeneration power
plants, two district cooling microgrids, roof top solar, over 100,000 thermostats
for load control, a fiber communications network reaching every substation, 100%

smart meter coverage, a smart grid architecture, and all the smart grid infrastructure.

9. Since 1992, I have held P&L responsibilities and senior executive titles while being responsible for the strategy, development, and commercialization of over 40 products. For example, my prior positions include EVP and Chief Strategy Officer at Proximity, EVP and Chief Strategy Officer at Grid Net, CEO at HillCast Technologies (acquired by Charles Schwab), CEO at agentGo.com (acquired by Avalon Marketing Systems), EVP and COO at iMark.com (acquired by FreeMarkets), VP at Tycho Networks (acquired by DSL.net), President & General Manager at Philips Consumer Communications, General Manager at Digital Equipment Corporation (now HP Enterprise), General Manager at Borland, Regional Manager at SCO, Product Manager at SCO, and Windows and MS-DOS Product Manager at Microsoft in Redmond, WA.

10. I hold a B.S. in Mechanical Engineering with a concentration in Robotics and Control Systems from The University of Kansas. Additionally, I have obtained post-graduate certificates in Business Management from Stanford University, Quality Management from The Wharton School of The University of Pennsylvania, and Power Utility Management from The University of Idaho.

11. Attached as “Appendix A” is a copy of my current C.V. further elaborating on my professional background and qualifications.

III. SUMMARY OF CONCLUSIONS FORMED

12. This Declaration explains the conclusion that I have formed on my analysis. To summarize those conclusions:

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

IV. LEVEL OF PERSON OF SKILL IN THE ART

13. In my opinion, a person of skill in the art (“POSA”) at the time of the claimed invention in the ’433 Patent would have at least 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.

~~C. Lead and Back-Up Counsel~~

Lead Counsel	Back-Up Counsel
~~Rodney R. Miller Registration No. 66,073 Womble Bond Dickinson (US) LLP 271 17th St. N.W., Suite 2400 Atlanta, GA 30363 T: (404) 879 2435~~	~~Preston H. Heard Registration No. 64,675 Womble Bond Dickinson (US) LLP 271 17th St. N.W., Suite 2400 Atlanta, GA 30363 T: (404) 888 7366~~

<u>Rodney.Miller@wbd-us.com</u>	<u>Preston.Heard@wbd-us.com</u>
	James E. Dority Registration No. 77,313 ~~Womble Bond Dickinson (US) LLP~~ ~~550 S. Main St., Suite 400 Greenville,~~ ~~SC 29601~~ ~~T: (864) 255-5412~~ <u>James.Dority@wbd-us.com</u>
	David L. McCombs Registration No. 32,271 Haynes and Boone, LLP 2801 N. Harwood St., Suite 2300 Dallas, TX 75201 ~~T: (214) 651-5533~~ <u>david.mccombs.ipr@haynesboone.com</u>
	Adam C. Fowles Registration No. 65,005 Haynes and Boone, LLP 2801 N. Harwood St., Suite 2300 Dallas, TX 75201 ~~T: (972) 739-8674~~ <u>adam.fowles.ipr@haynesboone.com</u>

~~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.~~

V. LEGAL PRINCIPLES

14. I am not a lawyer and I will not provide any legal opinions in this IPR. Although I am not a lawyer, I have been advised that certain legal standards must be applied by technical experts in forming opinions regarding the meaning and validity of patent claims.

15. I am informed and understand that the terms used in the claims of an issued patent should have the meaning they would have to a POSA at the time the claimed invention was made, based on the claims, specification, and prosecution history of the patent-at-issue.

16. I am informed and understand that a patent claim is invalid as obvious under 35 U.S.C. § 103 if the differences between the claimed invention and the prior art are such that the subject matter as a whole would have been

~~²For 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.~~

obvious at the time the invention was made to a person having ordinary skill in the art. I am informed and understand that a claimed invention composed of several elements is not proved obvious merely by demonstrating that each of its elements was known independently in the prior art. A patent challenger must identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements. In determining whether a claimed invention is obvious, each claim must be considered separately, and hindsight may not be used, but only what was known at the time of the invention.

17. ~~§§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.~~ I am informed and understand that in making a determination whether a given patent claim is obvious, one must take into account: (1) the scope and content of the prior art; (2) the differences between the prior art and the claims; (3) the level of ordinary skill in the art; and (4) any objective evidence (called “secondary considerations”) that may have existed at the time of the invention and afterwards that shed light on the nonobviousness of the claimed invention, including:

(a) whether the invention was commercially successful as a result of the merits of the claimed invention; (b) whether the invention satisfied a long-felt need; (c) whether others had tried and failed to make the invention; (d) whether others

copied the invention; (e) whether the invention achieve unexpected results; and
(f) whether others in the field praised the invention; among others.

VI. MATERIALS CONSIDERED

18. In forming my opinions, I have reviewed and considered the
documents identified in the list of exhibits below. To the extent I am provided
additional documents and information in this proceeding, including any expert
declarations, I may offer further opinions.

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

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.~~

<u>Exhibit No.</u>	<u>Description</u>
<u>EX1001</u>	<u>U.S. Patent No. 10,608,433 (“the ’433 Patent”)</u>
<u>EX1002</u>	<u>File History for U.S. Patent No. 10,608,433</u>
<u>EX1003</u>	<u>Declaration of Andres E. Carvallo</u>
<u>EX1004</u>	<u>U.S. Patent App. Publication No. 2010/0088261 (“Montalvo”)</u>
<u>EX1005</u>	<u>Virginia S.C.C. Tariff No. 25, Appalachian Power Company (January 14, 2015) (“APC-Tariff”)</u>
<u>EX1006</u>	<u>U.S. Patent App. Publication No. 2016/0329708 (“Day”)</u>
<u>EX1007</u>	<u>U.S. Patent App. Publication No. 2019/0318327 (“Sowell”)</u>
<u>EX1008</u>	<u>Order, Dkt. 219, <i>Bearbox LLC et al. v. Lancium LLC et al.</i>, 1:21-cv- 00534-GBW-CJB (D. Del.)</u>
<u>EX1009</u>	<u>California Independent System Operator, <i>Resource Testing Guidelines Procedure No. 5330</i> (July 6, 2015) (“the Guidelines”)</u>
<u>EX1010</u>	<u>New York Independent System Operator, <i>Emergency Demand Response Program Manual No. 7</i> (November 2022) (“NYISO Manual”)</u>
<u>EX1011</u>	<u>California Independent System Operator, <i>Overview of Reliability Demand Response Resource</i> (May 8, 2014) (“RDRR Overview”)</u>
<u>EX1012</u>	<u>California Independent System Operator, <i>Implementation Overview for PDR</i> (August 26, 2014) (“PDR Overview”)</u>
<u>EX1013</u>	<u>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</u>
<u>EX1014</u>	<u>RUI WANG, NAGARAJAN KANDASAMY, CHIKA NWANKPA, AND DAVID R. KAELI, <i>DATACENTERS AS CONTROLLABLE LOAD RESOURCES IN THE ELECTRICITY MARKET</i> (2013)</u>
<u>EX1015</u>	<u>Pennsylvania New Jersey Maryland Interconnection (PJM), <i>PJM Manual 11: Energy & Ancillary Services Market Operations</i>, Rev. 88 (May 11, 2017) (“PJM Manual”)</u>
<u>EX1016</u>	<u>Ivy Main, <i>Virginia regulators approve Appalachian Power’s ‘solar tax’</i>”, POWER FOR THE PEOPLE VA (December 1, 2014), https://powerforthepeopleva.com/2014/12/01/virginia-regulators-approve-appalachian-powers-solar-tax/.</u>

<u>EX1017</u>	<u>Mike Gangloff, <i>Appalachian Power's proposed fee targets users of solar panels</i>, ROANOKE TIMES (Sept. 8, 2014), https://roanoke.com/news/local/appalachian-powers-proposed-fee-targets-users-of-solar-panels/article_16597740-c251-5c3a-99e9-135dc19ae42c.html.</u>
<u>EX1018</u>	<u>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/.</u>
<u>EX1019</u>	<u>Final Order, Application of Appalachian Power Company, Commonwealth of Virginia State Corporation Commission, Case No. PUE-2014-00026 (Nov. 26, 2014).</u>
<u>EX1020</u>	<u>William T. Reisinger, <i>Public Utilities Law</i>, 49 U. RICH. L. REV. 137 (2014).</u>
<u>EX1021</u>	<u>Pitt & Michaud, <i>Assessing the Value of Distributed Solar Energy Generation</i>, 2 CURRENT SUSTAINABLE/RENEWABLE ENERGY REPORTS 105 (July 19, 2015).</u>
<u>EX1022</u>	<u>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.</u>
<u>EX1023</u>	<u>Pitt & Wang, <i>Optimizing the Grid Integration of Distributed Solar Energy</i>, FINAL PRESIDENTIAL RESEARCH QUEST FUND GRANT REPORT VIRGINIA COMMONWEALTH UNIVERSITY (April 2018).</u>
<u>EX1024</u>	<u>Gilbert Michaud, <i>Community Shared Solar in Virginia: Political and Institutional Barriers and Possibilities</i>, 5 POLITICS BUREAUCRACY AND JUSTICE 6 (2016).</u>
<u>EX1025</u>	<u><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).</u>
<u>EX1026</u>	<u>Revised Draft Virginia S.C.C. Tariff No. 25, Appalachian Power Company (January 14, 2015) Part 1</u>
<u>EX1027</u>	<u>Revised Draft Virginia S.C.C. Tariff No. 25, Appalachian Power Company (January 14, 2015) Part 2</u>
<u>EX1028</u>	<u>Revised Draft Virginia S.C.C. Tariff No. 25, Appalachian Power Company (January 14, 2015) Part 3</u>
<u>EX1029</u>	<u>Revised Draft Virginia S.C.C. Tariff No. 25, Appalachian Power Company (January 14, 2015) Part 4</u>

<u>EX1030</u>	<u>Revised Draft Virginia S.C.C. Tariff No. 25, Appalachian Power Company (January 14, 2015) Part 5</u>
<u>EX1031</u>	<u>Revised Draft Virginia S.C.C. Tariff No. 25, Appalachian Power Company (January 14, 2015) Part 6</u>
<u>EX1032</u>	<u>Wayback Machine Screen Capture of “CLK Case Information”, COMMONWEALTH OF VIRGINIA STATE CORPORATION COMMISSION, https://web.archive.org/web/20150214172415/http://www.scc.virginia.gov/clk/casefile.aspx (Feb. 14, 2015).</u>
<u>EX1033</u>	<u>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).</u>
<u>EX1034</u>	<u>Whited et al., <i>Caught in a Fix: The Problem with Fixed Charges for Electricity</i>, SYNAPSE ENERGY ECONOMICS, INC. (Feb. 9, 2016).</u>
<u>EX1035</u>	<u>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).</u>
<u>EX1036</u>	<u>U.S. Patent App. Publication No. 2018/0101220 (“Mahindru”)</u>
<u>EX1037</u>	<u>U.S. Patent App. Publication No. 2015/0371328 (“Gabel”)</u>
<u>EX1038</u>	<u>U.S. Patent App. Publication No. 2018/0356770 (“ElBsat”)</u>

19. In addition to the documents and materials cited in this declaration, I also relied on my knowledge, education, skills, experience, and training in forming my opinions.

~~VII. VI.OVERVIEW OF THE~~ TECHNOLOGY BACKGROUND – DEMAND RESPONSE PROGRAMS

~~A.Background~~

20. The effective functioning of the United States electricity grid hinges on the precise management of energy supply and demand. Within the web of interconnected power systems, the Eastern Interconnection and Western Interconnection operate as two essential regional entities, each with its unique set

of challenges and responsibilities.

21. To ensure the seamless flow of electricity, Independent System Operators (“ISOs”) and Regional Transmission Organizations (“RTOs”) ~~are responsible for~~assume critical roles as the overseers of specific geographic areas. EX1004, ¶¶[0002], [0004]. These entities are tasked with coordinating, controlling, and monitoring the ~~U.S. electricity grid in specific geographic areas.~~ EX1003, ¶¶20-21. ~~For instance, PJM~~various components of the grid, including power generation, transmission lines, and distribution networks. EX1004, ¶[0002]; EX1013. Their expertise and real-time decision-making are vital in maintaining grid stability, averting power outages, and ensuring a reliable supply of electricity to homes, businesses, and industries.

22. Among the ISOs/RTOs, the Pennsylvania-New Jersey-Maryland Interconnection LLC (“PJM”) is a RTO thatin the Eastern Interconnection coordinates the movement of wholesale electricity in ~~several states including, for example~~all, or most, parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania and, Tennessee, Virginia. ~~Id., ¶22.~~West Virginia, and the District of Columbia. See EX1004, ¶[0004].

23. Additionally, California Independent System Operator (“CAISO”) isan ISO/RTO member of the Western Interconnection. As one of the largest ISOs

in the world, CAISO orchestrates the movement of wholesale electricity for the bulk of California's electric power system, ensuring that the power generated reaches consumers in need across the interconnected network. See EX1004, ¶[0005]; see generally, EX1009, EX1011, EX1012.

24. Despite meticulous planning and advanced forecasting, however, maintaining a perfect balance between energy supply and demand is an ongoing challenge. The demand for electricity fluctuates throughout the day, with peaks during periods of intense weather, economic activity, or seasonal changes. EX1004, ¶[0069]; EX1013. These fluctuations are particularly evident during extreme weather months when scorching heatwaves or frigid cold snaps prompt increased use of air conditioning and electric heating systems. EX1013.

25. To address this dynamic scenario, ISOs/RTOs implement demand response programs as a proactive measure. These innovative initiatives incentivize end-users, including residential, commercial, and industrial consumers, to voluntarily modify their electricity consumption patterns during times of peak demand. Id. Participants are encouraged to reduce their energy usage or shift it to off-peak hours through financial incentives, lower electricity rates, or even direct payments. Id.

26. Demand Response is the act of reducing energy consumption from the grid at the direction of an ISO/RTO. EX1004, ¶[0003]. Demand response

programs empower consumers to be active participants in grid management, allowing them to contribute to grid stability while also reaping economic benefits. EX1013; EX1014, 176. By voluntarily curtailing energy usage during peak hours, consumers collectively relieve pressure on the grid, mitigating the risk of brownouts or blackouts. *Id.* This demand-side flexibility not only fosters grid reliability but also promotes energy conservation and environmental sustainability by reducing the need for additional fossil-fuel-based power generation during peak times.

~~ISOs/RTOs interface with local utility companies to regulate the grid and~~

27. Moreover, demand response programs are not limited to short-term crisis management. They also play a vital role in fostering energy efficiency and demand-side management strategies in the long run. By encouraging the adoption of smart technologies, such as smart thermostats, energy-efficient appliances, and smart meters, these programs create a culture of energy consciousness among consumers. EX1004, ¶[0023]; see EX1013 (“Smart customer systems such as in-home displays or home-area-networks can make it easier for consumers to change their behavior and reduce peak period consumption from information on their power consumption and costs.”).

28. Conversely, when the power supply exceeds the demand during periods of low consumption or abundant renewable energy generation,

ISOs/RTOs initiate curtailment actions. EX1004, ¶¶[0005], [0026]; EX1014, 178. These proactive measures involve managing the amount of power arriving at the grid from various generation sources to maintain a balanced system. EX1004, ¶¶[0015] – [0016], [0026]; EX1014, 178. Curtailment can be applied to large-scale power plants, renewable energy facilities, or distributed energy resources (“DERs”) like rooftop solar panels. *Id.* ¶¶[0045], [0055] – [0056].

29. During curtailment, certain power sources may be temporarily disconnected from the grid or operated at reduced capacities. *Id.* For instance, wind turbines may be feathered to reduce their rotational speed and power output, or solar power plants may temporarily shut down. *Id.* By carefully managing curtailment, ISOs/RTOs can optimize power transmission and avoid grid congestion, preventing excess electricity from going to waste.

30. In addition to managing imbalances between supply and demand, curtailment actions are crucial for grid stability when faced with issues such as grid overloading, voltage fluctuations, or system frequency deviations. By regulating the power flow strategically, ISOs/RTOs ensure that electricity is efficiently transmitted across long distances without compromising the integrity of the grid.

31. For example, Section 10 of the PJM Manual provides an overview of Demand Resource Participation in the PJM Energy Market. EX1015, 129. The

purpose of the Demand Resource Participation rules is to enable Demand Resources under the direction and control of Curtailment Service Providers (“CSPs”) to participate in the various PJM markets. *Id.* CSPs are Members or Special Members of PJM that participate in the PJM Markets by causing Demand Resources to reduce demand. *Id.* PJM Emergency or Pre-Emergency Load Response enables Demand Resources that reduce load during emergency or pre-emergency conditions to receive payment for those reductions. *Id.* PJM Economic Load Response enables Demand Resources to respond to PJM energy, synchronized reserve, and/or day-ahead scheduling reserve prices by reducing consumption and receiving a payment for the reduction or following PJM signal to reduce or increase load if providing regulation services. *Id.*, 129-30. PJM offers both a “Day-ahead Option” and a “Real- time Option,” the latter providing a mechanism by which any qualified market participant may offer Demand Resources the opportunity to commit to a reduction and receive payments based on real-time LMP for the reductions. *Id.*, 130.

32. CAISO also facilitates the flow of wholesale electricity by its member utilities using reliability demand response resources (“RDRR”) and proxy demand resources (“PDR”) to offer energy economically in the day-ahead-market and offer remaining, uncommitted capacity as energy in the real-time market.

EX1011, 5. They are compatible with existing California retail emergency-triggered demand response programs. *Id.*, 6. Further, they can simultaneously provide additional value to respond economically in the day-ahead timeframe while curtailing real-time load when required under a system or local emergency. *Id.*, 8. If a resource operator chooses to enroll a resource into any of CAISO's demand response programs, it must meet certain criteria. The purpose of this criteria is to ensure that the resource is capable of precisely increasing/decreasing KW Demand to expected levels at CAISO's request when the reliability of the grid is threatened.

33. In another example, the New York Independent System Operator ("NYISO"), a member of the Eastern Interconnection, similarly employs an Emergency Demand Response Program ("EDRP") and Day-Ahead Demand Response Program ("DADRP"). When requested by the NYSISO, these DR programs allow member utilities to curtail or shift electric loads onto local generators during emergency conditions. EX 1010, 4.

34. In order to deliver power reliability to end users, ISOs/RTOs must coordinate with local electric utility companies. For example, Appalachian Power Company ("APC") is an investor-owned utility company in PJM's jurisdiction that serves local areas including parts areas of Virginia. EX1005, 2, 7-10. Although governmental in nature, investor-owned utilities are technically businesses that

are often regulated by state agencies. In Virginia, APC is regulated by Virginia's State Commission Corporation ("SCC").~~Id.~~

35. These demand response programs and curtailment actions showcase the adaptability and innovation of ISOs/RTOs in addressing the evolving energy landscape. These approaches offer flexible, sustainable, and cost-effective solutions to the challenges of grid management in an era of rising energy demand and environmental concerns. Their continued evolution is essential as the electricity grid navigates the transition to a more resilient, decentralized, and sustainable energy future.

VIII. OVERVIEW OF THE PROSECUTION HISTORY

36. From my review of the materials, the application that led to the '433 Patent was filed on December 4, 2019. EX1002, 1, 4. I understand that on January 27, 2020, the Examiner issued a Notice of Allowance. I understand that that Examiner did not issue an Office Action. *Id.*, 17. I further understand that most of the references cited in the IPR (Montalvo, EX1004; APC-Tariff, EX1005; Day, EX1006) were not cited during prosecution of the '433 Patent, except for Sowell (EX1007). EX1002, 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**

IX. OVERVIEW OF THE '433 PATENT

37. To assist the Board with evaluating the Challenged Claims, I have summarized the '433 Patent's disclosures below. I included annotations to both the '433 Patent's figures and the figures and illustrations of the various prior art

references discussed below.

38. From my review of the materials, the '433 Patent to McNamara et al. issued March 31, 2020. The '433 Patent claims priority to U.S. Provisional Application No. 62/927,119 and has an earliest effective filing date of October 28, 2019.

39. The '433 Patent is directed to methods and systems for adjusting power consumption based on a power option agreement. The system of the '433 Patent includes a set of computing systems and a control system. EX1001, 6:43-6:65.

40. All the independent claims of the '433 Patent claim variations of the same general computing system. Below is Independent Claim 1, which is an example of that system:

[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:

[1.2.1] 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.

41. Based on my reading of the remaining independent claims of the '433 Patent, Independent claim 17 is generally directed to the method performed by the system claimed in independent claim 1. EX1001, 6:14-42. Independent claim 20 is nearly identical to independent claim 1, except that the preamble of independent claim 20 recites a non-transitory computer-readable medium "that is configured to store instructions, that when executed by a computing system, causes the computing system to perform operations consistent with the method steps described above." *Id.*, 6:66-7:3.

42. The '433 Patent describes a set of computing systems configured to perform computational operations using power from a power grid. EX1001, 6:43-46. The control system is configured to monitor a set of conditions and receive power option data based, at least in part, on a power option agreement. *Id.* The specifications state the power option data specifies: (i) a set of minimum power thresholds, and (ii) a set of time intervals, where each minimum power threshold

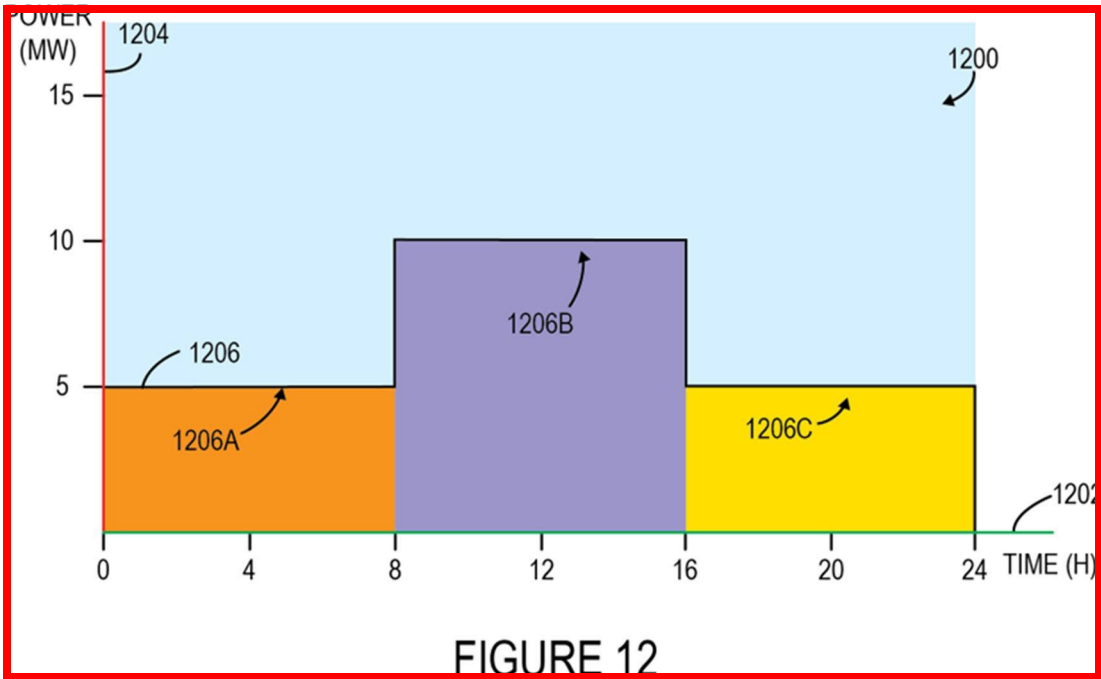
in the set of minimum power thresholds is associated with a time interval in the set of time intervals. *Id.*, 6:46-53; see *infra* ¶¶43-44. For example, Figure 12 annotated below shows the association between time intervals and minimum power thresholds provided by a power option agreement to illustrate a target average amount of power consumed by a computing system under a power option agreement. *See id.*

43. The control system is further 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. EX1001, 6:53-58. The performance strategy comprises a power consumption target for the set of computing systems for each time interval in the set of time intervals, where each power consumption target is equal to or greater than the minimum power threshold associated with each time interval. *Id.*, 6:58-63. The control system is also configured to provide instructions to the set of computing systems to perform one or more computational operations based on the performance strategy. *Id.*, 6:63-65.

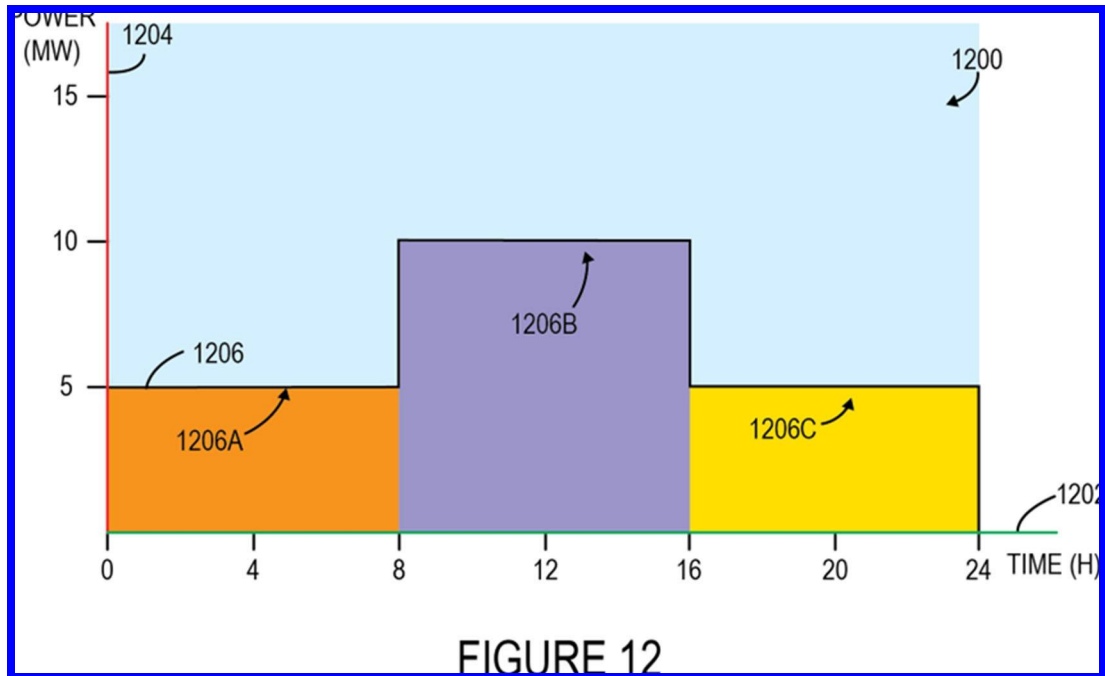
44. Figure 12 below depicts a graph representing power option data

based on a power option agreement. ~~Id.~~EX1004, 50:53-55. ~~Graph~~The graph 1200³ shows power option data arranged according to power **1204** (red) over time **1202**, ~~which~~ (green). Id., 50:55-56. As shown, time **1202** increases along the X-axis and minimum power thresholds 1204 increase along the Y-axis of the graph 1200. Id., 50:57-59. In this example embodiment, the time **1202** increases to 24-hours in 4-hour increments and the power is shown in MW, increasing in intervals of 5 MW. Id., 50:59-62. The time and minimum power threshold values can differ based on the power option agreement. ~~Id.~~See id., ~~50:55-56, 62-65~~50:62-65.

43. ³~~All emphasis and color annotations added unless otherwise indicated.~~



Line



45. The graph 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.~~ The graph line 1206 is further used to illustrate power consumption levels that ~~load(s)~~ one or more loads (e.g., a set of computing systems) operating according to the power option agreement may utilize during the 24-hour duration. *Id.*, 51:8-12. ~~The~~ Particularly, the power quantities above the graph line 1206 (i.e., shaded areas in light blue) ~~represent~~ represents power levels that the load(s) may consume from the power grid during the 24-hour duration that would satisfy the requirements (i.e., the minimum power thresholds 1206A-1206C) set forth by the power option agreement. *Id.*, 51:12-17. In particular, the power quantities above the graph line 1206 (i.e., shaded areas in light blue) include any power quantity that meets or exceeds the minimum power threshold at that time. *Id.*, 51:17-19. ~~The~~ By extension, the power quantities positioned below the graph line 1206 (i.e., shaded areas in orange, purple, and yellow) ~~represent~~ represents 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

46. ~~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.~~ The '433 Patent also discloses a method for implementing control strategies based on a fixed duration power option agreement. EX1001, 54:22-24. Figure 13 below shows that a control system (*e.g.* the remote master control system 262) may be configured to perform one or more steps of the method 1300. *Id.*, 54:26-

28. In this configuration, the control system may take various forms of a computing system, including, but not limited to, a mobile computing device, a wearable computing device, a network of computing systems, etc. *Id.*, 54:28-31.

A. ~~D.~~ **Prior Art**

i. Montalvo (EX1004)

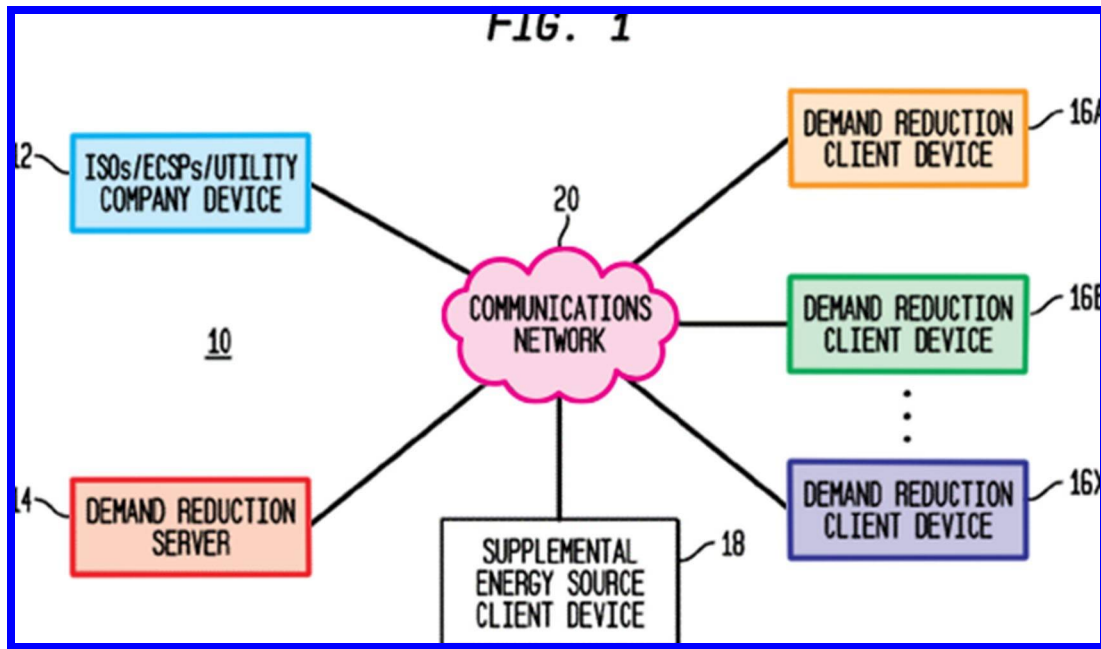
47. The primary prior art reference identified by Petitioners is U.S. Patent Application Publication No. 2010/0088261 (“to Rey Montalvo”) and it claims priority to U.S. Provisional Patent Application No. 61/195,608, and was filed on October 8, ~~2009 and published on April 4, 2010~~ 2008, and thus qualifies as prior art to the '433 Patent under at least 35 U.S.C. § 102(a)(1)-(2).

48. From my review of the materials, 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~~ in accordance with the terms of the DR Agreements. *Id.* ~~EX1003, ¶47-55~~ Montalvo explains that utility companies are typically deregulated, and ISOs, such as PJM, have agreements directly with ECSPs to reduce a specified amounts of KW demand in the event of a DR event. *Id.*, ¶[0004]. These ECSPs, in turn, have DR Agreements with end users for the end users to reduce and/or eliminate KW Demand during a DR event. *Id.*

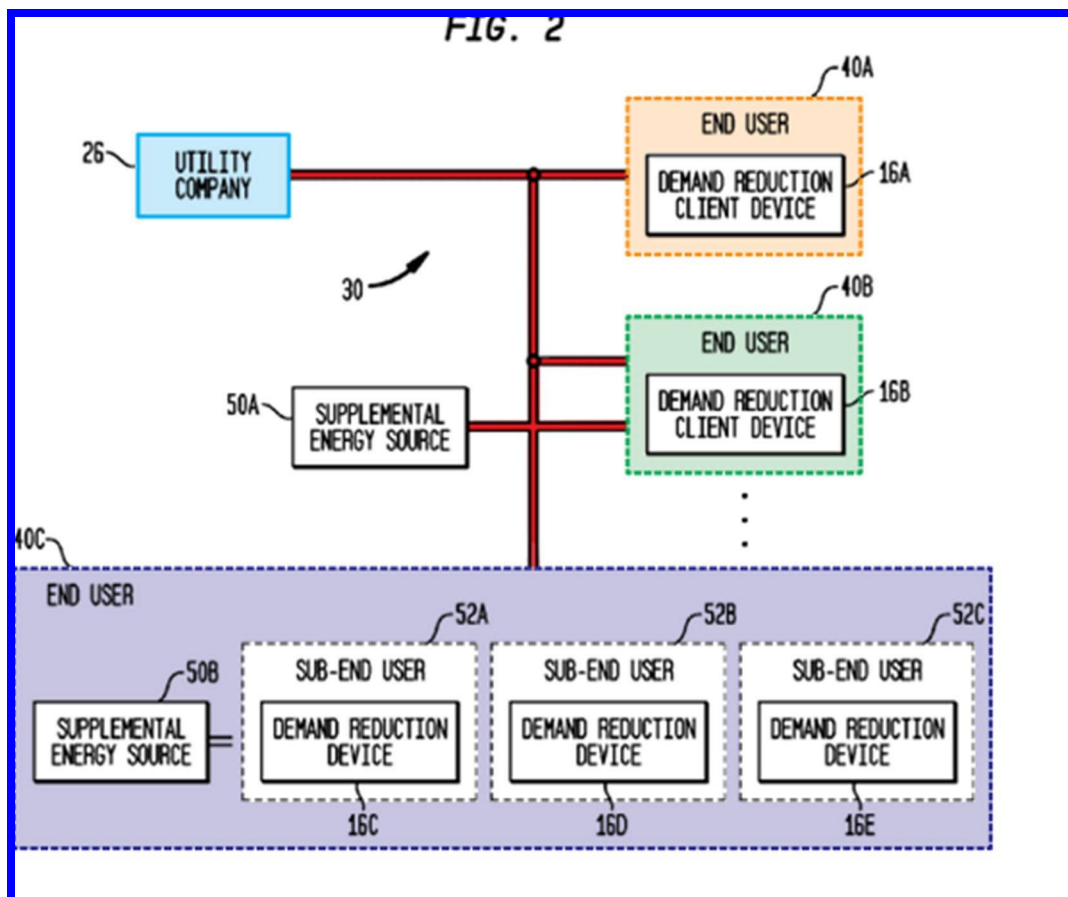
49. Montalvo explains that the system can include electronic message data that indicates one of a plurality of demand response events including the first demand response event. EX1004, ¶[0026]. Figure 1 illustrates the demand response system 10 (annotated below). *Id.*, ¶[0055], FIG 1.



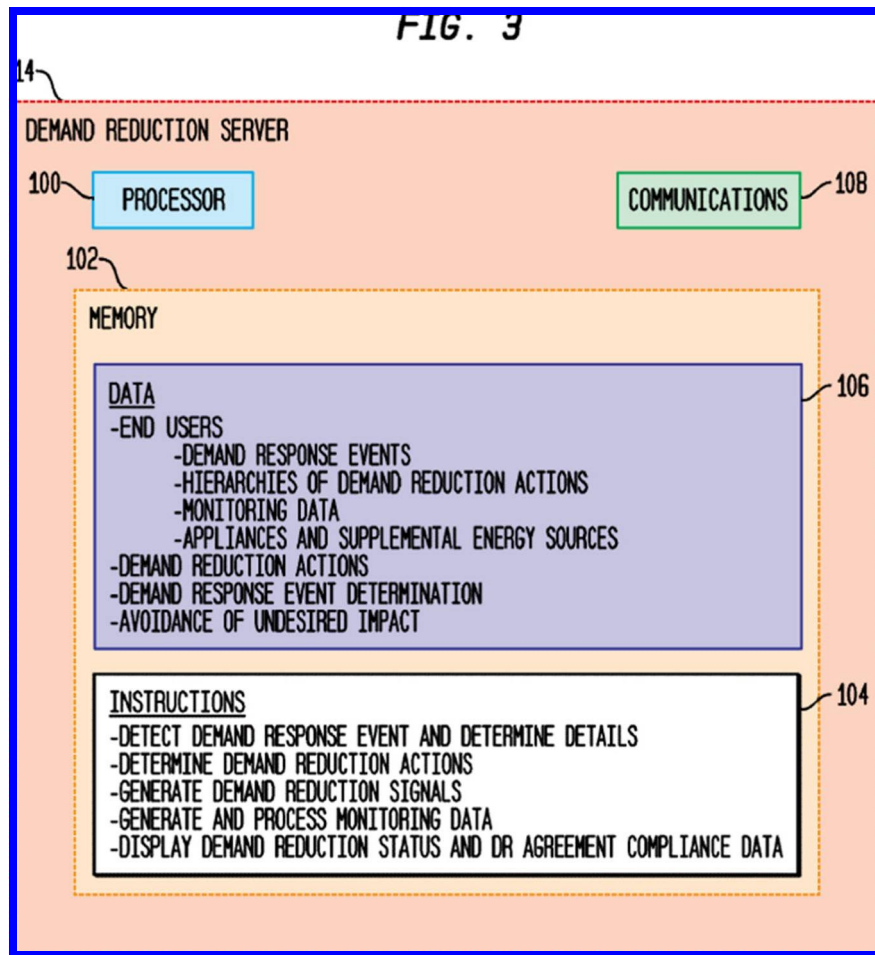
50. The system 10 includes a computer 12 [light blue], a demand reduction server computer (“DR Server”) 14 [red], and demand reduction client devices 16A [orange], 16B [green], and 16X [purple]. The computer 12 [light blue] is operated by ISOs and/or their affiliates, such as ECSPs, utility companies etc., to transmit, over the network 20 [pink], electronic message data to the DR server 14 and the DR clients 16. EX1004, ¶[0055]-[0056]. Furthermore, the DR server 14 transmits data to and receives data from the DR clients 16, [...], via the network 20, to implement fully automated demand response at end users [...] in accordance with the terms of DR agreements. *Id.*, [0056]

51. Montalvo illustrates in Figure 2 a utility company 26 (light blue), who is an operator or affiliate of an operator of the computer 12 (light blue of FIG. 1),

supplying electrical power over a power grid 30 (red) to end users 40A (orange), 40B (green), and 40C (purple), who are customers of, and consume electrical power supplied over the grid 30 by, the utility company 26. EX1004, ¶[0057], FIG 2.



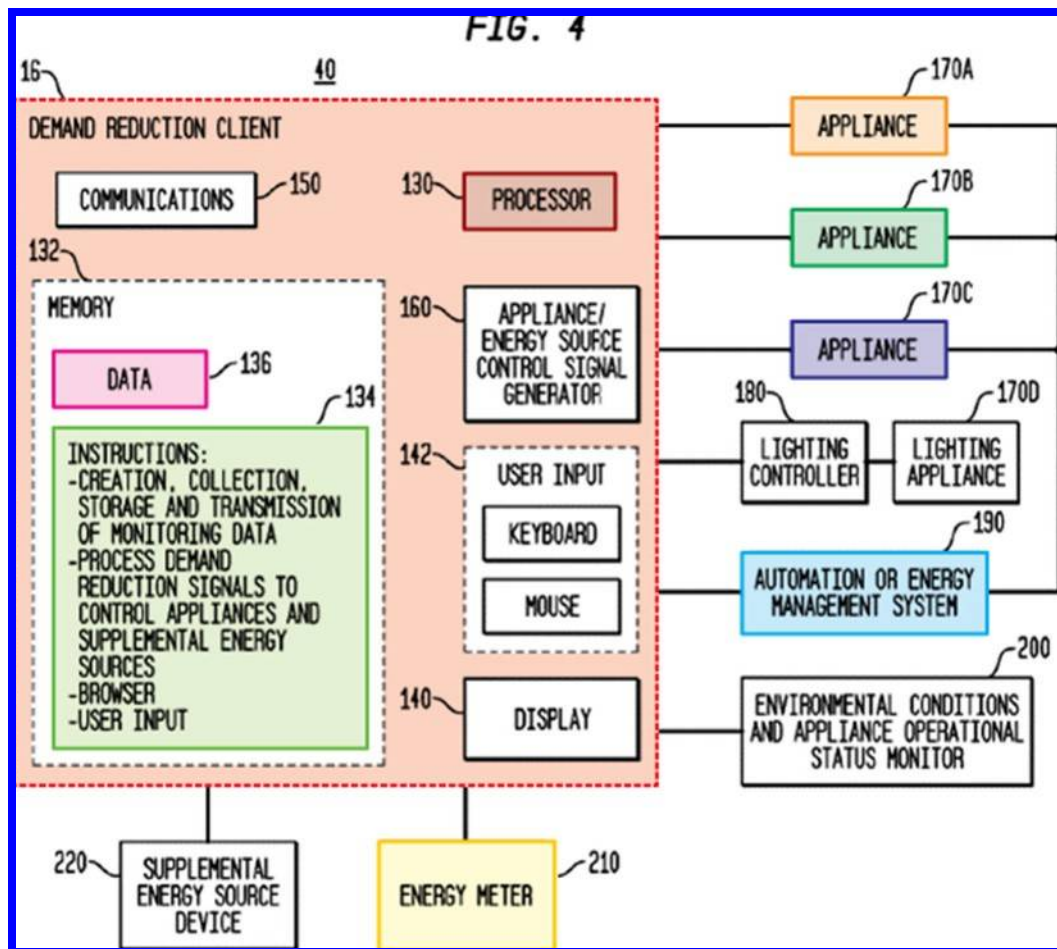
52. Figure 3 below discloses an embodiment where the DR server 14 (red) may include a processor 100 (light blue), a memory 102 (orange), a communications network interface device 108 (green), and other components typically present in a general purpose computer. EX1004, ¶[0060]; FIG 3.



53. For each end user, the data 106 (purple) includes monitoring data used by the processor 100 to determine a demand reduction action to be taken for a DR event. EX1004, ¶[0069]. Possible monitoring data may include: (i) exterior environmental data; (ii) interior environmental data; (iii) energy consumption data describing consumption of electrical power supplied from the power grid or from a supplemental energy source; (iv) energy generation data describing generation of electrical power from a supplemental energy source; (v) appliance operation data (including end user power consumption); and (vi) electricity pricing limits. *Id.*,

¶¶[0047]-[0051], [0069]-[0071], [0152].

54. Referring to Figure 4, Montalvo illustrates an embodiment where an end user 40 includes a DR client 16 (red) that is connected to appliances 170A (orange), 170B (green), 170C (purple), and an automation control or energy management system 190 (light blue) connected to some or all the appliances. EX1004, ¶[0082], FIG 4.



55. The DR client 16 includes instructions 134 (light green) that the processor 130 (dark red) executes to create monitoring data from information

supplied to, or acquired by, the DR client 16; store all or portions of the monitoring data in the data 136 (pink); and transmit the monitoring data over the communication network 20 to the DR server 14. EX1004, ¶[0086].

ii. **APC-Tariff (EX1005)**

- ~~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,~~The second prior art reference identified by the Petitioners is the Appalachian Power Company Tariff (“APC-Tariff”). I understand that the 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, qualifying it~~ 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).~~

56. 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.~~ It appears to me that APC-Tariff outlines the terms and conditions of "Standard Service," which is defined as "service made available to retail customers purchasing bundled generation, transmission and distribution services" from APC. Id., 13. APC- Tariff's terms and conditions apply to all customers taking "Standard Service" from APC. Id.

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. This demand response program is available to APC non-residential customers on a voluntary basis to who (1) are taking firm Standard Service from APC, and (2) are not already enrolled in a demand response program directly through PJM or through a Curtailment Service Provider. Id. 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.~~

58. For customers enrolled in the PSEDR program, 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~~As little as ninety minutes advanced notice is required. Id. The customer is ultimately responsible for receiving and acting upon a curtailment notification from APC. Id. Importantly, the *minimum PSEDR capacity* that a customer is required to have under the PSEDR schedule is 100 kW. *Id.*, 222; (emphasis added).

59. For each customer, a Customer Baseline Load (“CBL”) is calculated for each hour corresponding to each curtailment event hour, generally providing for a “reasonable representation of normal load conditions.” ~~EX1003~~1005, ¶56-61222. The customer’s Curtailed Demand may then be determined from either (1) a Guaranteed Load Drop (“GLD”) method or (2) a Firm Service Level (“FSL”) method. *Id.*, 222-

223. The GLD method requires that the customer specify a minimum demand reduction that the customer will provide for each hour during a curtailment event. Id., 222. Generally speaking, the FSL method requires that the customer designate an “Available Curtailment Demand,” calculated as the difference between (i) an average of the load’s five highest daily peak loads in a year, and (ii) the load’s Firm Service Level, which is the amount of energy the customer agrees to reduce

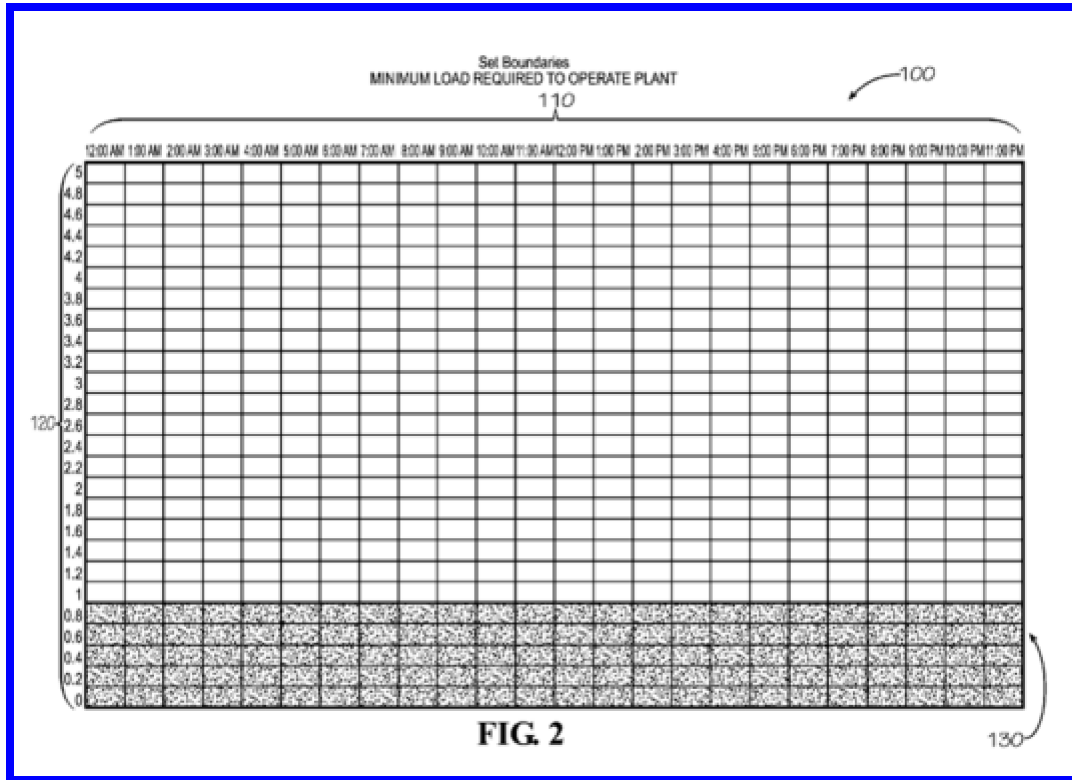
its load to or below during each hour of a curtailment event. *Id.*, 223.

61. Customers enrolled in APC's PSEDR program receive financial incentives (in the form of Curtailment Credits) corresponding to the amount of energy curtailed when directed by APC. EX1005, 224. The amount of energy curtailed ("Curtailed Energy") is calculated for each curtailment event hour as the difference between the customer's CBL for that hour and the customer's metered load for that hour. *Id.*

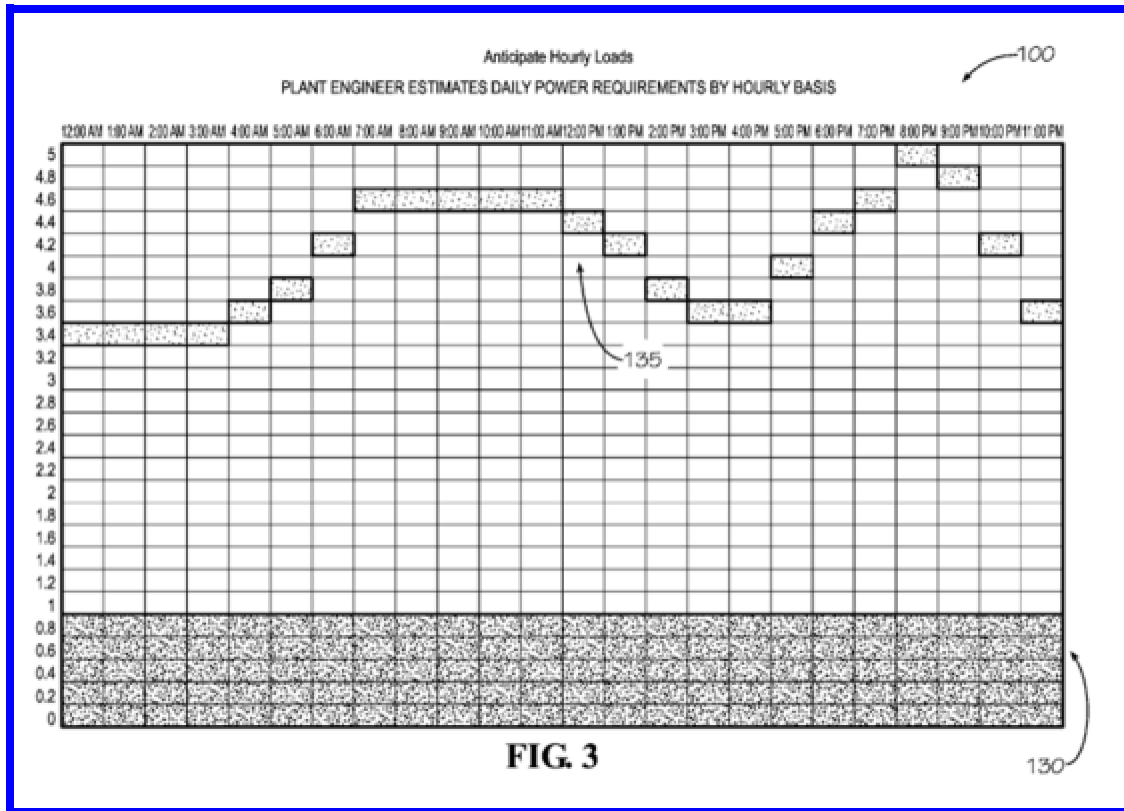
iii. Day (EX1006)

62. The third prior art reference identified by Petitioners is U.S. Patent Application Publication No. 2016/0329708 (~~"to Day"~~) and it claims priority to U.S. Provisional Patent Application No. 62/157,310, and 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)- and (a)(2).

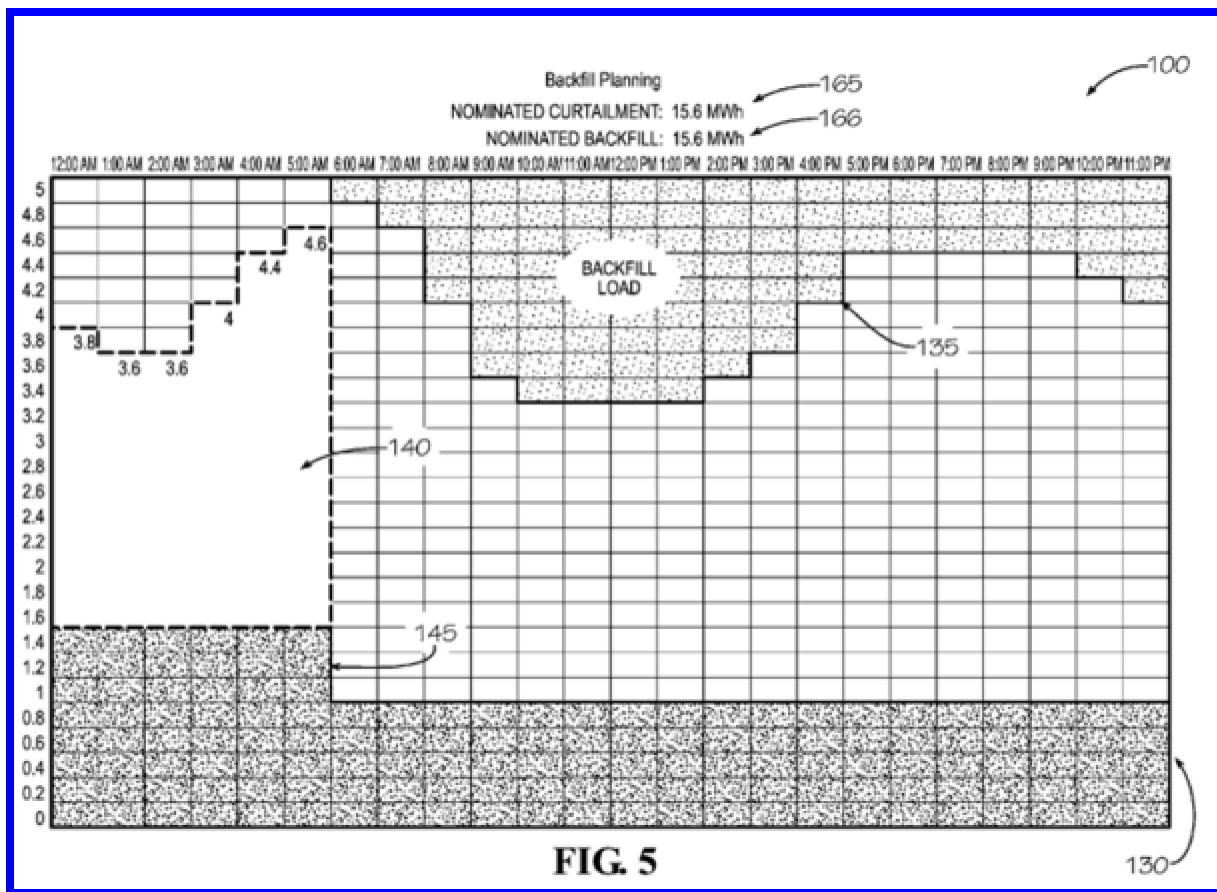
63. Based on my review of the materials, Day is generally directed towards an electric load curtailment nominating system for a load facility. EX1006, ¶[0009]. The load nomination system includes a user interface configured to accept entry of load facility curtailment bids, backfill bids, and related load facility operational parameters, as shown below:



64. As shown above in Figure 2 of Day, user interface 100 includes a grid structure having a series of twenty-four columns 110 each representing an hour of the day, and a series of rows 120 each representing a 200 kW increment of electrical power. *Id.* ¶[0036]. The user interface 100 is configured to enable the plant engineer to define the absolute minimum load 130 required to operate the plant on an hour-by-hour basis, which, in the above example, has been set to 1.0 MW for each of the day's twenty-four hours. *Id.*



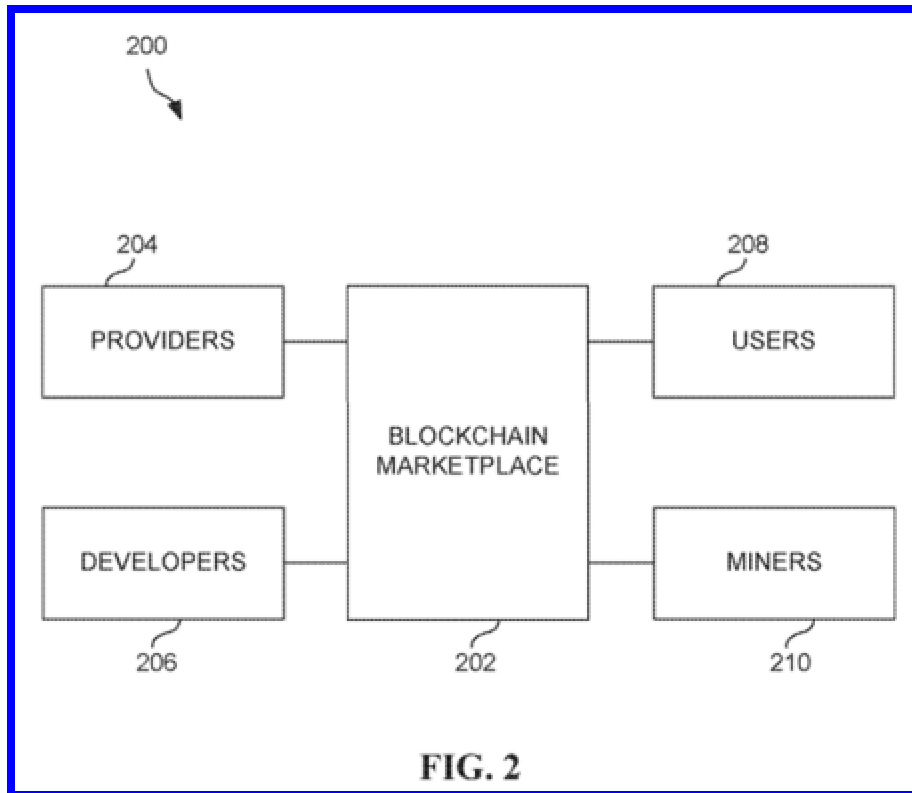
65. Based on my reading of Figure 3, the user interface 100 is configured to enable the plant engineer to define the load facility's anticipated loads for the coming day, on an hour-by-hour basis. EX1006, ¶[0037]; ~~EX1003, ¶¶62-65.~~ As shown above, the anticipated load 135 is indicated by shaded boxes. *Id.* This specification shows the anticipated load varies from 3.4 MW at the 12:00 am hour to 5 MW at the 8:00 pm hour. *Id.* The area between the minimum load 130 and the anticipated load 135 represents the loads which are available for curtailment. *Id.* Figure 5 of Day illustrates different minimum loads 130 at different times, as shown below:



iv. Sowell (EX1007)

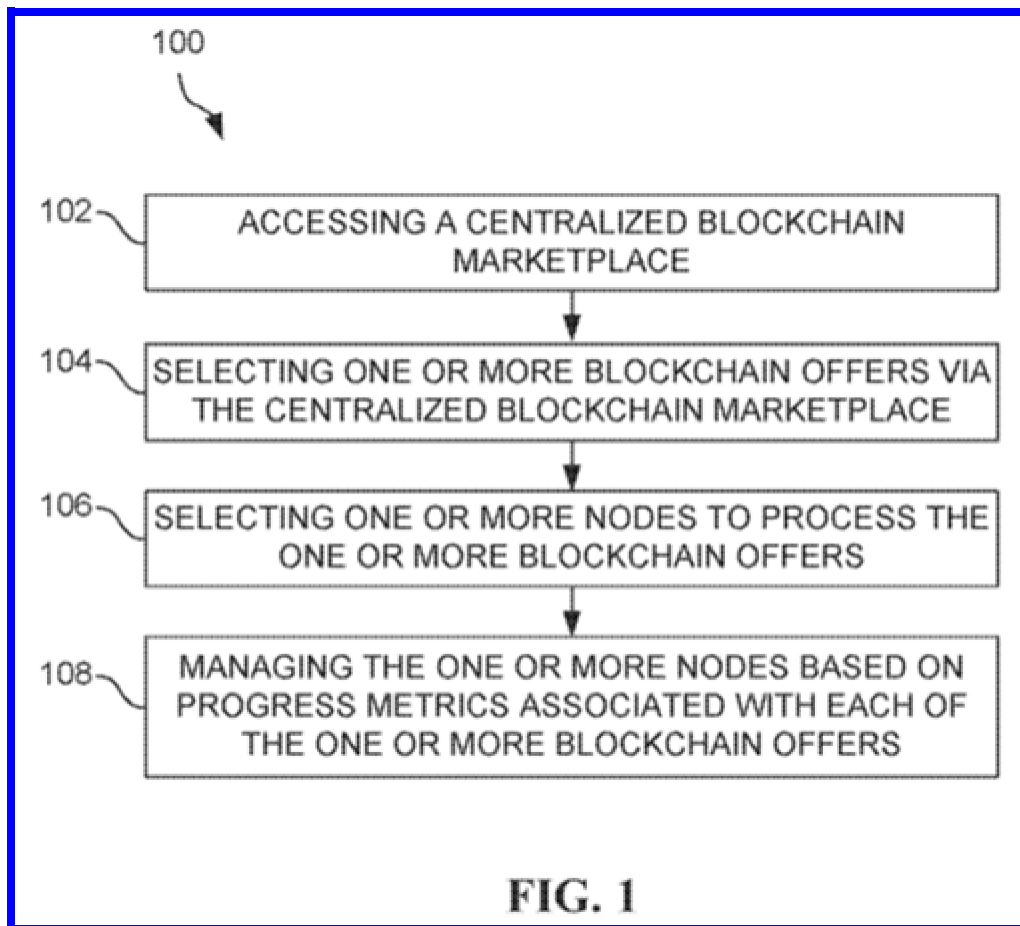
66. The fourth and final prior art reference identified by Petitioners is
U.S. Patent Application Publication No. 2019/0318327 (“to Sowell”) et al. and
claims priority to U.S. Provisional Patent Application No. 62/625,293, and was
filed on April 11, 2018,2 and published on October 17, 2019, and thus qualifies as
prior art to the ’433 Patent under at least 35 U.S.C. § 102(a)(2).

67. Based on my review of the materials, Sowell ~~describes~~is generally
directed to a system, method, and computer program product for using a
blockchain marketplace ~~that includes~~. EX1007, ¶[0005].



68. FIG. 2 of Sowell illustrates a blockchain marketplace **200**. *Id.* ¶[0034].

The blockchain marketplace of Sowell serves as a central repository whereby miners and developers can interact. *Id.*, ¶[0025]. For example, it be used to upload action items (e.g. blockchain offers) and/or any input string, manage uploaded items, and solicit and/or bid to work (i.e. use hashing power to mine blockchains). *Id.* The blockchain marketplace **202** is connected to providers **204** and developers **206** who can provide blockchains and/or work items to the blockchain marketplace **202**. *Id.*, ¶[0035]. On the other side of the blockchain marketplace are users **208** and miners **210**, who provide resources (e.g. hash power, hash rate, etc.) to the blockchain marketplace **202**. *Id.* For example, the users **208** and miners **210** can include an entity with mining hardware capable of processing blockchains. *Id.*



69. FIG. 1 of Sowell illustrates a method **100** for managing nodes of a blockchain marketplace. *Id.*, ¶[0024]. First, in operation **102**, a provider or developer can access the centralized blockchain marketplace to upload action items (e.g., blockchain offers), or a user or miner can access the centralized blockchain to solicit and/or bid work (i.e., use hashing power to mine blockchains). *See id.*, ¶[0025]. After one or more blockchain offers are selected in operation **104**, one or more nodes are then selected to process the one or more blockchain offers in operation **106**. *Id.*, ¶¶[0027] - [0028]. Sowell describes a node as an amount of hashing power, including “a disparate device capable of

mining blockchain(s), an allocated amount of hashing power from a blockchain farm (e.g. a server farm with mining capabilities), and/or any processing power which can be applied towards mining.” *Id.*, ¶[[0028].

70. The nodes of Sowell are thereafter managed based on progress metrics associated with each of the one or more blockchain offers. *Id.*, ¶[[0030].
Managing nodes includes virtually taking “any action” with respect to a node, such as allocating more or retracting hashing power from a node. *Id.* The progress metrics of Sowell may include, among other things, at hashing power (or hash rate), an electricity consumption rate, a processor load, and/or a price per hashing power. *Id.*, ¶[[0031].

71. The blockchain marketplace of Sowell can further include a distribution of hashing commands amongst available nodes and/or resources to mine such hashing commands. ~~EX1007~~*Id.*, ¶[[0084]. The blockchain marketplace of Sowell can be configured to allow miners to view potential offers to determine, based on their resource capabilities, where the best reward may exist. *Id.* For example, the blockchain marketplace may provide recommendations to the miner as to which offers may provide the greatest return on investment based on the hardware configuration of the node and/or resource. *Id.* ~~The~~

72. Along the same lines as described above, Sowell’s blockchain marketplace ~~further~~ can be configured to forecast and project revenue ~~and~~

~~recommend~~associated with mining a blockchain, such that the blockchain marketplace can make recommendations on which blockchain to a miner should pursue. *Id.*, ¶[0087]; EX1003, ¶66-72. This

~~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.~~

recommendation process can be automated to include analyzing the difficulty of the blockchain, production needs for the blockchain, and the current and projected value of the coins, and taking an action (or proposed action) which would maximize the financial reward for the miner. *Id.*, ¶[0088]. Additionally, based on thresholds set by the miner, the blockchain marketplace may propose alternative offers to pursue based on expected reward amounts. *Id.*, ¶[0087].

X. ~~VIII.~~ CLAIM CONSTRUCTION

73. In I understand that the '433 Patent was the subject of a past litigation styled *Bearbox LLC et al. v. Lancium LLC et al.*, 1:21-cv-00534-GBW-CJB (D. Del.). From my review of the materials, the ~~Court~~district court construed “power

option agreement” ~~asto~~ mean “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~~ Additionally, the district court construed “minimum power threshold” ~~asto~~ mean “a minimum amount of power a load must use during an associated time interval.” *Id.* For purposes of this proceeding ~~only~~, I understand that Petitioners do not contest these constructions, nor do Petitioners propose any further constructions.

**XI. ~~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
under 35 U.S.C. §103 over Montalvo in view of APC-Tariff.**

i. Motivation to Combine

74. ~~A~~In my opinion, a POSA would have been motivated to combine Montalvo and ~~the~~ APC- Tariff for several reasons.

75. ~~APC-Tariff and Montalvo~~Both references are in the ~~same~~ field of endeavor of the '433 Patent. ~~The '433 Patent states that the “specification relates to adjusting power consumption for loads to maintain the integrity of a power grid. For instance, the '433 Patent describes the never-ending challenge grid operators face in striving to maintain a perfect balance between a grid’s KW supply and demand. EX1001, 4:9-5:43. In an effort to “maintain grid stability” the invention of the '433 Patent is directed to a system capable of “power consumption adjustments when using grid power and/or intermittent behind-the-meter power.” EX1001~~Id.; see also id., at 1:16-18, 58:54-60 (“[T]he invention provides more economically efficient control and stability of such power grids in the implementation of the technical features as set forth herein.”).

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~~

76. Montalvo is in this same field of endeavor as the '433 Patent. 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]. Notably, the '433 Patent similarly contemplates adjusting KW consumption based on the same kind of demand response conditions taught by Montalvo. EX1001, 35:51-62. Thus, Montalvo is in the same field of endeavor of adjusting power consumption for loads to maintain the integrity of the power grid. ~~EX1003~~

77. APC-Tariff similarly is in the field of adjusting the power consumption of loads to maintain the integrity of the power grid. Specifically, ~~¶76. APC-Tariff—explains—that's~~ “optional rider PSEDR [Peak Shaving and Emergency Demand Response Rider]” is specifically focused on demand response ~~end-users~~ that will be enrolled in PJM’s demand response program through the

Company. EX1005, 221. As previously mentioned with respect to Montalvo, ISO/utility companies/ECSPs typically have a minimum requirement for demand reduction to enter into a DR Agreement. See EX1004, ¶[0059]. APC-Tariff sets the minimum power consumption threshold necessary to contract with the company at 100 kW to participate in ~~the demand response~~its PSEDR program. *Id.* Thus, in my opinion, APC-Tariff is in the same field of endeavor of adjusting power consumption for loads to maintain the integrity of the power grid. In view of these similarities, APC-Tariff is also reasonably pertinent to the problem the '433 Patent is addressing, that of grid stability/integrity. ~~EX1003, ¶77.~~

78. A POSA would have been motivated to combine APC-Tariff with Montalvo for several additional reasons. The invention of Montalvo ~~describes~~is premised on an end user deploying a hierarchy of automated ~~energy curtailment for end users~~actions to reduce ~~energy~~KW demand ~~during demand response events dictated by DR agreements with ISOs, ECSPs and/or utility companies~~as directed to by an ISO/utility company upon the occurrence of a DR event. EX1004, ¶[0041]. Montalvo explains ~~that the~~general feature of DR agreements, recognizing that they “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~~—...~~, utility companies and/or ECSPs 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~~However, Montalvo does not provide any sample agreement terms citing specific tariffs, ~~for example. EX1003, ¶78.~~

79. Upon reviewing Montalvo, a POSA would have thus been motivated to search for real-life examples of demand response programs and agreements offered by various ISOs/utility companies. 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,~~ for ISOs/utility companies in practice, ultimately learning about the APC- Tariff ~~includes the~~ ’s offering of its “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.~~EX1005, 221-225. ASpecifically, 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~~

80. Moreover, ~~¶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.^{as} Montalvo expressly 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 teachings from 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.~~~~

81. With respect to specific claim elements, as discussed, 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]. A POSA would have ~~further~~thus been specifically motivated to combine APC-Tariff's minimum power consumption requirements (which, at 100 KW, falls into Montalvo's sample range)

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~~

82. Lastly, in my opinion, 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.~~

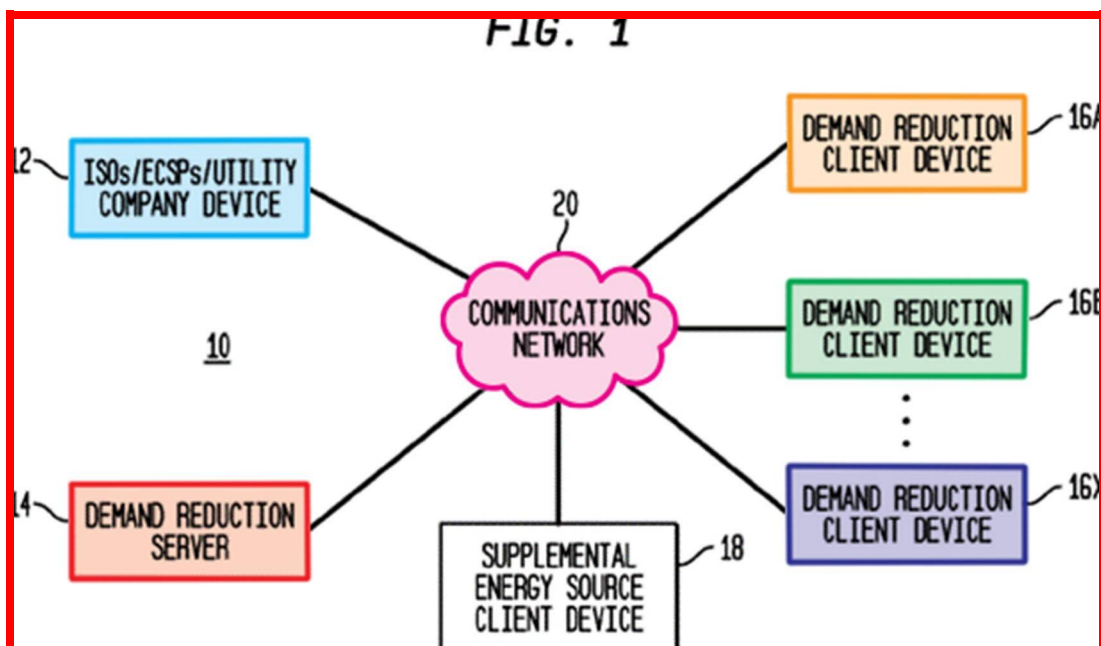
ii. Claims 1, 17, and 20

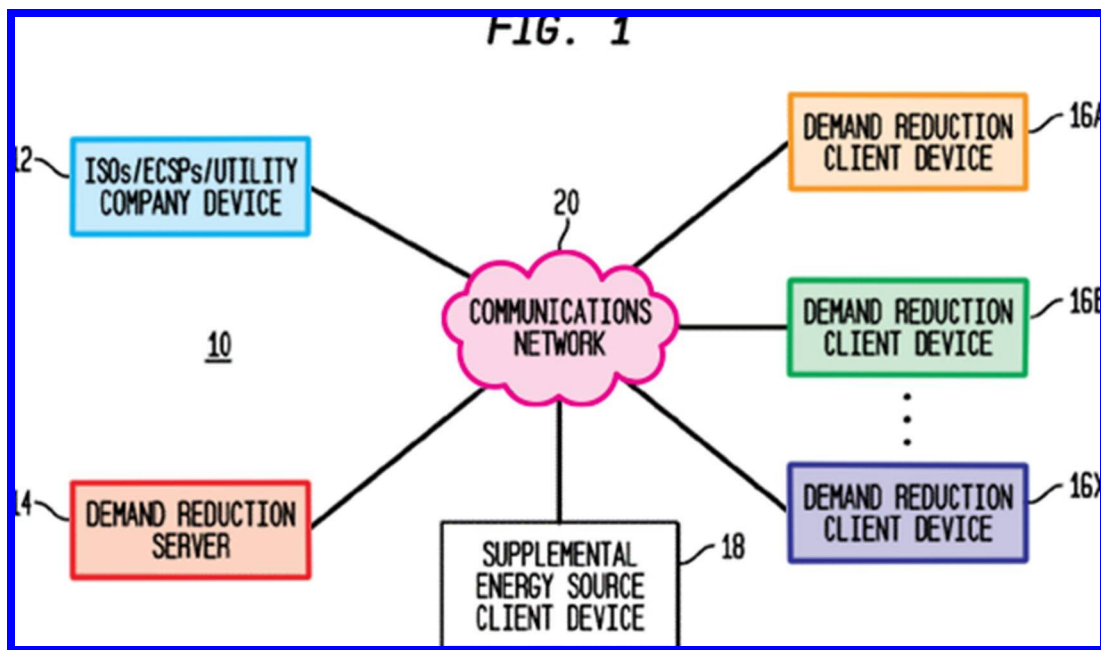
83. From my review of the materials, Montalvo in view of ~~the~~ APC-Tariff renders obvious all limitations of independent claims 1, 17, and 20.

~~EX1003, ¶83.~~

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

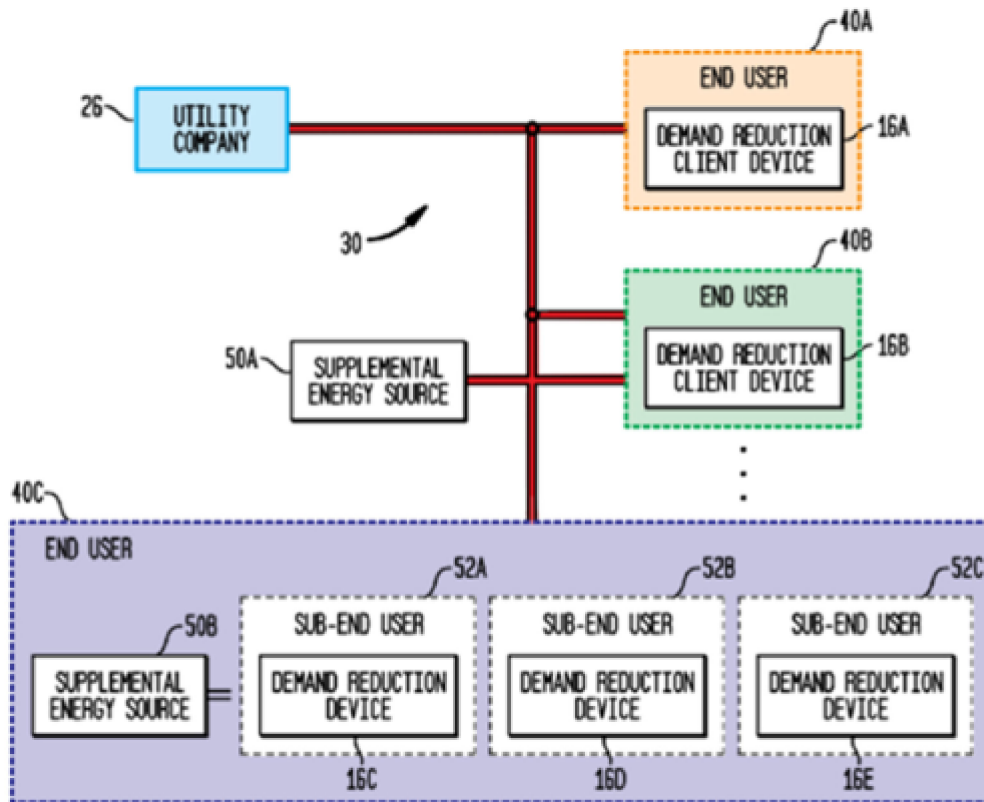
84. To the extent the preambles are limitations, Montalvo discloses an “inventive system and method” that implements demand response actions to reduce end user KW demand. EX1004, ¶[0041]. Montalvo’s Figure 1 “is an exemplary system” of the demand response system. ~~EX1004~~ Id., ¶[0055], FIG. 1:

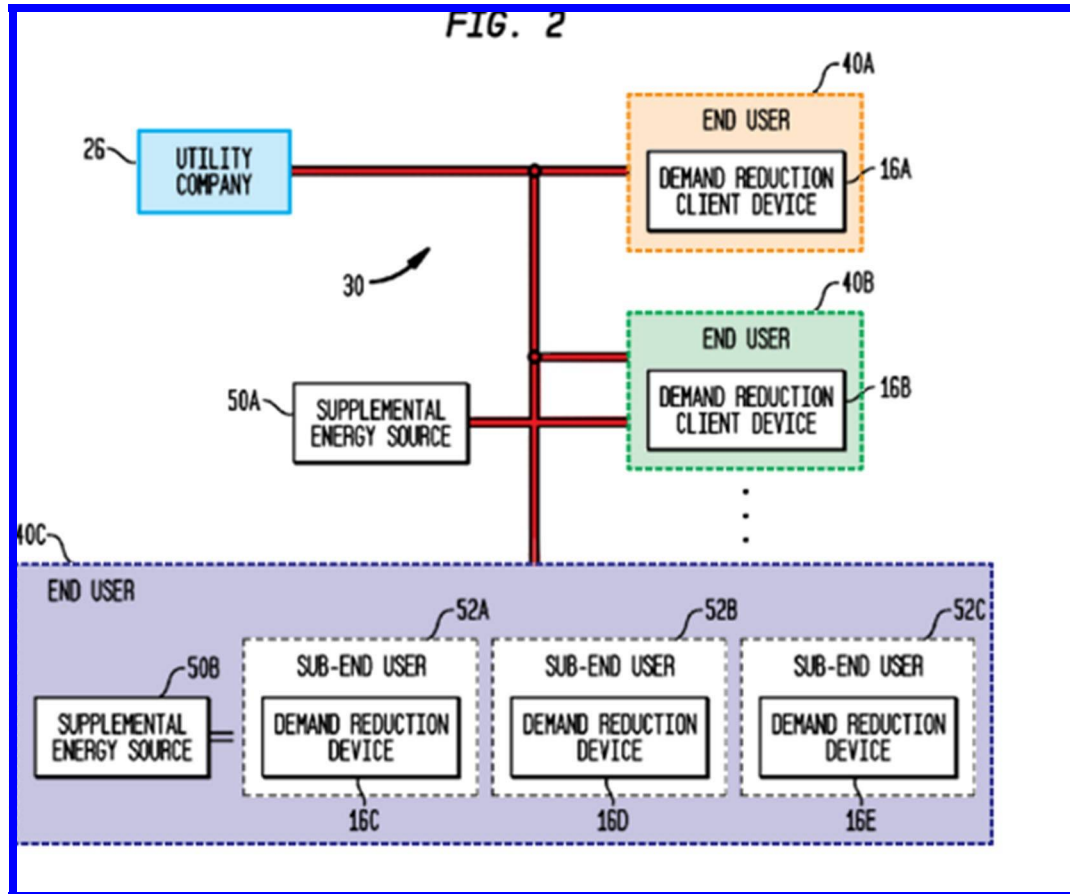




85. The system 10 includes “a computer 12 [light blue], a demand reduction server computer (‘DR server’) 14 [red], demand reduction client devices (‘DR clients’) 16A [orange], 16B [green], and 16X [purple].” *Id.* In particular, ~~as illustrated in Figure 2,~~ Montalvo discloses a utility company 26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

FIG. 2





EX1004, ¶[0057]; ~~EX1003 ¶85.~~

86. Montalvo illustrates an example of the method in Figure 5. ~~EX1004~~Id., ¶[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.~~

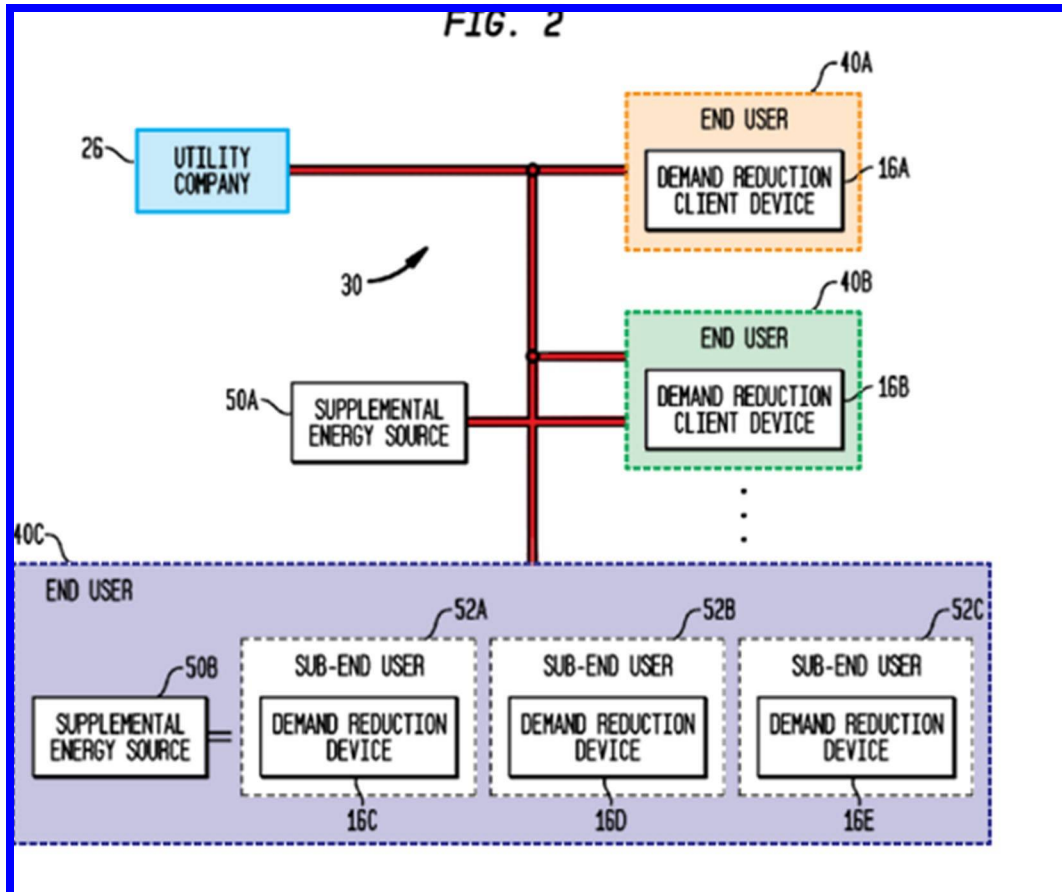
b. b) [1.1]

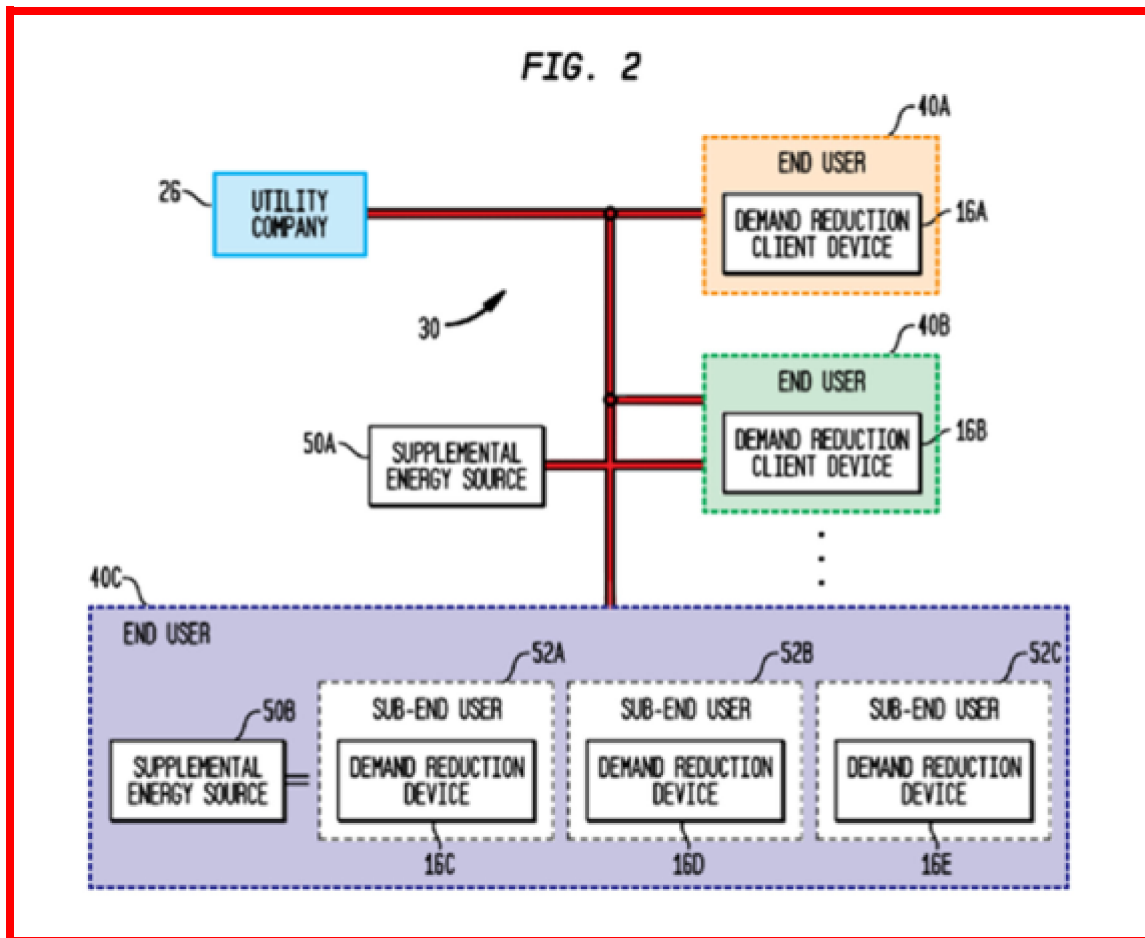
87. In my opinion, Montalvo discloses a set of computing systems, wherein the set of computing systems is configured to perform computational operations using power from a power grid. ~~EX1003 ¶87.~~

88. As demonstrated with the Preambles, Montalvo's system includes a ~~DR server, computer, and DR clients~~ number of computing systems. Computer 12 in Montalvo's system is, by its name, a computing system. EX1004, ¶[0055]; ~~Figs~~ FIG. 1. Additionally, Montalvo refers to DR server 14 as a computer in ¶[0055], and 2. The notes that DR clients "16 are computers for purposes of the exemplary illustrated embodiments ~~are computers."~~ *Id.*; see also id., ¶[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.~~

89. This includes the DR server 14 and DR clients 16 transmitting and receiving electronic messages between each other "to implement fully automated demand response at end users ~~per~~ with which the DR clients are associated, in accordance with the terms of DR Agreements to which the end users are parties." *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 [14](#), and send appropriate control signals to the end user appliance(s) in response to those commands. ~~EX1003 ¶89~~; ~~EX1004~~[Id.](#), ¶¶[0056], [0086], [0099], [0122]-[0125]; *see also* Figure 2:





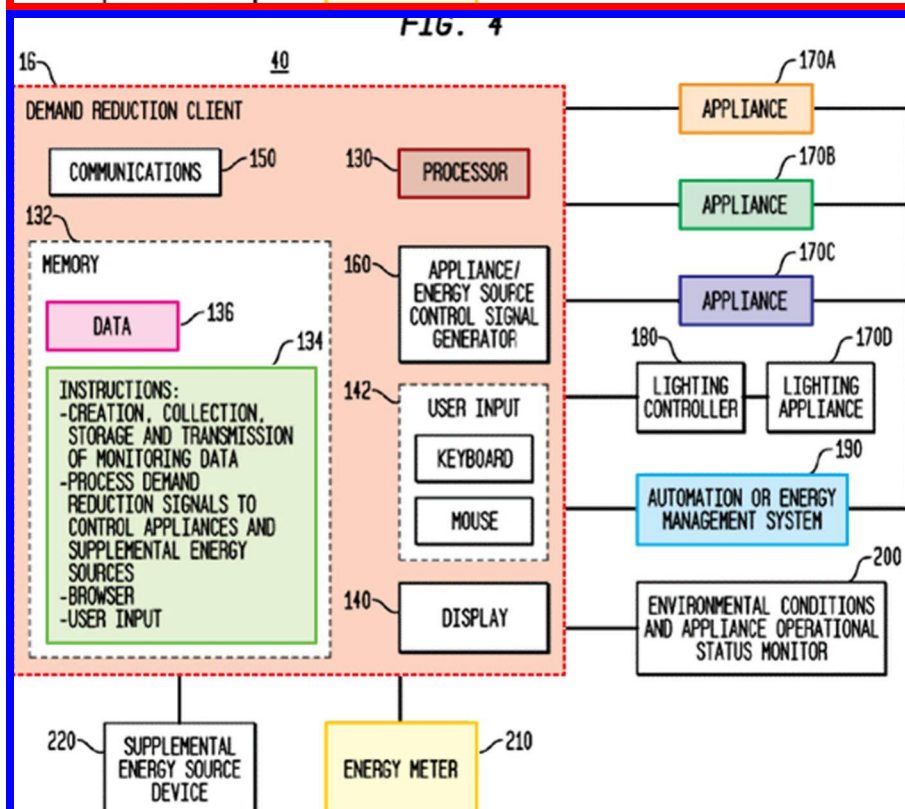
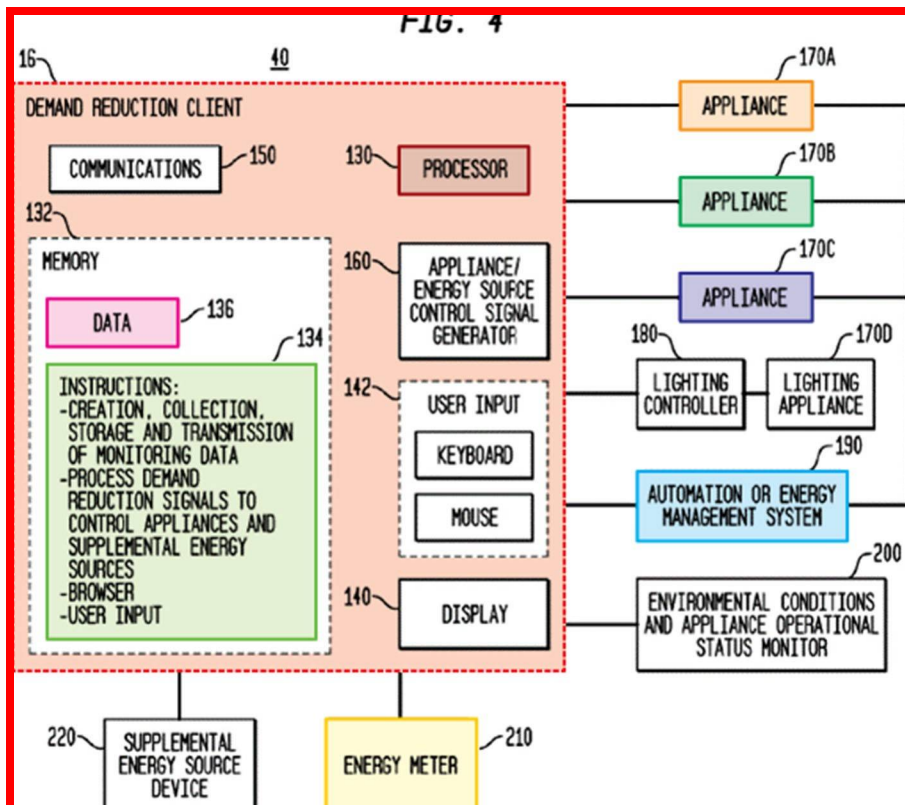
90. Montalvo’s ~~“appliances 170” disclose~~ further discloses the “set of computing systems” with its teachings of “appliances 170.” A DR client “is electrically and/or communicatively connected to appliances 170.” EX1004, ¶[0082]; ~~EX1003, ¶90.~~ Appliances are defined as “any device of an end user that consumes electrical power to operate, such as a computer.” ~~EX1004~~Id., ¶[0044]; ~~EX1003, ¶90.~~ The DR actions that may be taken in Montalvo include “reducing or eliminating consumption of electricity from the power grid at an appliance(s) of the end user.” ~~EX1004~~Id., ¶[0054]; ~~EX1003, ¶90.~~

91. Indeed, in Montalvo ~~describes~~ a DR action ~~impacting~~may impact

such appliances at “a computer ~~operation~~operations 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~~Id., ¶[0074]; *see also* ~~Figure~~FIG 4:



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

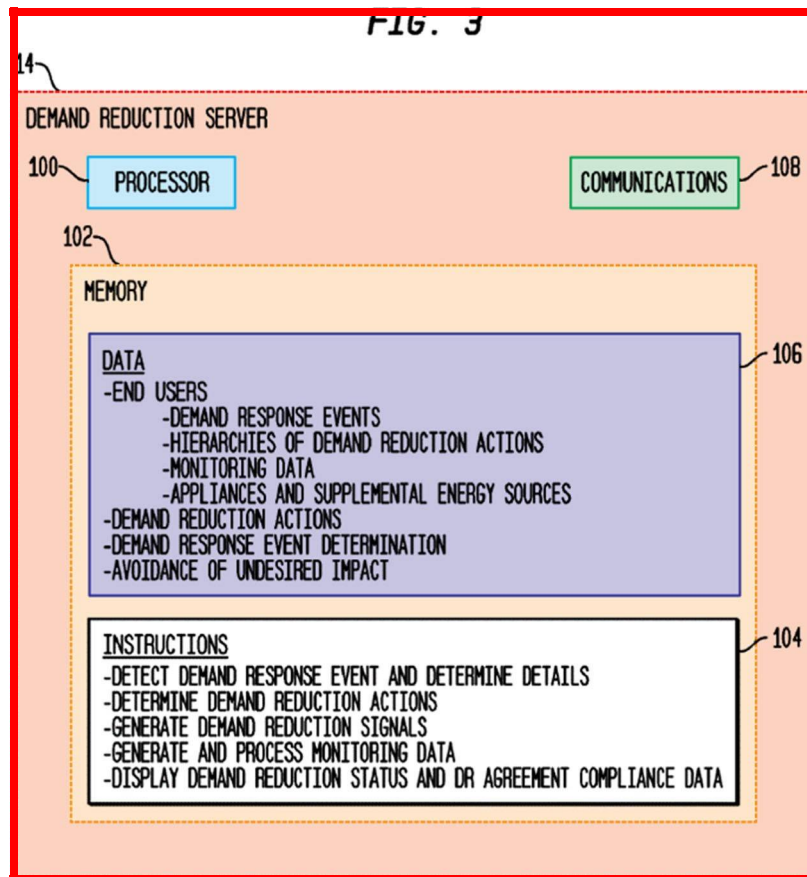
c. e) [1.2.0], [17.1], [20.1]

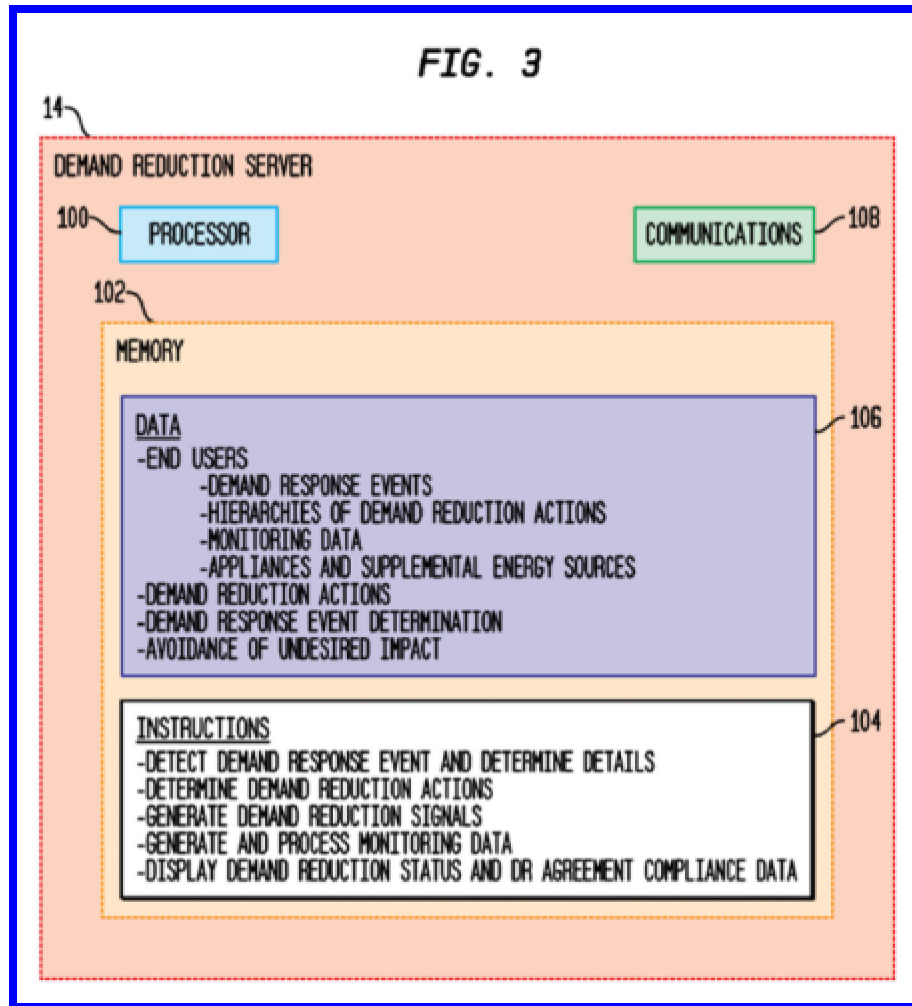
93. In my opinion, Montalvo discloses a control system configured to monitor a set of conditions. ~~EX1003, ¶93.~~

94. Montalvo’s DR server **14** and DR client **16**, independently or in combination, are examples of a “*control system*.” ~~EX1003~~ Computer 12 of Montalvo’s system may be operated by ISOs/ECSPs/utility companies to transmit electronic message data to the DR server 14 and the DR clients 16. *Id.*, ¶94[0056]. The DR server 14 then transmits data to and receives data from the DR clients 16 to implement fully automated demand response actions at the end user. *Id.*

95. The DR server 14 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:

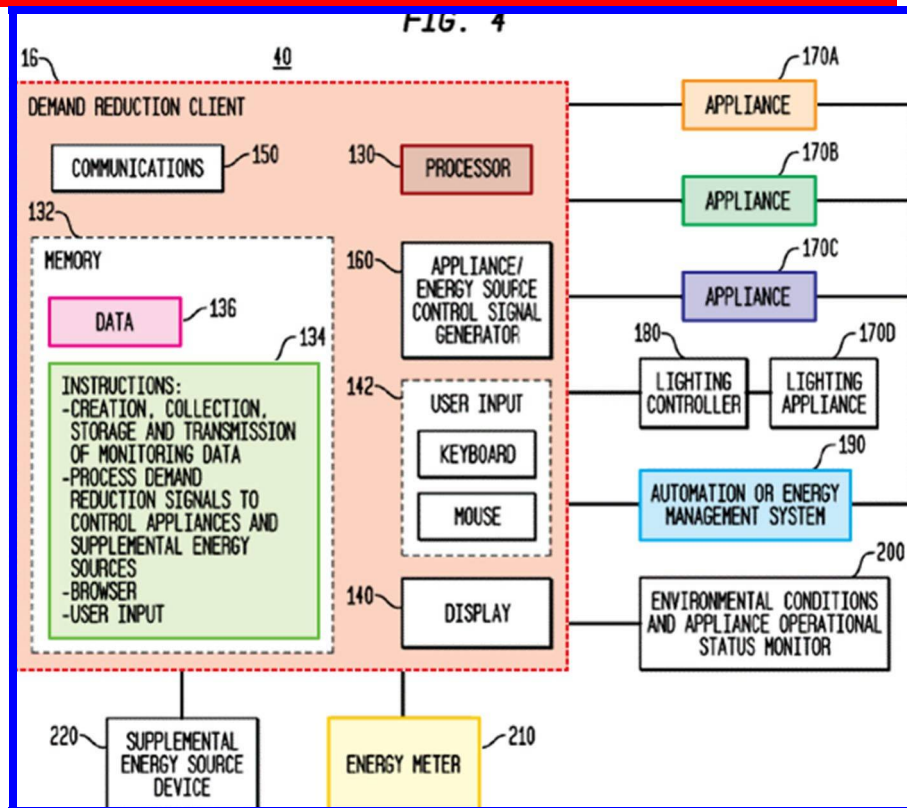
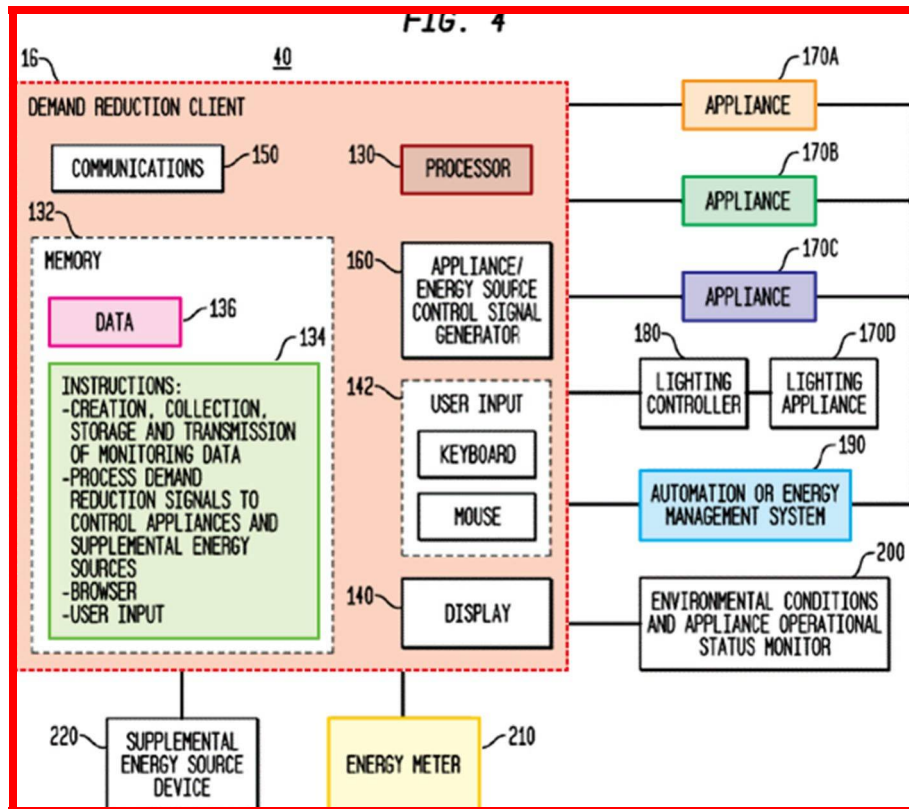




96. The DR server 14’s memory 102 stores data including “information describing the terms of DR Agreements between end users and an ISO, utility company and/or ECSP” for DR goals. EX1004, ¶[0068]. The memory further stores “monitoring data” for each end user to determine what “demand reduction action” 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.~~

97. 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, just the same data type from multiple DR clients 16 (and corresponding appliance(s)) together also constitutes a “*set of conditions*.” ~~EX1003, ¶97~~ As a non-limiting example, an embodiment of Montalvo’s system configured to monitor electricity pricing limits and appliance operation data would constitute the monitoring of a set of conditions.



98. The DR client 16 ([shown](#) above), which sends the monitoring data to

the DR server 14, similarly includes a processor, a memory containing instructions, ~~and~~as well as monitoring data for one or more appliances. EX1004, ¶[0084], FIG. 4. The DR client 16 is electrically and/or communicatively connected to, among other things, appliances 170, ~~appliance~~appliances operating status monitor 200, and an 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 14 and DR client 16, independently or in combination, serve as a “control system” that monitors the “set of conditions.” ~~EX1003, ¶¶93-98.~~

d. ~~d~~ [1.2.1], [17.2], [20.2]

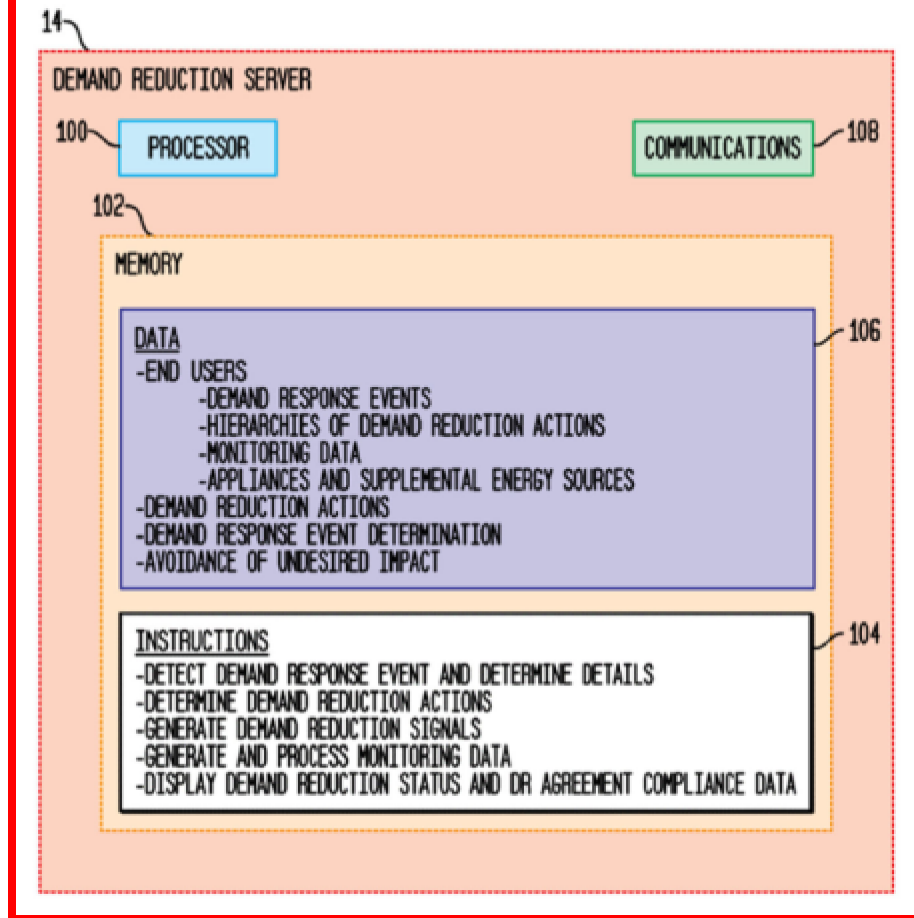
99. In my opinion, Montalvo discloses the control system configured to

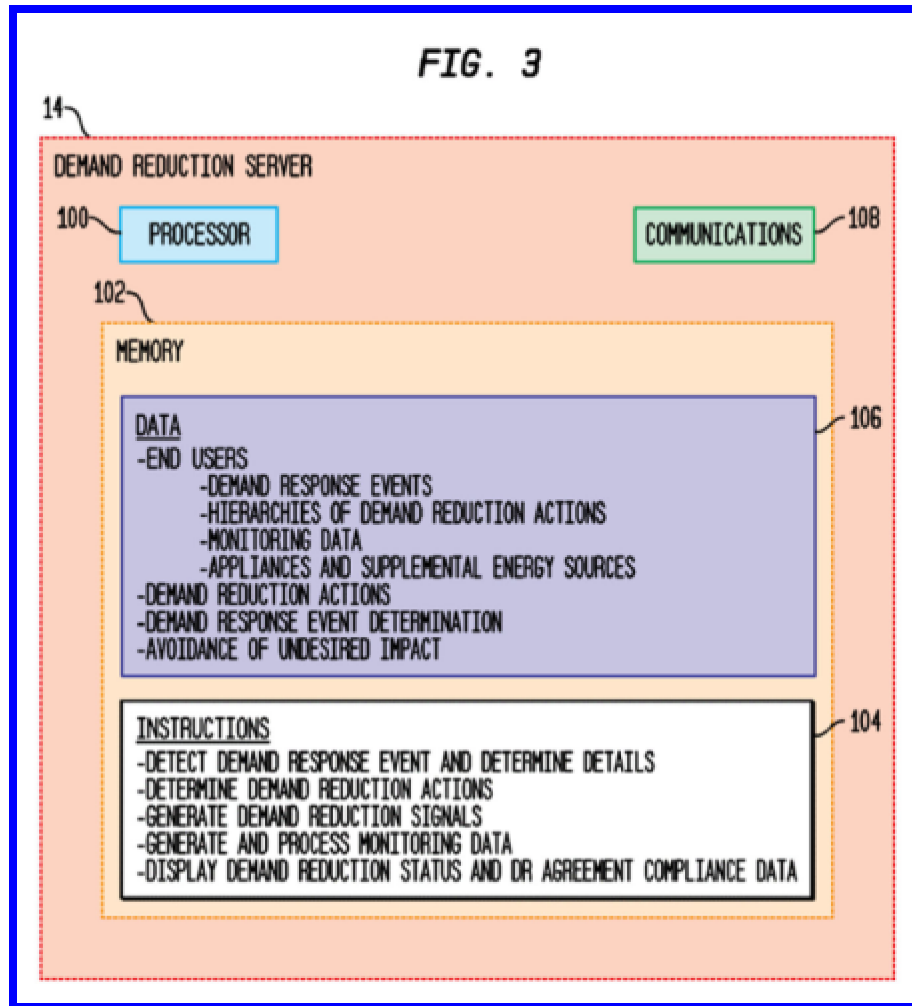
receive power option data based, at least in part, on a power option agreement.

~~EX1003, ¶99.~~

100. 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 demand response agreements (“DR Agreements”) with ISOs, ECSPS, and/or utility companies, to automatically reduce KW demand for DR event(s) ~~per~~in accordance with 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 can 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





101. The data in Montalvo’s DR server ~~includes~~may include 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~~Id., ¶[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.~~

102. 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 id.*, ¶[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.~~

103. 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] (emphasis added). 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 may execute to process signals and/or electronic data received directly from an ISO, utility company and/or ECSP. *Id.*, ¶¶[0087]- [0088]. ~~EX1003, ¶103.~~

104. 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] (emphasis added). 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. ~~e)~~ [1.2.2], [17.3], [20.3]

105. In my opinion, Montalvo combined with of 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.~~

106. 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.~~

107. Montalvo teaches that ISOs (e.g., PJM [Interconnection](#)), 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~~

108. [In my opinion, ¶107-Itit](#) 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~~ [A POSA would understand that the entire purpose of the minimum PSEDR capacity in the APC- Tariff’s PSEDR program is to ensure that end users are capable of reducing kW demand by at least the minimum PSEDR capacity when directed.](#) This was well- understood by POSAs to be a requirement for entering into DR agreements. ~~Id.~~

109. APC-Tariff’s teachings combined with Montalvo’s further renders obvious requiring a minimum amount of power consumption corresponding to the

promised curtailment amount. As I previously discussed, APC is a utility company in PJM’s jurisdiction and offers a demand response program ~~with~~in the form of 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.* EX1005, 222 (the minimum “capacity contracted for under this Rider will be 100 kW,” with aggregation allowed to reach that minimum). 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~~XI.A.i.

110. A POSA would understand from these combined teachings that ~~Montalvo’s~~an end user ~~with a DR agreement would~~must 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.*~~

111. 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~~be using 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 the load by any value from zero to 5 MW. ~~Id.~~EX1001, 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~~Id., 51:36-47. ~~EX1003, ¶111.~~

112. 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]. Notably, 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.~~

113. Thus, in my opinion, 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. ~~f.~~ [1.2.3], [17.4], [20.4]

114. In my opinion, 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.~~

115. 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** may execute to process data included in demand reduction action signals received from the DR server and/or that the processor **130** may 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 generates provides for the generation of energy device control signals to control the operation of selected appliances **170**. *Id.*; ~~EX1003, ¶115.~~

116. 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~~.

117. Further, Montalvo teaches that the DR server 14 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] above, the appliances are an example of a “*set of computing systems.*” EX1004, ¶¶[0044], [0054]; ~~EX1003, ¶117~~.

118. 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. EX1005, 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. See EX1004, ¶¶[0003], [0068]; ~~EX1003, ¶118.~~

119. As another, additional example that separately renders obvious the “*power consumption target for the set of computing systems for each time interval,*” Montalvo teaches also 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. g) [1.2.4], [17.5], [20.5]

120. In my opinion, 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.~~

121. 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~~221-225 (contracting for definite demand reduction capacity corresponding to normal demand); ~~EX1003, ¶¶120-121.~~

122. 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~~221-225. 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~~And, ¶122in fact, it was known for power consumption to typically be

well above the minimum threshold.

123. 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.*”

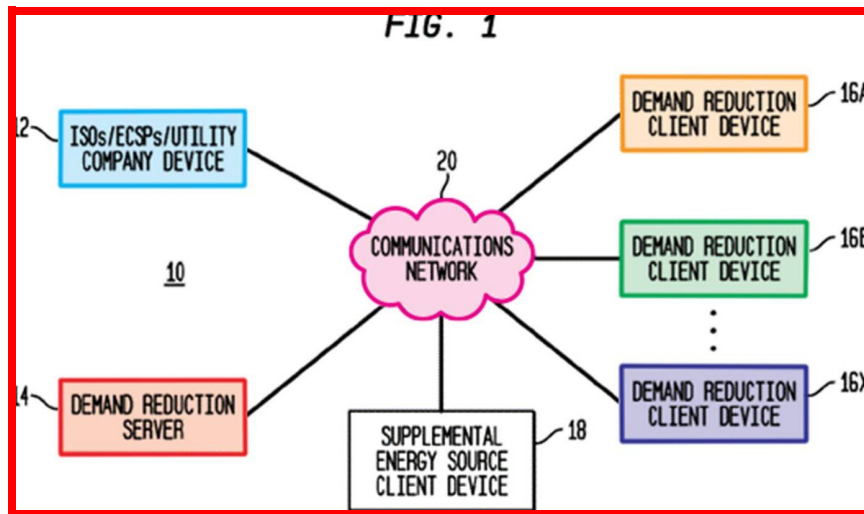
~~EX1003, ¶123.~~

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

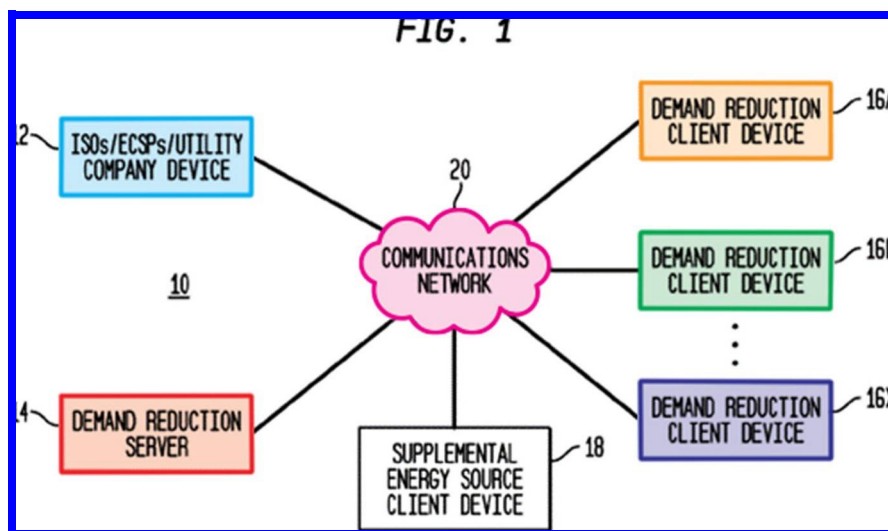
124. In my opinion, Montalvo renders obvious the control system configured to provide instructions to the set of computing systems to perform one or more computational operations based on the performance strategy. ~~EX1003,~~

~~¶124.~~

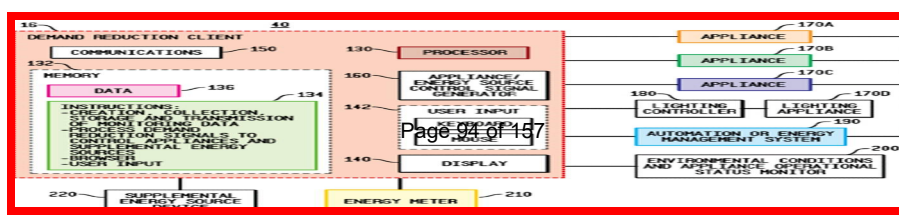
125. As discussed with respect to [1.2.3], [17.4], [20.4], Montalvo teaches the DR server **14** determining a “*performance strategy*” (the DR actions to be taken, ~~and corresponding commitment to consume load to be able to take those~~ ~~DR actions, such as for day-ahead and/or day-of events, see 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:



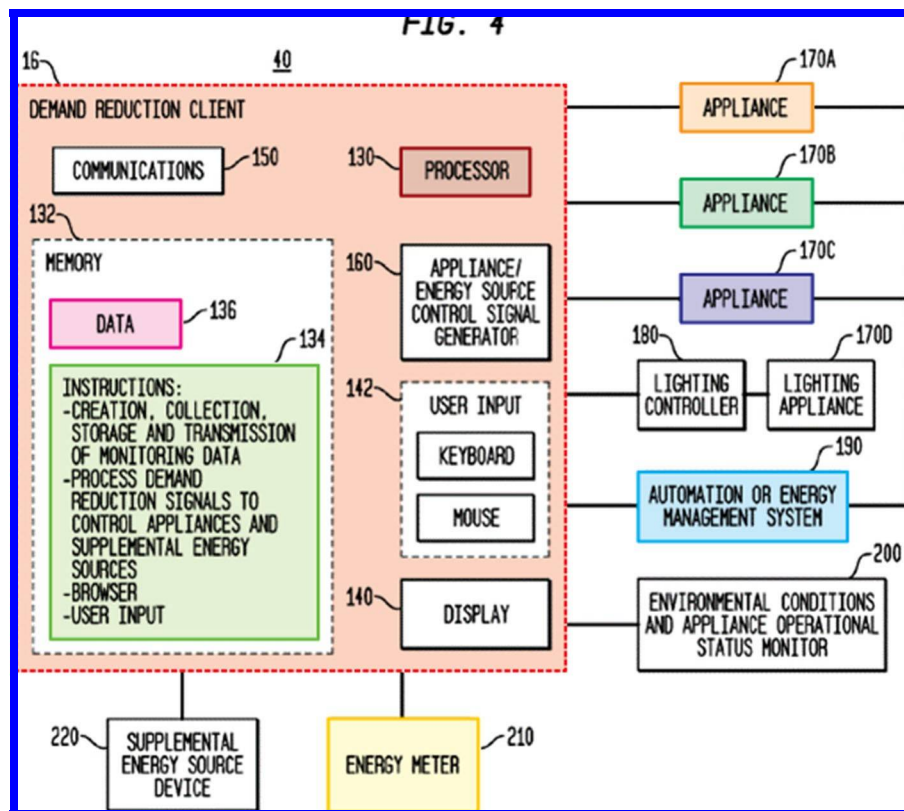
EX1003, ¶125.



126. The DR client 16, 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~~FIG 4:



~~EX1003, ¶126.~~



127. 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.~~ EX1004, ¶[0074]; ~~EX1003~~,

¶127.

128. In particular, 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, based~~
~~on these same~~ teachings, to apply the same to computers (which have known
adjustable characteristics including frequency of operation, fan speed/frequency,
cooling set points, turn on/off components or entire systems, and so on). ~~See~~
~~EX1003, ¶128; generally ¶¶124-128.~~

iii. Claims 2-5

129. 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)~~
(ii) a plurality of parameters associated with one or more computational
operations to be performed at the set of computing systems. ~~EX1003, ¶129~~ From
my review of the materials, this limitation is taught by Montalvo.

130. 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.~~

131. 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~~ And, ¶~~131~~. ~~Indeed~~ indeed, Montalvo teaches that the DR server does in fact receive ~~the~~ “rate of electricity” as in the form of “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~~.

132. Second, as further demonstrated with respect to [1.2.0], the DR server monitors additional conditions including 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), and appliance operation data (including status or mode of operation). 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 claimed “*plurality of parameters associated with one or more computational operations to be performed at the set of computing systems.*” ~~EX1003~~, ¶¶~~129-132~~.

133. 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.~~

134. 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.~~

135. 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~~ As a result, 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.~~

136. Further, and 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~~ which include 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.~~

137. ~~Particularly~~ For example, 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 express examples of how to prioritize various DR actions, a POSA would have recognized that the operations performed on the computers themselves would also have impacts of varying magnitudes on the amount of power consumed (and, therefore, the amount of demand reduction). See, e.g., EX10031036, ¶137, ¶[0049]- [0050] (different workloads have different priorities, based on their respective service level agreements, resulting in different power consumption amounts).

138. Claim 5 adds the limitation that the performance strategy further 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.~~

139. 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.~~

140. 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.~~

141. 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.~~

142. 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

143. From my review of the materials, Montalvo in view of APC-Tariff renders ~~obvious~~ all limitations of dependent claims 6-8 and 19. ~~EX1003, ¶143~~ obvious as explained below.

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

144. To the extent the ~~preambles~~ Preambles are limitations, they are disclosed by Montalvo ~~discloses a control system. Specifically.~~ For instance, Montalvo discloses a Demand Reduction Server 14 (“DR server”) and Demand Reduction Client Devices 16 (“DR clients”). EX1004, ¶[0055]; ~~EX1003, ¶¶143-144.~~

b. ~~b)~~ [19.1], [6.1]

145. From my review of the materials, 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~~ instance, the end users of Montalvo have entered into demand response agreements (“DR Agreements”) with ISOs, ECSPS, and/or utility companies, to automatically reduce KW demand for *DR event(s)* ~~per~~ in accordance with the terms of the DR Agreements. ~~EX1004~~ Id., ¶[0041] (emphasis added). 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] (emphasis added). As noted with respect to [1.2.2], this describes plural “event(s).” ~~EX1003, ¶145.~~

146. ~~Montalvo’s~~ The electronic message data in Montalvo received by the

DR server “indicates one *of a plurality* of demand response events including the first demand response event.” ~~EX1004~~Id., ¶[0026] (emphasis added). 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~~Examples of 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,~~ (emphasis added). Montalvo also discloses that the DR Agreements can require reduction in KW demand for “day of” DR events to occur within 10 minutes or less of receiving notice. *Id.*, ¶[0017]; ~~EX1003, ¶146.~~

147. 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] (emphasis added). Montalvo ~~teaches~~further discloses that the DR server ~~implementing~~“may provide for implementation of a demand reduction action ~~by using “in form of~~ demand rolling, which may occur during a DR event.” *Id.*, ¶[0151]. ~~In~~Montalvo teaches

that in demand rolling, the DR server ~~provides~~may provide 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.~~

148. Thus, it is my opinion that 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 16, which then sends it on to DR server 14 (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.~~

149. 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~~POSA would have understood from

Montalvo's demand rolling teachings (involving the 15- minute time intervals) that the DR server sends instructions (i.e., data that is 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.~~

150. 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 EX 1004, ¶[0088]; ~~EX1003, ¶150.~~

c. e) [19.2], [6.2]

151. From my review of the materials, Montalvo discloses subsequent power option data specifying to decrease one or more minimum power thresholds

of the set of minimum power thresholds. ~~EX1003, ¶151.~~

152. As I discussed with respect to [19.1], and [6.1], Montalvo discloses receiving subsequent power option data for a second plurality of demand response events. ~~For~~, for example, ~~Montalvo discloses that, in~~ through its discussions of “demand rolling.” In demand rolling, the DR server ~~provides~~ may provide 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 ~~to~~ exceed a pre-established threshold.” ~~EX1004~~ Id., ¶[0151]; ~~EX1003, ¶1152.~~

~~Each~~ A POSA would understand that, in demand rolling, each individual minimum power threshold associated with the second (e.g., second 15 minute) plurality of demand response events is ~~either~~ limited to being (i) greater than, ~~(ii)~~ (ii) less than, or (iii) equal to each minimum power ~~threshold~~ thresholds associated with the first (e.g., first 15 ~~minute~~ minutes) plurality of demand response events. ~~Thus~~

153. In my opinion, a POSA would understand that the subsequent power option data of Montalvo can specify to decrease one or more minimum power thresholds, ~~for~~ in many situations. 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~~ the subsequent power option data of Montalvo would specify to decrease at least one minimum power threshold. These teachings, ~~as understood by a POSA,~~ alone renders obvious this limitation. ~~EX1003, ¶153.~~

154. Additionally, it would have been obvious to a POSA based on the Montalvo- APC-Tariff combined 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]; EX 1005, 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. ~~d)~~ [19.3], [7.1]

155. From my review of the materials, Montalvo combined with APC-Tariff renders obvious, responsive to receiving the 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~~

156. In my discussion of [1.2.3], [17.4], and [20.4], I explained why Montalvo discloses 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. This limitation merely applies the same to “subsequent” power option data.

157. 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~~Id., ¶[0151].

~~EX1003, ¶¶155-157.~~

~~A~~

158. In this regard, 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~~ Again, an end-user in the real world practicing Montalvo would not go through the trouble of setting up the necessary system to perform the claimed method and bind itself through a DR Agreement with an ISO merely to determine a performance for the first plurality of demand response events and not the second. This is nothing more than the mere duplication of the determination

demonstrated at [1.2.3].~~Id.~~

e. ~~e)~~ [19.4], [7.2]

159. From my review of the materials, Montalvo combined with APC-Tariff renders obvious wherein ~~each~~ the modified performance strategy comprises one or more reduced power consumption targets for the set of computing systems.

160. In my discussion of [1.2.4], [17.5], and [20.5], I explained why Montalvo discloses 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~~ The power consumption targets of Montalvo are effectively “reduced” when the system is configured to demand rolling roll, wherein “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 ~~to~~ exceed a pre- established threshold.” EX1004, ¶[0151]. ~~A~~ In my opinion, 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 I explained ~~in~~ for [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]; EX 1005, 221-222; ~~EX1003, ¶¶159-160.~~

f. ~~¶~~ [19.5], [8.1]

161. From my review of the materials, Montalvo discloses a control system configured to provide instructions to the set of computing systems to perform the one or more computational operations based on the modified performance strategy.

162. As I previously discussed with respect to [1.2.5], [17.6], and [20.6], 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~~ The limitations of this claim merely provide the same for a “modified” performance strategy. In my opinion, a POSA would understand that when a percentage of the KW demand load is reduced in demand rolling, the DR client/server ~~would~~ must 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. ~~As~~ I

explained with respect to [1.2.5], Montalvo teaches providing demand reduction signals to control the end user appliances according to the control action, and that the end user appliances include computers that perform computational operations. See EX1004, ¶¶[0044], [0074], [0077], [0116]-[0120], [0122], Figure 1. It would have been obvious to a POSA for Montalvo's demand reduction signals to be sent in response to changes to the performance strategy based on subsequent power option data (e.g., electronic message data when received).

v. Claim 9

163. Claim 9 adds the limitation that the control system is a remote master control system positioned remotely from the set of computing systems. The basic features of this claim are disclosed by Montalvo. 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~~such as computers, are located. *Id.*, ¶¶[0044], [0074]. Thus, since the DR server **14** is remote from the DR client **16**, and the DR client 16 is at or near the end user appliances including computers, then the DR server 14 (a master control system) is positioned remotely from the appliances (computers). ~~EX1003, ¶163.~~

vi. Claim 10

164. ~~Claim 10 adds that~~Montalvo renders obvious wherein the control system is a mobile computing device. Montalvo teaches that the DR server 14

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 14 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

165. Claim 11 adds the limitation that the control system is configured to receive the power option data while monitoring the set of conditions. The control system in Montalvo’s system provides is configured in the same way, providing for ~~a~~ “fully automated demand response, *in real time or substantially real time*, at one or more end users without human involvement[.]” ~~EX1004~~Id., ¶[0055] (emphasis added). 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

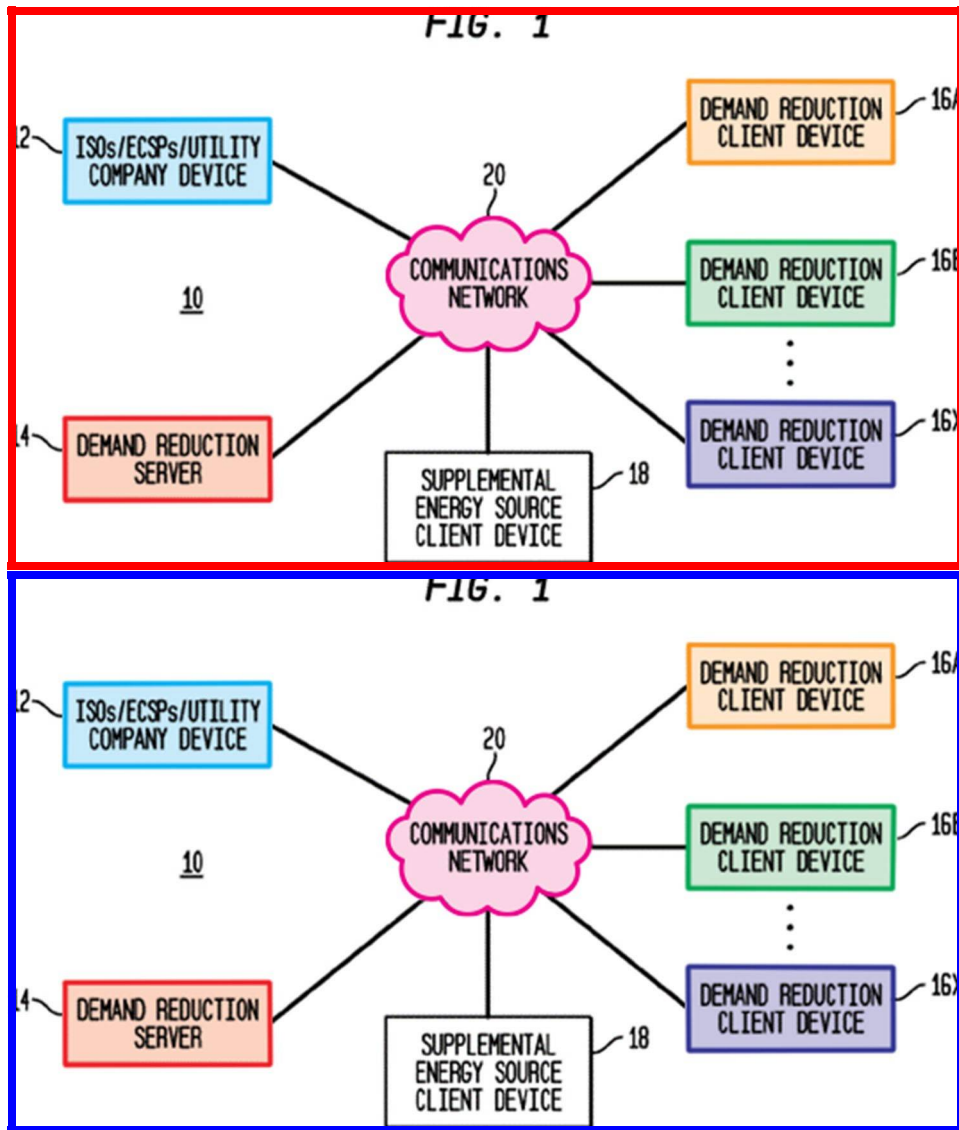
166. Montalvo renders obvious the control system configured to provide a request to a qualified scheduling entity (QSE) to determine the power option agreement. ~~EX1003, ¶166.~~

167. The ’433 Patent generally describes the QSE as a power entity that manages and schedules the power option data ~~per~~ in accordance with the power purchase agreement, in both day-ahead and real-time markets. EX1001, 46:20-30; 57:49-53; ~~EX1003, ¶167.~~

168. 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, id.* ¶[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~~ such as 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).

169. In view of Montalvo's teaching of ECSPs having DR agreements on one side with the utility/ISO, and on the other side 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.,~~ examples of the "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 id., FIG. 1:



~~EX1003, ¶169.~~

170. Thus, since Montalvo teaches the ECSP transmitting data to the DR server 14 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.~~

171. 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.~~

172. 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.~~

173. 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 under 35 U.S.C. §103 over Montalvo in view of APC-Tariff and Day.

i. Motivation to Combine

174. ~~A~~In my opinion, a POSA would have been motivated to combine Montalvo and ~~the~~ APC- Tariff with Day ~~for several reasons.~~

175. ~~Day, like Montalvo and the APC-Tariff, is~~All three references are in the same field of endeavor ~~as the '433 Patent. Each reference is in.~~ Specifically, the field of adjusting power consumption for loads to maintain the integrity of ~~at~~the power grid; ~~Day. Montalvo~~ achieves this via its teachings of system for fully automated energy curtailment, which allows end users to participate in demand response programs such as APC-Tariff’s PSEDR program. Day achieves the same via its teachings of 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;” which a POSA would understand to include APC-Tariff’s PSEDR program. EX1006, ¶¶[0034].

Thus, ~~[0038]. In view of these similarities, Day is also reasonably pertinent to the problem the ‘433 Patent is~~ all three references are highly relevant to addressing, ~~that the same goal~~ of improved grid stability/ and integrity. ~~EX1003, ¶¶174-175.~~

176. 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)–~~ (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

177. In my opinion, Montalvo combined with APC-Tariff and Day renders obvious ~~all limitations of~~ dependent claims 13-15.

iii. Claim 13

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

179. As I 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 I discussed with respect to Limitation [6.1]. ~~EX1003, ¶¶177-179.~~

180. Indeed, Montalvo teaches continuously monitoring for electronic

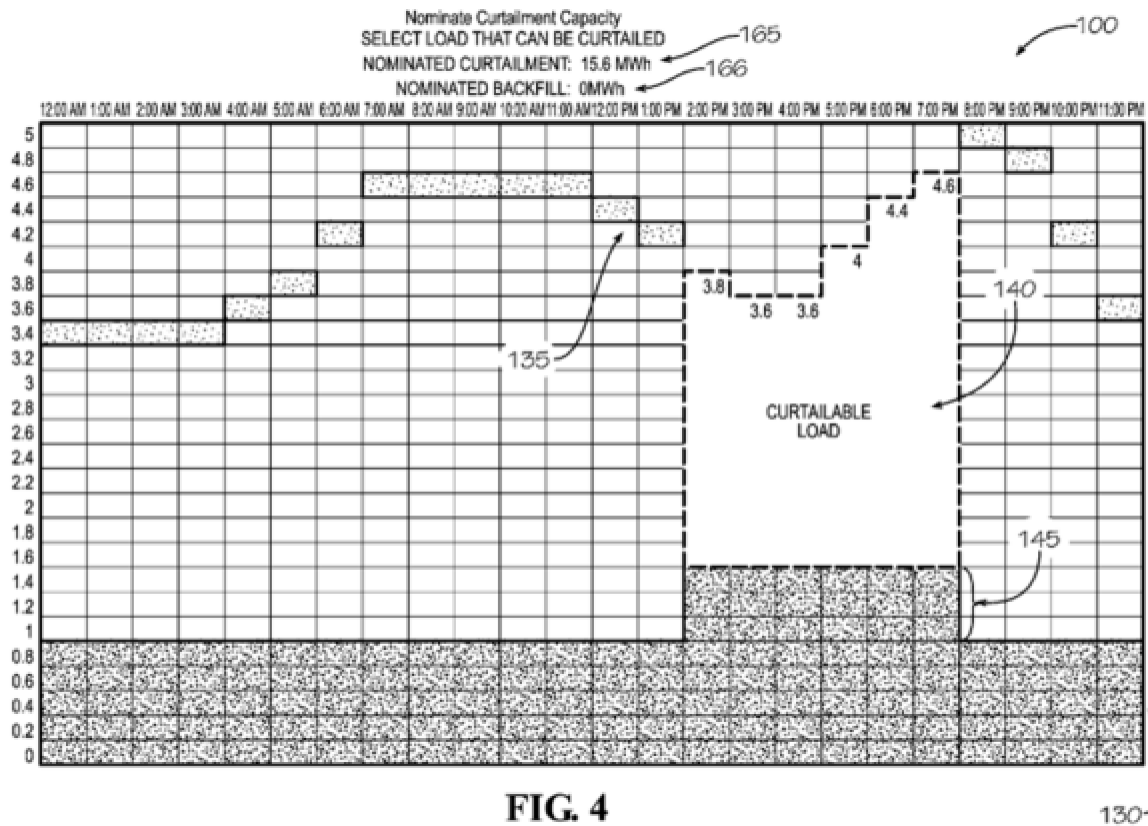
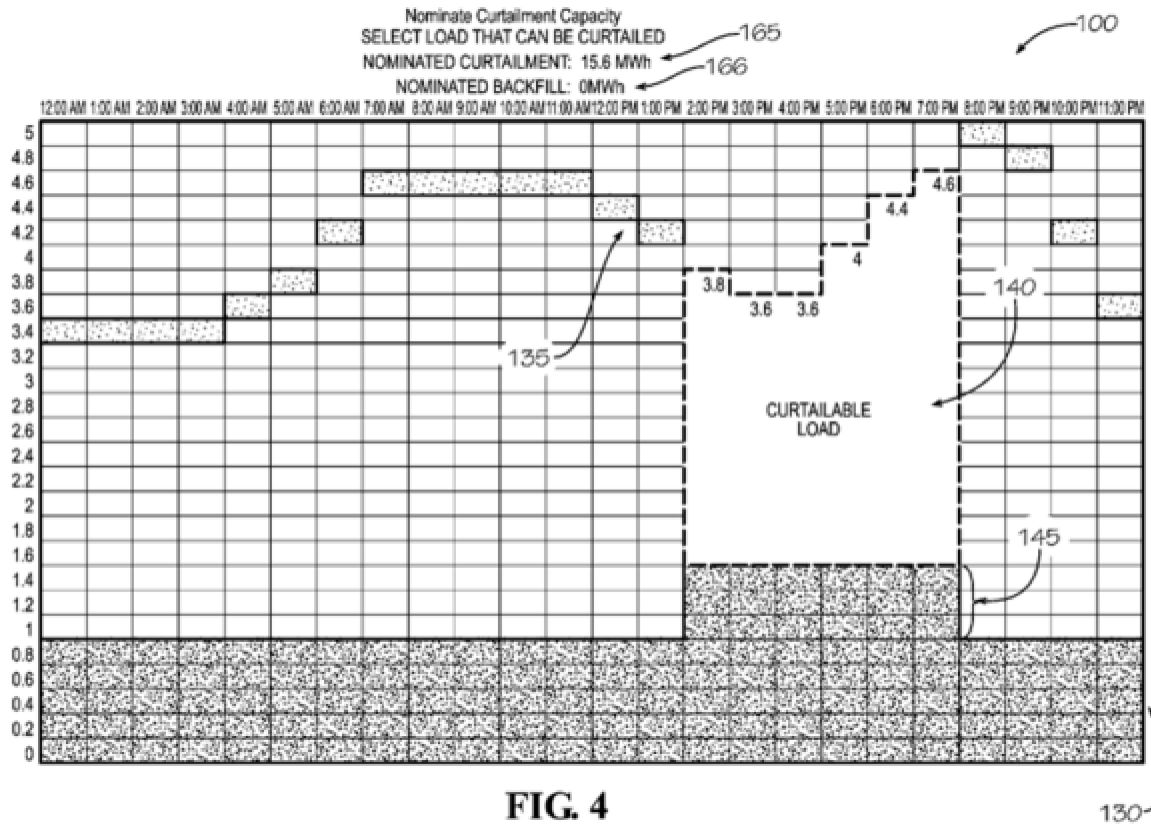
message data for the DR server to process, demonstrating that Montalvo's "power option data" includes "subsequent" data in the form of later electronic message data. See EX1004, ¶[0099]; see also id., ¶[0101] (bypassing DR client for DR server). Montalvo also teaches that the minimum power thresholds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

181. ~~This is~~ Montalvo further ~~rendered obvious by Montalvo's teachings~~ discloses 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~~ Id., ¶[0151]. ~~In~~ Montalvo teaches 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." Id. ~~A POSA would understand~~ It naturally flows, then, that the second

demand response event (e.g., second “demand rolling” DR events occurring after the first 15-minute time interval) would similarly include its own minimum power threshold ~~(e.g., second pre-established threshold). EX1003, ¶181.~~

182. Claim 13 is further rendered obvious in combination with Day. The load nomination system of Day includes a user interface configured to accept entry of load facility curtailment bids, backfill bids, and related load facility operational parameters. *Id.*, ¶~~182.~~[0036]. The user interface 100 is configured to enable the plant engineer to define the anticipated load 135 and the absolute minimum load 130 required to operate the plant on an hour-by-hour basis, as shown below:



183. 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

184. 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~~

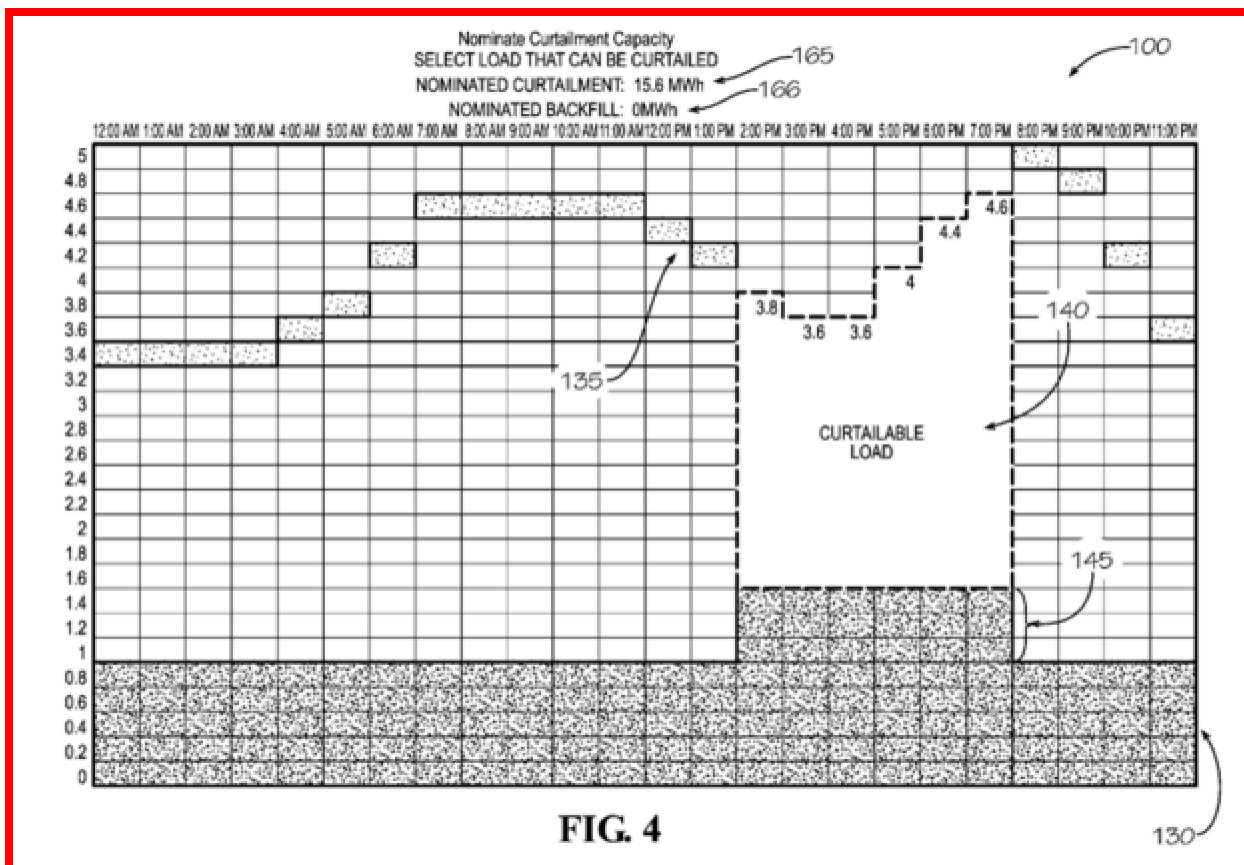
185. For example, as I have previously discussed with respect to [1.2.4], [17.5], and [20.5], Montalvo combined with APC-Tariff renders obvious each power consumption target (for each time interval) being equal to or greater than the minimum power threshold associated with each time interval. This claim merely expands on 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~~ the limitations of claim 14, which are a subset of those demonstrated with respect to [1.2.4]. ~~EX1003, ¶¶184-185.~~

~~Further, the discussion at~~

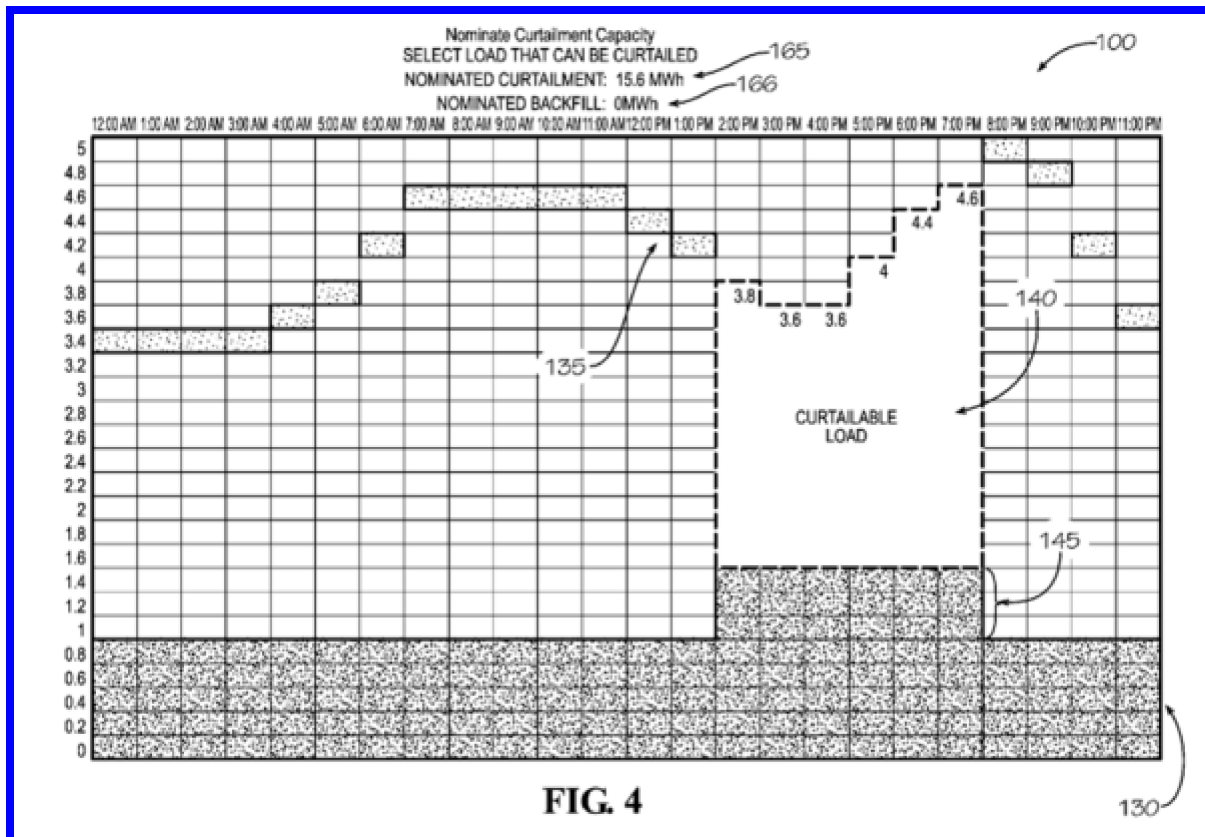
186. Additionally, I discussed with respect to [19.3] ~~describes~~ how Montalvo discloses modifying of a performance strategy based on subsequent power option data and wherein the modified performance strategy comprises one or more reduced power consumption targets for the set of computing systems via Montalvo’s teachings of demand rolling. EX1004, ¶[0151]. ~~Montalvo’s teachings~~

~~of~~ In my opinion, a POSA would understand that, during demand rolling ~~include~~ ~~two or more~~, a power consumption ~~targets (i.e., one target for the first 15-minute is~~ associated with each time 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.~~

187. ~~Moreover~~ Additionally, Figure 4 of Day features the claimed performance strategy:



~~EX1003, ¶187.~~



188. 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.~~

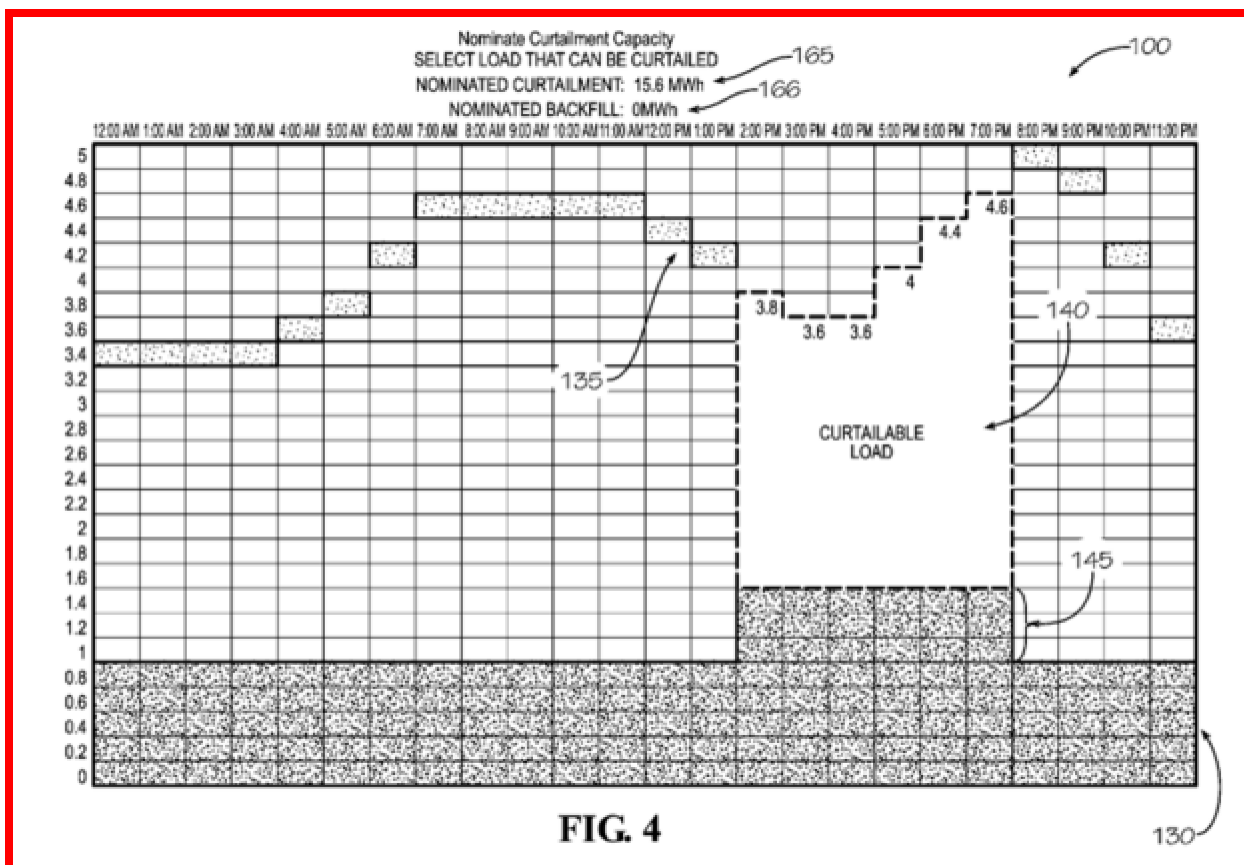
v. **Claim 15**

189. Montalvo combined with APC-Tariff ~~and~~alone, further in combination with Day, renders obvious wherein the total duration of the set of time intervals corresponds to twenty-four hours.

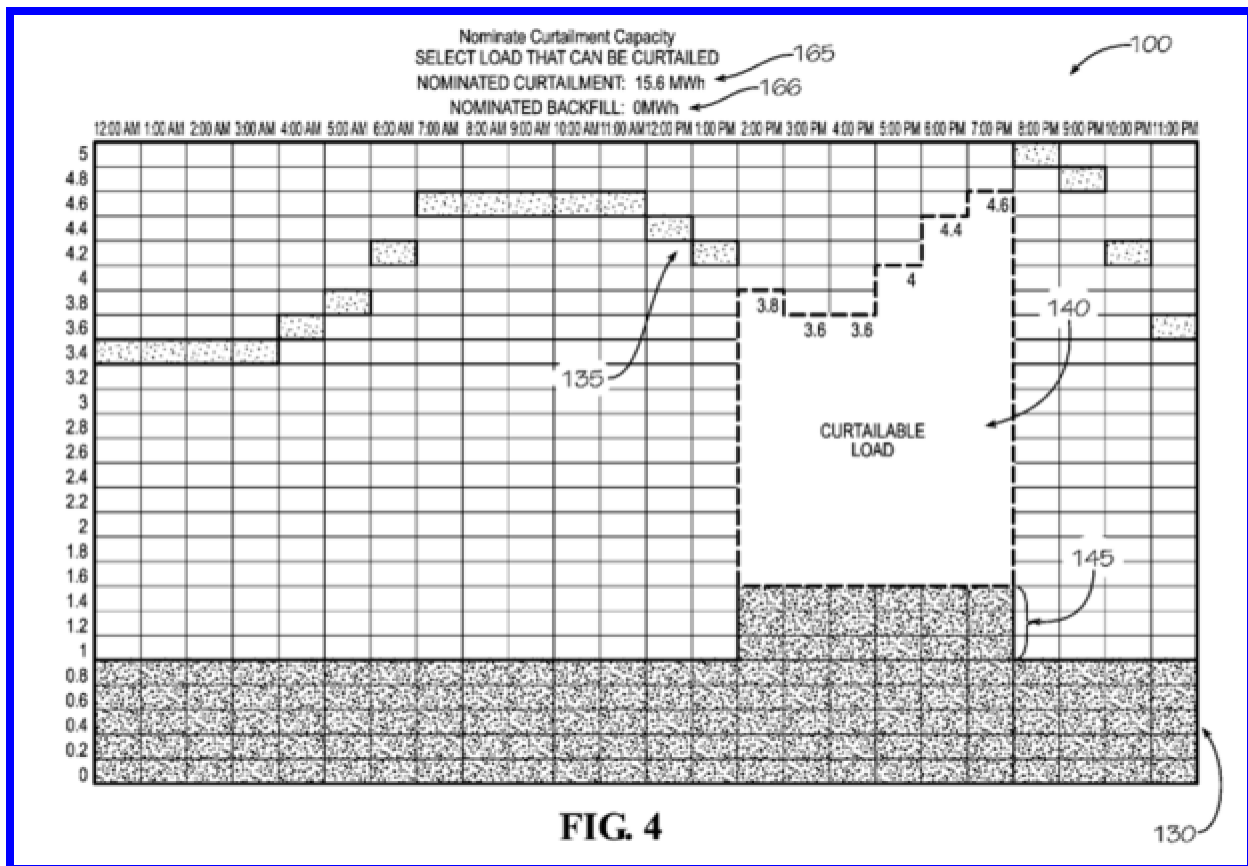
190. ~~In~~For example, in addition ~~to teaching time incremental~~the concept of demand rolling, Montalvo ~~explains that the data in the DR server can include information describing~~discusses “day ahead” DR events and “day of” DR events. EX1004, ¶¶[0072], [0151]. Day ahead events may arise when an ISO determines there might be concerns of a brown out or black out the next day, while day of events arise when
an ISO determines that same on the day in question. EX1004, ¶¶[0072], [0151]. Additionally, 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 the day. *Id.*, ¶[0121]. Montalvo further explains that the DR server ~~obtains~~may obtain “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~~In this respect, based on the teachings of Montalvo alone, a POSA would understand~~, therefore,~~ that the total time of the plurality of DR events in Montalvo includes twenty-four hours. ~~EX1003, ¶¶189–190.~~

191. This is further rendered 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.~~



192. 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 under 35 U.S.C. §103 over Montalvo in view of APC-Tariff and Sowell.

i. Motivation to Combine

193. ~~A~~In my opinion, a POSA would have been motivated to combine Montalvo and ~~the~~ APC- Tariff with Sowell for several reasons.

194. 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~~would aid 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.~~

195. 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 hourly" 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.~~

196. 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.~~

197. 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.~~

198. 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

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

iii. Claim 16

200. 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 at the portion of the power option data and the price of power from the power grid. ~~EX1003, ¶200.~~

201. 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~~

202. As previously discussed, ¶201. Sowell ~~describes~~ is generally directed to a system, method, and computer program product for using a blockchain marketplace. EX 1007, ¶[0005]. ~~The~~ Specifically, 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. *Id.*, ¶¶[0030], [0084]. Sowell ~~teaches (1)~~ discloses

(1) a set of conditions including a global mining hash rate and a price for a cryptocurrency. Specifically, the blockchain marketplace of Sowell 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~~for projected value of coins.” *Id.*

203. Sowell further ~~teaches~~discloses (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~~. These teachings would be combined with ~~Montalvo’s~~the DR server teachings of Montalvo. 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.~~

204. Lastly, Sowell ~~teaches~~discloses (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~~of Sowell may provide 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 can include an electricity consumption rate. *Id.*, ¶[0030]. ~~Thus~~Given Sowell's focus on maximizing the financial reward of a miner and providing miners with the greatest return on investment, a POSA would understand that Sowell's blockchain marketplace is configured to avoid mining cryptocurrency unprofitably (e.i.g., when the price of power from the power grid is greater than the revenue obtained by performing the mining operations). ~~EX1003~~

205. Thus, in my opinion, ¶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

206. 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.~~

207. Montalvo further discloses determining a performance strategy based on power option data. *See supra* analysis of [1.2.3], [17.4], and [20.4]. This includes,

for example, 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* EX 1004, ¶¶[0116]-[0120]. It would be obvious to a POSA ~~to apply,~~ based on these teachings, to apply the same 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, and so on).~~

208. 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.*

209. Claim 18 is rendered obvious ~~in further view of~~ in combination with 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, ¶at [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.~~

210. 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. *Adva*  *EL*
Elektromedizinische Geräte GmbH, IPR2019-01469, [Supp. 6](#), [Ex. 1003](#) (Sep. 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.~~

I hereby declare that all statements of my knowledge made in this
declaration are true and that these statements were made with the knowledge that
willful false statements and the like are punishable by fine or imprisonment, or
both, under Section 1001 of Title 18 of the United States Code.

~~XII. CONCLUSION~~

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

~~Respectfully submitted,~~

Dated
:
Septe
mber
13

Sep 12,
2023

~~/~~
~~R~~
~~e~~
~~d~~
~~n~~
~~e~~

y
R

i
M

i
l
l

e

f

/ _____ Rodney R. Miller Registration No. 66,073

*Lead
Counsel
for
Petition
ers*

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).~~

APPENDIX

A

Andres E. Carvallo

300 Pemberton Way, Austin, TX 78737 andres@512cmg.com – Mobile:
512-968-8108

Overview

Andres Carvallo is currently the CEO and founder of CMG Consulting LLC, as well as a Texas State University Professor of Innovation at The College of Science and Engineering, a Fellow of The Materials Applications Research Center, and Co-Director of The CIEDAR Consortium. And he is Editor of Power Engineering,

OBM and Cholla Energy
Ex. 1003 Page 131 of

Telcom/IoT, and Building Technologies at Artech House, and Author of the best-selling book “*The Advanced Smart Grid: Edge Power Driving Sustainability*”.

Andres Carvallo is a 36-times award-winning executive, engineer, speaker, author, editor, researcher, and professor. Andres has published 46 books (35 in Power Engineering, 5 in Telecom/IoT, and 6 in Building Technologies). Andres is a world-class principal consultant that has developed multiple growth and transformation plans for global vendors, startups, utilities, and cities since 2014. At Texas State University, Andres drives the design and buildout of 14 living labs in 800 acres focus on 9 sectors including smart cities, smart buildings and infrastructure, smart energy, utilities, water, wastewater, smart mobility and transportation, smart networks, sensors, and big data / software. And Andres is globally recognized by IEEE as one of the early developers of the smart grid concept and technology. Andres defined the term smart grid on March 5, 2004. Andres championed Austin Energy's utility transformation by investing over \$4 billion in a broad range of technologies including its smart grid program design and implementation from 2003 – 2010. Andres also architected the Pecan Street Project in 2009.

Andres has deep technical and market development expertise in Smart Cities, Smart Grids, Microgrids, Smart Pipes, Smart Metering, Smart Devices, Smart Buildings, Energy Storage, Distributed Generation (CHP, solar, wind, fuel-cells), Electric Vehicles and Charging Stations, Energy Management Systems, Enterprise Software, Embedded Software, Operating Systems, Programming Tools, Cloud Computing, Big Data, Mobile Computing, Mobile Phones, Security, Telecom Networks, and Internet of Things.

Andres has more than 36 years of experience in the energy, telecommunications, computer, and software industries. Having held executive management positions with P&L responsibilities since 1992, Andres has been responsible for the successful development and commercialization of over 50 products at six start-ups and leading global companies like \$2.5 billion Philips Electronics' Mobile & Wireless Division from zero, \$2 billion Digital Equipment's Personal Computer Business Unit (now HPE) from zero, and \$500 million Borland's International Operations from zero. Furthermore, Andres started his career as a Windows product manager at Microsoft in Redmond, WA.

Andres is a requested speaker on Leadership, Innovation, Smart Grid, Internet of Things, Smart Cities, Smart Buildings, Smart Enterprises, and Data Centers with over 400 public speeches delivered. Andres has been the recipient of 36 industry awards since 2005, including 10 Best Successful CEOs of 2020 by Industry Era, Top 50 Industrial IoT 5G Industrialist and Innovator in 2016, Top 15 Most Influential People in Energy in 2011, Computerworld Honors 21st Century Achievement Award in Energy in 2009, CIO 100 in 2006, Premier 100 IT Leader in 2006, and Best in Class of Premier 100 in 2006.

Andres has a BS in Mechanical Engineering with concentrations in robotics and control systems from The University of Kansas, and executive program certificates in business management, quality management, and power engineering from Stanford University, The Wharton School at The University of Pennsylvania, and The University of Idaho respectively.

Experience

CEO & Founder CMG Consulting LLC Jan 2014 – Present Austin, Texas Area

CMG is a strategy consulting and advisory company enabling Smart Energy, Smart Utilities, Smart Cities and Smart Buildings. CMG's mission is to help define and accelerate the digitalization and transformation of its customers. CMG services Cities, Utilities, Enterprises, Vendors, and Startups. CMG members are experts in

2022 © Andres Carvallo

All Rights Reserved

1

Andres E. Carvallo

300 Pemberton Way, Austin, TX 78737 andres@512cmg.com – Mobile:
512-968-8108

Energy, Water, IoT, Telecommunications, Manufacturing and Software technologies and markets. For More on CMG, please visit <http://www.512cmg.com>

As CEO, Andres leads a team of 14 members that deliver global advise and consulting for clients like AEP,

OBM and Cholla Energy
Ex. 1003 Page 132 of

[APS, Austin Energy, Brazos River Authority, Guadalupe Valley Electric Cooperative, Centerpoint Energy, DEWA, E.ON, Engie, Enerjisa, CPE Energy, LCRA, Golden Spread Electric Cooperative, Heartland Generation, JEA, LADWP, Liberty Utilities, National Grid, New Braunfels Utilities, Oncor, PG&E, San Diego Gas & Electric, Seattle City Light, Southern California Edison, Southern Company, Vistra Energy, Oncor, Xcel Energy, Watertown Municipal Utilities, City of Abu Dhabi, UAE; City of Austin City of Boulder City of Brownsville, City of Curitiba, BRAZIL, City of Dubai, UAE; City of Jacksonville City of Masdar, UAE; City of Sao Paulo, BRAZIL; City of Seattle, WA, USA; City of Madison, SD, USA; City of Rio Rancho, NM, USA, Anterix, Aclara, AT&T, Black & Veatch, Cisco, GE, IBM, Daikin, iFactor, Intel, Itron, Ligado Networks, Mission Communications, QinetiQ, Ramp Group, Siemens, Sprint, Tantalus, Veritas, Verizon, Viasat, Zpryme, Energy Thought Summit, Gridmates, Grid4C, ClearWorld, Hive Computing, Uptake, CapRock Renewables, Spark Cognition, Live Earth, Spirae, and RestorePoint.](#)

CMG consulting services expertise is in the following areas:

[Corporate Strategy, Business Models, Business Cases, IT Strategy, OT Strategy, IT/OT Management, Technology Governance, Technology Assessment, Technology Architecture, Road Map Development, Innovation Management, Marketing Strategy, Product Strategy, Services Strategy, Market Development, Channel Development, International Development, Go-To-Market Planning, Funding Strategy, and M&A Strategy.](#)

Keynotes:

[2022 Digital Twin Consortium Q4 Member Conference – Austin TX](#)
[2022 Digital 360 Summit – Austin TX](#)
[2022 India Smart Utility Week – Virtual 2021 Digital 360 Summit 2021 – San Marcos, TX 2021 Municipal Electric Utilities of Wisconsin Annual Conference – Manitowoc, Wisconsin 2021 Greater San Marcos Partnership Innovation Annual Conference – San Marcos, TX 2021 India Smart Utility Week – Virtual 2020 Digital 360 Summit 2020 – Virtual 2019 Technology Enhanced Infrastructure Summit – San Marcos TX 2019 Digital 360 Summit – San Marcos TX 2019 GridFWD Conference – Seattle, WA 2019 EUCI's Utilities & Smart Cities Conference – Birmingham AL 2018 Global Power & Energy Blockchain Conference – Orlando FL 2018 India Smart Grid Week Annual Conference – New Delhi, India 2017 American Electric Power Telecommunications Annual Planning Meeting – Columbus, OH 2017 Energy Management Association of New Zealand Conference and Exhibition – Wellington, NZ 2016 Kansas Municipal Energy Association Annual Conference – Wichita, KS 2015 Aclara Client Conference, Nashville, TN 2015 The University of Kansas 6th Annual Energy Conference, Lawrence, KS 2015 iConnect Customer Conference – Scottsdale, AZ 2015 Verizon's Annual Industry Sales Conference - Irving, TX 2015 IEEE ISGT 6th Annual Conference – Washington, DC 2014 Oak Ridge National Lab's Summit – Oak Ridge, TN 2014 Curent's Annual Seminar – Knoxville, TN 2014 Rural Smart Grid Summit – Phoenix, AZ 2014 Smart Water Summit - Palm Beach Gardens, FL 2014 Municipal Smart Grid Summit – Phoenix, AZ Texas A&M Smart Grid Center Summit – College Station, TX Senepar's 50th Annual Anniversary Conference – Curitiba, Brazil, SEP 2014 2013 Texas CEO Magazine Summit – San Antonio, TX](#)

Awards:

[2022 © Andres Carvallo](#)

[All Rights Reserved](#)

[2](#)

Andres E. Carvallo

[300 Pemberton Way, Austin, TX 78737 **andres@512cmg.com** – Mobile: 512-968-8108](#)

[10 Best Successful CEOs of 2020 by Industry Era CEO 2016 Industrial IoT 5G Innovator by RCR Wireless News](#)
[2016 Top 50 Industrial IoT 5G Industrialists and Innovators by RCR Wireless News](#)

Professor of Innovation, College of Science & Engineering

Fellow, Materials Applications Research Center

Co-Director, Connected Infrastructure for Education, Demonstration & Applied Research (CIEDAR) Consortium Texas State University 2018 – Present San Marcos, TX

[The College of Science and Engineering prepares undergraduate and graduate students for careers in the natural and physical sciences, mathematics, computer science, engineering, and technology. The college is committed to nurturing the talents of young scientists by immersing students in a robust curriculum and applied learning experiences in laboratory research, field study, and cutting-edge technology. Comprised of 190 faculty in seven departments, the Ingram School of Engineering, and the Materials Science, Engineering, and Commercialization Program, the College of Science and Engineering offers a broad spectrum of educational](#)

[OBM and Cholla Energy](#)
[Ex. 1003 Page 133 of](#)

resources, cross-disciplinary training, and career preparedness for our majors. Andres teaches EE4375 – Building a Smart Grid and EE4376 – Introduction to Telecommunications. Andres has played a key role in enhancing the Power Engineering and Telecommunications class curriculums.

Materials and Application Research Center (MARC) provides a seamless environment integrating applied multidisciplinary academic research, industry sponsored projects, and experiential learning opportunities for students addressing creation of a talent pipeline by integration of research, education and commercialization outreach. As Fellow at MARC, Andres has the responsibility to develop/drive a 10-year roadmap plan for the growth of research capabilities and funding towards an R1 level. As such, Andres has created the framework, strategic plan, and implementation plan for the Connected Infrastructure Education Demonstration Applied Research (CIEDAR) initiative. Additionally, Andres is an expert resource to evaluate, review, and assess a number of MARC initiatives and programs (e.g. StarOne incubator, New Ventures Competition, MARC Labs projects, etc.).

~~Dated: September 13, 2023 — /Rodney R. Miller/~~ CIEDAR Consortium is an Industry Research Center Collaboration with over 80 industry partners focus on 9 living labs (Utilities, Water/Wastewater, Entergy, Mobility, Cities, Buildings & Infrastructure, Networks, Sensors, and Data/Software) that have over 100 faculty and 300 students doing 290 research projects. CIEDAR is located at STAR Park and covers over 100 acres and 600,000 square feet of smart facilities. CIEDAR involves the study of all technologies with application to the lifecycle monitoring of infrastructure assets. This includes the: Validation of existing technologies, Evaluation of emerging technologies, and Development of new technologies. CIEDAR serves as the transdisciplinary study of technologies with application to infrastructure. Project teams may include civil engineering, electrical engineering, industrial engineering, manufacturing engineering, geography, mathematics, computer science, design, business, and many others. For more information on CIEDAR at Texas State visit <https://www.marc.txstate.edu/CIEDAR.html>

Editor of Power Engineering and Building Technologies, Artech House
2015 – Present
Boston, MA and London, England

A leading technical book publisher, Artech House provides today's professionals and students with cutting-edge books and software from the world's top authorities. From RF/microwave design, wireless communications, radar engineering, and electronic defense, to GPS/GNSS, power engineering, computer security, and building technology, Artech House publishes the forward-looking titles that engineers and managers need to excel. Artech House is a subsidiary of Horizon House Publications, Inc., publisher of the internationally acclaimed magazine Microwave Journal®.

Andres has led the publishing of over 40 titles (29 in Power Engineering, 5 in Telecom/IoT, and 6 in Building Technologies) in his short tenure. See listing in the last two pages.

Executive Vice President of Energy Solutions and Chief Strategy Officer, Proximity

2022 © Andres Carvallo

All Rights Reserved

3

~~Rodney R. Miller Registration~~
~~No. 66,073~~

Lead Counsel for Petitioners

CERTIFICATE OF SERVICE **Andres E. Carvallo**

~~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:~~

300 Pemberton Way, Austin, TX 78737 andres@512cmg.com – Mobile:
512-968-8108

2011 – 2013 (3 years) Austin, TX and San Diego, CA

Proximity was a leading global network and device management software platform provider for the energy, telecommunications, and transportation industries. Proximity enables enterprises to easily and seamlessly visualize, provision, and optimally manage their multi-network, multi-frequency, multi-protocol, and multi-vendor device infrastructure, resulting in lower network operating costs, higher revenues via new powerful service offerings and higher customer satisfaction. AirSync™, the company's software platform, allows state of the art dynamic monitoring, control, and management of multiple networks from a single network operations center. AirSync™ supports 4G LTE, WiMAX, Wi-Fi, 3G and multiple flavors of RF-Mesh networking technologies. Founded in January 2005, Proximity was privately held, headquartered in San Diego, California, and backed by Munich Venture Partners, Aeris Capital, Investec and Rembrandt Venture Partners. Most recently, it was acquired by Relayr. For more information, please visit www.proximity.com.

As EVP of Energy Solutions and Chief Strategy Officer, Andres had global responsibility for strategy, development, marketing, products, commercialization, and partnerships. Andres is also responsible for the Energy P&L. During his tenure, Andres refined the company vision and strategy to include use case support for Microgrids, Distributed Generation, Energy Storage, Vehicle Electrification, Demand Response, Automated Metering Infrastructure, Distribution Automation, Transmission Automation, and Substation Automation. Furthermore, Andres added product support for Fiber, PLC, LTE and 3G; upgraded website and marketing materials; launched AirSync 4.0 and 5.0; developed AirSync Cloud offering; developed a partner program; signed reseller agreements with Cisco, Siemens, SAIC, CapGemini, and CSC; built a partner ecosystem that included Aclara, Airspan, Alvarion, Black & Veatch, ESRI, EDX Wireless, GE, Itron, Oracle, NewNet, SAP, Sierra Wireless, Qualcomm, Verizon, Sprint, and AT&T; signed utility customers Sempra Energy, Reliance Energy, CFE, and BC Hydro. Proximity grew from \$1 million to \$10 million and got acquired by Relyr.

Keynotes:

2012 Five Points Research Executive Summit
2012 University of Kansas Energy Conference
CSC Executive Exchange 2012 UTC Latin
America 2012 Conference & Expo, Brazil
Metering America 2012
Gridweek 2011

Awards:

2013 The Networked Grid 150 Companies – GreenTech Media
2012 Top 10 Utility Smart Grid in North America - GreenTech Media
2012 Cool Vendors in Energy and Utilities – Gartner 2012 The
Networked Grid 100 People - GreenTech Media 2012 The
Networked Grid 150 Companies - GreenTech Media 2011 Top 15
Most Influential People in Energy – FierceEnergy 2011 Top 3 UtiliQ
Company - IDC & Intelligent Utility Magazine 2011 Top 5 Smart Grid
Utility Leader – FierceSmartGrid

Executive Vice President and Chief Strategy Officer, GridNet

2022 © Andres Carvallo

All Rights Reserved

2010 – 2011 (1 year)

Austin, TX and San Francisco, CA

Grid Net was a pioneer smart grid and smart home software platforms provider for utilities, partners, and customer.

As Executive Vice President and Chief Strategy Officer, Andres had global responsibility for strategy, business development, marketing, products, commercialization, and partnerships. During his tenure at Grid Net, Andres crafted new strategy and branding that resulted in expanding the company vision and product focus from just supporting smart metering to also supporting distribution automation, demand response, vehicle to grid, building to grid, and home to grid capabilities. Gridnet grew from \$1 million to \$5 million in annual sales. Andres drove the products from just supporting WiMAX, Fiber, Ethernet and HomePlug to also supporting Wi-Fi, ZigBee, 3G HSPA, 3G EV-DO, and LTE. And Andres established new partnerships with Landis+Gyr, IBM, Oracle, EMC,

Andres E. Carvalho

300 Pemberton Way, Austin, TX 78737 andres@512cmg.com – Mobile:
512-968-8108

Sprint, AT&T, Verizon, Infineon, Airspan, Samsung, Huawei, and SmartSynch, as well as managed the GE and Intel partnerships. Key customer wins included Energy Australia, AusGrid, SPAusNet, and Consumers Energy.

Keynotes:

2011 University of Kansas New Energy Conference 2011 TPPA Marketing and Customer Service Conference
2011 Smart Energy Summit 2010 Texas Wireless Summit Smart Electricity World MENA 2010, Dubai, UAE
Smart Grid Technology 2010 CIO Utilities Summit 2010 Smart Electricity World Asia 2010 – Singapore National
Smart Grid Forum 2010 - Sidney, Australia

Awards:

2010 InformationWeek 500 - InformationWeek Magazine
2010 Top 100 HITEC Awards - Hispanic IT Executive Council
2010 Top 2 UtiliQ Company - IDC & Intelligent Utility
Magazine 2010 Top 100 Web 2.0 Innovators - Internet
Evolution

Chief Information Officer, Austin Energy & Chief Technology Officer, Pecan Street Project 2003 – 2010 (7 ½ years)

Austin Energy is the 8th largest public power utility in the nation providing low cost reliable power to the capitol city of Texas, with annual revenues over \$1.4 billion servicing 430,000 premises within 440 square miles representing around 43,000 businesses and 2 million consumers. Austin Energy is an integrated utility managing 3,000 MW of generation (nuclear, coal, natural gas, biomass, solar and wind), transmission, distribution, wholesale energy, and retail energy. Austin Energy is a national leader in conservation and energy efficiency (with a goal to save 800 MW by 2020), green energy generation (55% by 2020), distributed generation technologies, and smart grid technologies. And Austin Energy was the very first electric utility to receive ISO-9001 certification in 2008.

As chief technologist reporting to the CEO and a member of the Austin Energy Innovation & Opportunity Development Executive Board from 2003 – 2010, Andres co-led over \$ 4 billion in investments into two wind farms, a solar farm, a biomass power plant, a natural gas power plant, two cogeneration power plants, two district cooling microgrids, roof top solar, over 100,000 thermostats for load control, a fiber communications network reaching every substation, 100% smart meter coverage, a smart grid architecture, and all the smart grid infrastructure.

Andres defined the term smart grid on March 5, 2004, and was the executive sponsor and chief architect of their smart grid program from 2003 – 2010, as well as the chief technology officer of the Pecan Street Project from 2008 - 2010. As their chief technologist, Andres developed a unique prospective on the strategies, requirements, use cases, business cases, project management, architectures, best practices, technologies, security and products that worked and didn't. Andres was also a contributor to the 2007 Energy Independence and Security Act's Title XIII Smart Grid: Sections 1301 -1309. And he served as a key advisor and contributor to NIST and EPRI for the creation of the Smart Grid Interoperability Standards, as well as to the DOE, FCC and EPA for their Smart Grid efforts.

And Andres led a well-known and successful technology and process transformation at Austin Energy from 2003 – 2010 in which he performed an assessment, created a technology strategic plan, and run operations replacing all company systems and re-engineered most processes while creating a technology governance that included a technology leadership group, a program management office, a vendor management office, an enterprise architecture group, a cyber security group, an enterprise data group, a disaster recovery group, and a quality management group.

Andres E. Carvalho

300 Pemberton Way, Austin, TX 78737 andres@512cmg.com – Mobile:
512-968-8108

Andres had 100% responsibility for the vision, plan, design, build, and run life cycle of all technologies company-wide, including the strategic planning, governance, product creation (in-house and/or outsource), project

management, acquisition, partnerships, integration, operations, training, and services of all voice operations, data network operations, data center operations, systems operations, billing operations, and customer operations (e.g. Supervisory Control And Data Acquisition, Energy Management System, Generation Management Systems, Distributed Control Systems, Distribution Management System, Outage Management System, Geospatial Information System, Asset Management Systems, Work Management Systems, Mobile Work Management System, Metering Data Management System, Trading Systems, Load Forecasting Systems, Call Center Systems, Billing System, Customer Relationship Management System, Business Intelligence and Data Warehouse Systems, Enterprise Content Management Systems, Enterprise Resource Planning applications, Demand Response Management System, Marketing Systems, Websites, Customer Portals and Applications).

Keynotes:

~~Barnes & Thornburg LLP P.O.
Box 2786 Chicago, IL~~

~~60690-2786~~ 2010 Smart Grid Intelligent
T&D Conference EUCI 4th Annual Smart
Grid Implementation 2010 Smart Energy
Summit

2009 Storage Networking World 2009
Connections Conference

2009 University of Kansas Energy Conference

2008 Smart Grid Initiatives for Utilities

2008 Next Generation Utilities Summit

2008 Green IT Symposium

GridWeek 2008 UTC Telecom 2007 IBM Impact 2007 2007 IBM Academy Annual Meeting 2005 Russian CIO
Summit – Moscow, Russia

Awards:

2010 The Networked Grid Top 100 - GreenTech Media

2010 Top 10 Smart Grid Company – GreenTech Media

2009 Top 2 UtiliQ Company – IntelligentUtility Magazine and IDC

2009 CIO of the Year - Energy Central

2009 CIO Hall of Fame Finalist - CIO Magazine 2009 Top 100 Most Influential - Hispanic Business Magazine

2009 Computerworld Honors 21st Century Award Winner for Energy - Computerworld 2009 Computerworld

Honors Finalist for Energy - Computerworld 2009 Computerworld Honors Laureate for Energy - Computerworld

2009 Apex Finalist – Utilities Telecom Council 2009 Dewey Award for Community Service – The Dewey Family

2008, 2009 HITEC 100 - Hispanic Information Technology Executive Council 2008 and 2009 Top 12 Green IT

Company - Computerworld 2007, 2008, and 2009 InformationWeek 500 - InformationWeek Magazine 2006 CIO

100 Award - CIO Magazine 2006 Best in Class of Premier 100 IT Leader - Computerworld 2006 Premier 100 IT

Leader - Computerworld 2005 IT Executive of the Year - Association of Information Technology Professionals

Executive and Investor Several Start-Ups 2000 – 2002 (3 years) Austin, TX

CEO at HillCast Technologies: Wireless Financial Platform and Applications (Sales of \$7 mm from zero in 10
months - \$20k marketing budget – 10 people team – US only – Acquired by Charles Schwab).

Andres E. Carvallo

300 Pemberton Way, Austin, TX 78737 andres@512cmg.com – Mobile:
512-968-8108

CEO at agentGO.com: Wireless Software Platform and Applications (Sales of \$4 mm from zero in 10 months - \$100k marketing budget – 20 people team – US only – Acquired by Avalon Marketing Systems).
EVP of Sales and Marketing at iMark.com: Used Industrial Equipment Exchange and Auction Platform (Sales of \$10 mm from zero in 10 months - \$400k marketing budget – 50 people team – US only – Acquired by FreeMarkets).
VP Sales and Marketing at Tycho Networks: Tier One ISP/CLEC offering VOIP and DSL Services (Sales of \$3 mm from zero in 6 months - \$200k marketing budget – 20 people team – US only – Acquired by DSL.net).

President & General Manager Philips Consumer Communications, Philips Electronics 1996 – 1999 (3 ½ years) Dallas, TX

Philips Consumer Communications was a division of \$30 billion Philips Electronics. Andres was responsible for P&L and managed and drove the strategic and operational teams that guided the growth from inception. Andres grew business to \$2.5 billion in annual sales from zero in 3 years. Andres was responsible for \$100 million marketing budget, a 4,000 people team and offices in 30 countries with a large distribution of resellers. The company designed, manufactured, sold and serviced wireless (CDMA, TDMA, GSM, Analog, DECT) phones, wired phones, and pagers worldwide.

~~Dated: September 13, 2023~~ ~~/Rodney R. Miller/~~

General Manager Personal Computer Business Unit, Digital Equipment Corporation 1994 – 1996 (2 years) Deerfield Beach, FL

Digital Equipment Corporation (DEC) was the fourth largest computer company in the world at the time with \$14 billion in annual revenues. Andres was responsible for P&L and managed and drove the strategic and operational teams that guided the growth from \$100 million to \$2 billion in revenues, a \$50 million marketing budget, and achieved number 6th in global PC market share. Andres did a manufacturing joint venture in Brazil, opened and managed offices in 20 countries, and built a distribution and service network. Compaq acquired DEC for \$14 billion in 1998 and then HP acquired Compaq for \$25 billion in 2001.

General Manager International Operations, Borland Software 1992 – 1994 (2 ½ years) Scotts Valley, CA

Borland was the second largest software company at the time with \$500 million in revenues. Andres was responsible for P&L and managed and drove the international strategic and operational teams from zero to \$50 million in revenues. Managed a \$4million marketing budget, a 30 people team, and offices in 13 countries. Andres opened and managed subsidiaries in Australia, South Africa, Brazil, Chile, Argentina, and Venezuela. Andres built a distribution network to sell and service customers in all countries in Latin America, Africa, and Australia / New Zealand. Borland designed, manufactured, marketed, distributed, sold, and serviced the Turbo C++, Turbo Pascal, Quattro Pro, dBase, Paradox, and InterBase product brands.

Product Manager UNIX solutions, The Santa Cruz Operation 1989 – 1991 (3 years) Santa Cruz, CA

The Santa Cruz Operation was the largest Intel-based UNIX software company in the world. The company was 10% owned by Microsoft at the time. Andres was a product manager responsible for UNIX and Professional Applications. Andres was responsible for a \$5 million budget and a team of 10 engineers. During his tenure, SCO went from \$80 million to \$200 million in annual sales and did its IPO.

Product Manager Windows and MS-DOS, Microsoft Corporation 1986 – 1988 (3 years) Redmond, WA

Andres E. Carvallo

300 Pemberton Way, Austin, TX 78737 andres@512cmg.com – Mobile:
[512-968-8108](tel:512-968-8108)

Microsoft is the leading software company in the world. Andres worked at Microsoft in Redmond, Washington right out of school and was product manager for Windows and MS-DOS. Andres was responsible for a \$20 million product budget and a team of 40 engineers. During his tenure, Microsoft went from \$120 million to \$900 million in sales and did its IPO.

Education

Andres received a B.S. in Mechanical Engineering from the University of Kansas in 1986 with a concentration in robotics and control systems. Andres has post-graduate certificates from Stanford University in Business Management in 1992, The Wharton School of the University of Pennsylvania in Quality Management in 1993 and the University of Idaho in Power Utility Management in 2008.

Advisory Boards and Board of Directors Experience

- SAE Austin – Chairman – August 2022 - present
- SAE Austin – Vice-Chairman – August 2020 – July 2022
- Smart Electric Power Alliance – Technical Board Advisor – April 2017 – March 2018
- Smart Grid Interoperability Panel (SGIP) – Board of Directors – March 2015 – April 2017
- SGIP Marketing and Membership Committee – Chairman – April 2015 – April 2017
- SGIP Nominating and Governance Committee – Chairman – May 2015 – April 2017
- Gridmates, Inc. – Board of Directors – 2014 – present
- Texas State University Ingram School of Engineering – Industry Advisory Board – 2013 - present
- Energy Thought Summit – Board Advisor – 2016 – 2017
- Smart Grid Summits – Board Advisor – 2014 – 2016
- Energy Thought Summit – Chairman – 2013 – 2015
- Utility Telecom Council's Smart Network Council – Board of Directors – 2011 – 2014
- Knowbility chairman – 2010 – 2012
- Knowbility board directors – 2009
- University of Kansas: Energy Council – Board of Advisors – 2009 to 2017
- University of Kansas: ITT Center – Industry Advisory Board – 2007 to 2013
- LPPC CIO SOA Task Force – Chairman – 2008 – 2009
- LPPC CIO Task Force – Chairman – 2007 – 2008
- Knowbility's AIR Austin – Chairman – 2006 – 2008
- LPPC CIO Task Force – Vice-chairman – 2006 – 2007
- Center for Commercialization of Electric Technologies – Board of Directors – 2006 – 2010
- Innotech Austin – Chairman – 2005 - 2007

Andres Carvallo technical innovations and credits include

-Microsoft Windows products at Microsoft Corporation from 1986-88 -SCO Xenix and SCO Unix products at The Santa Cruz Operation from 1989-91 -Quattro Pro at Borland from 1992-94 -First ultra-thin notebook computer with CD-ROM and 2GB of RAM at Digital Equipment Corp. in 1995 -First analog cell phone to use AA batteries at Philips Electronics in 1996 -Smallest GSM cell phone (95 grams) at Philips Electronics in 1997 -First CDMA cell phone at Philips Electronics in 1998 -First VOIP software platform at Tycho Networks in 1999 (acquired by DSL.net in 1999) -First industrial exchange software platform at iMark.com in 2000 (acquired by FreeMarkets in 2000) -First wireless software transcoding engine at agentGO in 2001 (acquired by Avalon Systems in 2002) -First real-time wireless software streaming engine at HillCast in 2002 (acquired by Schwab in 2003) -First build software platform at BuildForge in 2004 (acquired by IBM in 2006) -First automated IT run-book platform at iConclude in 2005 (acquired by Opsware/HP in 2007) -First smart grid energy architecture and framework at Austin Energy in 2006 -First smart grid infrastructure fully deployed at Austin Energy from 2003 – 2010

Rodney R. Miller Registration No. 66,073

Andres E. Carvallo

300 Pemberton Way, Austin, TX 78737 andres@512cmg.com – Mobile:
512-968-8108

Lead Counsel for Petitioners - First WiMAX smart meter management system at Grid Net in 2010 -First 10 million node smart grid network and device management platform at Proximity in 2011 -First Transactive Energy Platform designed for eliminating energy poverty at Gridmates in 2014 -Technology Enhanced Infrastructure framework and terms at Texas State University in 2019

Publications as an Author

Andres Carvallo – “Smart Water Summit 2019 White Paper” Published in September 2020.

Andres Carvallo and two others – “Technology Enhanced Infrastructure: A New Paradigm” – Published September 2019.

Andres Carvallo and four others – “New Regulations, Financial Tools and Business Models” – Published in July of 2019.

Andres Carvallo and two others – “Presidential Victory must deliver Smart Grid and New Power Utility Business Models” – Published in November of 2016.

Andres Carvallo and John Cooper – “The Advanced Smart Grid: Edge Power Driving Sustainability” – Second Edition. Published by Artech House in March 2015.

Andres Carvallo and George Koutitas – “Collaborative Prosumers About to Emerge” – Published by Energy Central in September 2014.

Andres Carvallo and six others – “Disruption Becomes Evolution: Creating the Value-Based Utility” – Published by CMG in June 2014.

Andres Carvallo – “Network Management System Helps Utilities Reduce Outages” – Published by Electric Light & Power in November 2013

Andres Carvallo – “Managing Microgrids, Magnifying Benefits” – Published by EnergyBiz Magazine in September of 2013.

Andres Carvallo – “The Smart Grid Emerges” – Published by UTC Journal in July 2013.

Andres Carvallo – “IEEE Survey Report Illuminates Smart Grid Future” – Published by IEEE Smart Grid Newsletter in December 2012.

Andres Carvallo and John Cooper – “Integrated Energy Storage, Virtual Power Plants, and Microgrids” – Published by GreenTech Media in September 2011.

Andres Carvallo and John Cooper – “The Smart Grid Optimization Engine” – Published by GreenTech Media in August 2011.

Andres Carvallo and John Cooper – “The Past and Future of Smart Grid” – Published by GreenTech Media in July of 2011.

Andres Carvallo and John Cooper – “The Advanced Smart Grid: Edge Power Driving Sustainability” – Published by Artech House in June 2011.

Andres Carvallo – “Interesting Times” – Published by Energy Today in July 2009

Andres Carvallo – “Increasing Innovation and Agility with SOA – Published by Cisco Systems in April 2008.

Andres Carvallo and fourteen others – “Information Technology Leadership” – Published by Aspatore Books in 2005.

Andres E. Carvallo

300 Pemberton Way, Austin, TX 78737 andres@512cmg.com – Mobile:
[512-968-8108](tel:512-968-8108)

[Andres Carvallo – “Fast Forward the Electric Business” – Published by EnergyBiz Magazine in January 2005.](#)

Publications as an Editor

[“IEC 61850 – Digitizing the Electric Power Grid” by Alexander Apostolov](#)

[“Energy Storage Technologies and Applications” by C. Michael Hoff](#)

[“Practical Guide to Transmission Line Design and Characterization for Signal Integrity Applications Bookset” by Eric Bogatin](#)

[“Electrical Product Compliance And Safety Engineering” by Steli Loznen and Constantin Bolintineanu](#)

[“Sustainable Power Autonomous Ships, and Clean Energy for Shipping” by John Erik Hagen](#)

[“Blockchain for cyberphysical systems” by Ali Dorri, Salil Kanhere, Raja Jurdak](#)

[“Lithium-Ion Batteries and Applications Vol 2” by Davide Andrea](#)

[“Lithium-Ion Batteries and Applications Vol 1” by Davide Andrea](#)

[“Electric Systems Operations” by Mani Vadari](#)

[“Renewable Energy Technologies & Resources” by Nadar Anani](#)

[“Lithium-Ion Battery Failures in Consumer Electronics” by Ashish Arora and three others](#)

[“IEC 61850 Demystified” by Herbert Falk](#)

[“Microgrid Design and Operation: Toward Smart Energy in Cities” by Federico Delfino and five others](#)

[“Vertical GaN and SiC Power Devices” by Kazuhiro Mochizuki](#)

[“Electrical Circuits: A Primer” by JC Oliver](#)

[“Smart Grid Redefined: Transformation of The Electric Utility” by Subramanian Vadari](#)

[“Power Grid Resiliency for Adverse Conditions” by Nicholas Abi-Samra](#)

[“The Smart Grid as an Application Development Platform” by George Koutitas and Stan McClellan](#)

[“Big Data Analytics for Connected Vehicles and Smart Cities” by Bob McQueen “Plug-in Electric](#)

[Vehicle Grid Integration” by Islam Safak Bayram and Ali Tajer](#)

[“Applications of Energy Harvesting Technologies in Buildings” by Stephen Beeby and Joseph Matiko](#)

[“A Whole-System Approach to High-Performance Green Buildings” by David Strong and Victoria Burrows](#)

[“IoT Technical Challenges and Solutions” by Arpan Pal and Balamuralidhar Purushothaman](#)

[“Electric Power Systems Fundamentals” by Salvador Acha Daza](#)

[“Advanced Technology for Smart Buildings” by James Simopoli](#)

[“Telecommunications Networks for the Smart Grid” by Albert Sendin and Miguel Sanchez-Fornie](#)

["Introduction to Power Utility Communications" by Harvey Lehpamer](#)

[Andres E. Carvallo](#)

[300 Pemberton Way, Austin, TX 78737 andres@512cmg.com – Mobile:
512-968-8108](#)

["Battery Management Systems: Equivalent – Circuit Methods – Volume 2" by Gregory Plett](#)

["Designing Control Loops for Linear and Switching Power Supplies" by Chrisophe Basso](#)

["Battery Management Systems: Battery Modeling – Volume 1" by Gregory Plett](#)

["The Advanced Smart Grid : Edge Power Driving Sustainability" by Andres Carvallo and John Cooper](#)

["Micro and Nano Energy Harvesting Technologies" by Chengkuo Lee and Jingquan Liu](#)

["Design and Analysis of Large Lithium-Ion Battery Systems" by Shriram Santhanagopalan and Kandler Smith](#)

["Post-Parametric Automation in Design and Construction" by Alfrodo Andia and Thomas Spiegelhalter](#)

["Introduction to Power Electronics" by Paul Chappell](#)

["A System Approach To Lithium-Ion Battery Management" by Phil Weicker](#)

["GIS for Enhanced Electric Utility Performance" by Bill Meehan](#)

["Battery Power Management for Portable Devices" by Yevgen Barsukov and Jinrong Qian](#)

["Synergies for Sustainable Energy" by Elvin Yuzugullu "Power System State Estimation" by](#)

[Mukhtar Ahmad](#)

["Electric System Operations: Evolving to the Modern Grid" by Subramanian Vadari](#)

["Implementing Successful Building Information Modeling" by Erika Epstein](#)

["Embedded Commissioning of Building Systems" by Omer Akin](#)

["Battery Management Systems for Large Lithium Ion Battery Packs" by Davide Andrea](#)

["Energy Harvesting for Autonomous Systems" by Stephen Beeby and Neil White.](#)

[Languages](#)

[Andres Carvallo is fluent \(speak, read, write, and dream\) in English, Spanish, and Brazilian Portuguese.](#)

Document comparison by Workshare Compare on Wednesday, December 20, 2023 1:25:30 PM

Input:	
Document 1 ID	file://L:\2023.09.13 Petition for IPR.pdf
Description	2023.09.13 Petition for IPR
Document 2 ID	file://L:\Corrected EX 1003 - A. Carvallo Declaration.pdf
Description	Corrected EX 1003 - A. Carvallo Declaration
Rendering set	Standard

Legend:	
<u>Insertion</u>	
~~Deletion~~	
<u>Moved from</u>	
<u>Moved to</u>	
Style change	
Format change	
~~Moved deletion~~	
Inserted cell	
Deleted cell	
Moved cell	
Split/Merged cell	
Padding cell	

Statistics:	
	Count
Insertions	1191
Deletions	968
Moved from	11
Moved to	11
Style changes	0
Format changes	0
Total changes	2181