

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

UNIFIED PATENTS, LLC,
Petitioner,

v.

CAUSAM ENTERPRISES, INC.,
Patent Owner.

IPR2022-00404
Patent 10,396,592 B2

Before KALYAN K. DESHPANDE, BRIAN J. McNAMARA, and
JOHN A. HUDALLA, *Administrative Patent Judges*.

McNAMARA, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. BACKGROUND

On July 22, 2022, in response to a Petition (Paper 1, “Pet.”), filed by Unified Patents, LLC (“Petitioner”), we instituted an *inter partes* review of claims 1–3, 5, 6, 8, 9, 11, 13–15, and 17 (the “challenged claims”) of U.S. Patent No. 10,396,592 B2 (“the ’592 patent”). Paper 10 (“Dec. to Inst.”). Causam Enterprises, Inc. (“Patent Owner”) filed a Patent Owner Response (Paper 15, “PO Resp.”), Petitioner filed a Petitioner Reply (Paper 21, “Reply”) and Patent Owner filed a Sur-reply (Paper 28, “Sur-reply”). A transcript of an oral hearing held on April 20, 2023 (Paper 30, “Hr’g Tr.”) has been entered into the record.

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). We base our decision on the preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d).

Having reviewed the arguments of the parties and the supporting evidence, we conclude that Petitioner has demonstrated by a preponderance of the evidence that the challenged claims are unpatentable.

II. THE ’592 PATENT

The ’592 patent concerns “a system and method for estimating and/or providing dispatchable operating reserve energy capacity for an electric utility using active load management so that the reserve capacity may be made available to the utility or to the general power market (e.g., via a national grid).” Ex. 1001, 2:11–15. Figure 3 of the ’592 patent is reproduced below.

III. ILLUSTRATIVE CLAIM

Claim 1, reproduced below with the paragraph designators used in the Petition, is illustrative of the subject matter claimed in the '592 patent.

[1.0] A system for managing power on an electric power grid, comprising:

- [1.1] at least one power consuming device, at least one controllable device, and at least one client device constructed and configured in network communication;
- [1.2] wherein the at least one controllable device is operably coupled to the at least one power consuming device;
- [1.3] wherein the at least one controllable device is operable to control a power flow from the electric power grid to the at least one power consuming device responsive to power control instructions from the at least one client device;
- [1.4] wherein the at least one power consuming device has an actual value of power reduced based on revenue grade metrology, and confirmed by measurement and verification; and
- [1.5] wherein the actual value of power reduced is a curtailment value as supply equivalence and provides operating reserve for the electric power grid.

IV. GROUNDS OF INSTITUTION AND TESTIMONIAL EVIDENCE

A. *Grounds of Institution*

We instituted trial on the following grounds:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–3, 5,6, 8,9, 11, 13–15, 17	103	Ehlers, ¹ Rose ²
1,2, 5,6, 8,9, 11, 13–15, 17	103	Chen, ³ Benson, ⁴ Rose

¹ U.S. Patent Appl. Pub. No. 2004/0133314 to Ehlers (Ex. 1005).

² U.S. Patent No. 6,636,030 B1 (Ex. 1006).

³ U.S. Patent Appl. Pub. No. 2004/0095237 (Ex. 1007).

⁴ U.S. Patent Appl. Pub. No. 2007/0260359 A1 (Ex. 1008).

B. Testimonial Evidence

In support of its challenges, Petitioner cites the direct testimony of its expert, Dr. Mark Ehsani. Ex. 1003, Declaration of Dr. Mark Ehsani (“Ehsani Decl.”); Ex. 1023, Reply Declaration of Dr. Mark Ehsani (“Ehsani Reply Decl.”). Petitioner also cites the cross-examination testimony of Patent Owner’s expert, Dr. Vijay Madiseti. Ex. 1022, Transcript of Deposition of Dr. Vijay Madiseti (“Madiseti Tr.”).

In opposition to Petitioner’s challenges, Patent Owner cites the direct testimony of its expert, Dr. Vijay Madiseti. Ex. 2008, Declaration of Dr. Vijay Madiseti In Support of Patent Owner’s Response (“Madiseti Decl.”). Patent Owner also cites the cross-examination testimony of Petitioner’s expert, Dr. Mark Ehsani, concerning the Ehsani Declaration and the Ehsani Reply Declaration. Ex. 2010, Transcript of Deposition of Dr. Mark Ehsani dated Sept. 23, 2022, (“Ehsani Tr. I”) and Ex. 2012, Deposition Transcript of Deposition of Dr. Mark Ehsani dated March 17, 2023 (“Ehsani Tr. II”).

V. CLAIM CONSTRUCTION

Construction of the terms “power supply value” and “revenue grade metrology” are relevant to this Decision.

A. Power Supply Value (PSV)

In the Decision to Institute, we construed “power supply value” according to the definition in the Specification. Dec. to Inst. 9. The Specification states “[i]mportantly, the PSV is an actual value that includes measurement and verification of the reduction in consumed power.” Ex. 1001, 9:2–4. Neither party disputes this construction and we apply it for purposes of this Decision.

B. Revenue Grade Metrology

The Decision to Institute applied the plain and ordinary meaning of “revenue grade metrology,” noting that “to the extent the plain and ordinary meaning of this term requires clarification, for purposes of this Decision, we understand revenue grade metrology to include measurement techniques and meters that measure power consumption with sufficient accuracy to be used in revenue collecting applications.” Dec. to Inst. 9.

The Petition argued that a person of ordinary skill would have understood the plain and ordinary meaning of “revenue grade metrology” to “at least include a method of measurement using any apparatus used for the purpose of making measurement of, or obtaining the basis of a charge for, electricity supplied to a purchaser.” Pet. 5 (citing Ex. 1003, Ehsani Decl. ¶ 26). Patent Owner contends “Petitioner identifies ‘revenue grade metrology’ as a term requiring construction, (Pet., 5), but its construction as applied is unreasonably broad and improperly eliminates ‘metrology’ from the claim.” PO Resp. 10. According to Patent Owner, Petitioner’s description

ignores the distinction between a value established based on underlying science, and a measurement of the that value . . . [and] rewrites the claimed feature to read: “wherein the at least one power consuming device has an actual value of power ~~reduced based on~~ [consumed that is measured by a] revenue grade metrology [meter], ~~and confirmed by measurement and verification.~~”

PO Resp. 11 (citing Ex. 2008, Madisetti Decl. ¶ 58) (strikethrough and second and third alterations added by Patent Owner).

Although Patent Owner does not formally propose a construction, Patent Owner argues that the Specification describes the claimed “actual value of power reduced based on revenue grade metrology” as “the use of

stored data or forecasts to scientifically determine or estimate value of reduced power during a control event.” *Id.* at 10–14 (citing Ex. 1001, 8:22–36, 17:23–37, 18:7–16, 18:36–45, 18:54–59, Fig. 9). Asserting that “confirmation-by-measurement of the reduced power is a separately-claimed requirement,” Patent Owner contends that Petitioner’s construction “is divorced from the actual claim language” and wrongly equates metrology with “a measuring device taking a direct measurement.” *Id.* at 14–15; Ex. 2010, Madisetti Decl. ¶¶ 57–58.

Petitioner notes that neither Patent Owner nor Patent Owner’s expert, Dr. Madisetti, proposes a construction of “revenue grade metrology.” Reply 1 (citing Ex. 1022, Madisetti Tr. 50:17–22; *see also id.* at 48:51–55:20 (Dr. Madisetti, under questioning from Petitioner’s counsel, refusing to opine on (i) whether control events, e.g., storing power consumption data, regulating and/or spinning reserves, described at column 8, lines 36–45 of the ’592 patent Specification, constitute revenue grade metrology, (ii) that a meter is not evidence that something is based on metrology as construed by Petitioner, and (iii) that the claim includes a measurement confirmation).

Petitioner notes that claim 1 encompasses a power consuming device that has an actual value of power reduced based on revenue grade metrology and that the actual value of power reduced is confirmed by measurement and verification, but argues “the ’592 Patent discloses a meter doing precisely this.” Reply 1 (citing Ex. 1001, 9:7–11 (“ Power Supply Value (PSV) is calculated at the meter . . . or at any device or controller that measures power within the standard as supplied by the regulatory body(ies) that govern regulation of the grid”); *see also* Ex. 1001, 28:33–38; Ex. 1001, 8:65–9:4:

based upon the reduction in consumed power, the systems and methods of the present invention provide for generating at the control center a power supply value (PSV) corresponding to the reduction in consumed power by the device(s). Importantly, the PSV is an actual value that includes measurement and verification of the reduction in consumed power; such measurement and verification methods may be determined by the appropriate governing body or authority for the electric power grid(s).

Noting that the definition of metrology cited by Patent Owner and Dr. Madisetti states that metrology includes “the science that deals with all aspects of measurement, **including how to accurately obtain them,**” Petitioner emphasizes that the question before us is not what science encompasses, but what “revenue grade metrology,” as claimed, encompasses. Reply 3 (quoting Ex. 1011, 472) (emphasis by Petitioner). Petitioner contends that Patent Owner’s arguments about the science of metrology ignore applied science and divorce the term “metrology” from “revenue grade” to such an abstract degree that “nothing tangible could satisfy the claims.” Reply 2; *see also* Ex. 1024, 1 (“[m]etrology as the ‘science of measurement’ implies a meta-subject with a deeper level of abstraction.”).

Although Patent Owner argues that Petitioner’s construction of “revenue grade metrology” is wrong, Patent Owner does not propose a construction of revenue grade metrology. *See* PO Resp. 10–15; *see also* Ex. 2008, Madisetti Decl. ¶¶ 55–56 (stating that the proper construction is the plain and ordinary meaning, but that Petitioner relies on an incorrect construction of “revenue grade metrology” by treating metrology the same as a meter). Citing the description of ALMS at column 8, lines 22–64, of the Specification as intrinsic evidence, Dr. Madisetti asserts that “Petitioner is

relying on its expert witness to contradict the '592 Patent specification, which does not treat a meter as identical to metrology.” Ex. 2008, Madisetti Decl. ¶ 61.

Instead of proposing a construction, Dr. Madisetti cites the '592 patent Specification as disclosing (i) that the ALMS “determines ‘power consumed’ by the one or more devices and ‘produce[s] power consumption data’ that is stored in a repository,” (ii) that “an active load director (ALD) ‘determines an expected, future time period for a control event during which power is to be interrupted or reduced to one or more devices.’” Ex. 2008, Madisetti Decl. ¶ 61 (citing Ex. 1001, 8:22–36). Dr. Madisetti further cites the '592 patent as disclosing that, (iii) based on the stored power consumption data, the ALMS estimates the expected power consumption during the time period of the control event, (iv) based on the estimated power consumption, the ALMS determines the projected energy savings resulting from the control event, and (v) based on the projected energy saving, the ALMS determines the operating reserve. *Id.* (citing Ex. 1002, 8:36–45); *see also* PO Resp. 13–14.

The portions of the Specification cited by Dr. Madisetti do not refer to the steps performed by the ALMS as “revenue grade metrology.” *See* Ex. 1001, 8:22–45; Ex. 2008, Madisetti Decl. ¶¶ 60–61. Under the guise that metrology is a “science,” Patent Owner reads into the claim a series of steps that the claim does not recite.

The terms “metrology” and “revenue grade metrology” do not appear anywhere in the Specification of the '592 patent. Dr. Madisetti referred to the examples in the Specification as “non-limiting” examples of metrology. Ex. 1022, Madisetti Tr. 59:22–50:5, 53:12–15, 54:12–22. However, Dr. Madisetti refused to characterize any of the examples as “revenue grade

metrology.” *Id.* at 52:1–7 (“I don’t offer an opinion whether these are revenue grade or not . . . I offer these as examples of what one would expect to be nonlimiting examples of metrology as a science . . .”). Nevertheless, Patent Owner attempts to read these examples from the Specification into the claim as limitations based on terminology that is not mentioned in the Specification. We agree with Dr. Madisetti that the examples from the Specification are non-limiting and conclude that they do not limit the scope of “metrology” or “revenue grade metrology.” We decline to read into the claims the steps that Patent Owner and Dr. Madisetti propose as “revenue grade metrology.”

We further note Patent Owner’s assertion that “revenue grade metrology,” i.e., the revenue grade science of measurement, explicitly excludes measurements. Hr’g Tr. 28:15–18. At oral argument, Patent Owner cited Exhibit 1024, an article by Richard Brown (“Brown article”) submitted by Petitioner regarding metrology, as stating that the vast majority of measurement sits outside metrology. *Id.* at 28:5–8. Although measurement itself is not metrology (Ex. 1024, 2), the basis of Patent Owner’s assertion that revenue grade metrology excludes measurement is unclear. In fact, the metrology article at Exhibit 1024 suggests that measurement is an integral part of the science of metrology. *See* Ex. 1024, 1 (“Metrology is the structure that ensures these measurements are stable, comparable and accurate, providing confidence in measurement at a stated level (usually by quoting a measurement uncertainty)),” 2 (“Assuring confidence in measurement results via certification, standardization, accreditation and calibration, often known as ‘industrial metrology’ (since that is the sector where it is usually found) or ‘applied metrology’ may to a

lesser extent be considered as containing aspects of metrology, but may also just be ‘good measurement.’”).

The Brown article states “[a]ll of metrology may be considered as a subset of measurement, but not all of measurement is metrology.” *Id.* at 1. For purposes of this Decision, we need not resolve the philosophical question of how measurement relates to metrology. We do not read into claim 1 steps performed by the ALMS based on the claim’s recitation of “revenue grade metrology.” As discussed above, even Dr. Madisetti refers to these as non-limiting examples. Ex. 1022, Madisetti Tr. 59:22–50:5, 53:12–15, 54:12–22. Therefore, we do not limit the claim language “actual value of power reduced based on revenue grade metrology” to “the use of stored data or forecasts to scientifically determine or estimate value of power during a control event,” as discussed by Patent Owner. PO Resp. 11–12.

We also note that claim 13, which depends from claim 1, recites that “the actual value of power to be reduced,” i.e., the actual value of power recited in claim 1, is a power supply value (PSV) that is “generated at a control center, meter, a submeter, . . . or any device or controller that **measures** power within the standard as supplied by regulatory bodies that govern regulation of the electric power grid.” Ex. 1001, 28:33–38 (emphasis added). As discussed above, the ’592 patent Specification explicitly defines the PSV as “an actual value that includes measurement and verification of the reduction in consumed power.” *See* Section V.A *supra*. Consistency of claim terminology precludes excluding measurement data from “the actual value of power reduced based on revenue grade metrology.”

Having considered the evidence and arguments of record, in this Decision we apply the same plain and ordinary meaning we applied in the Decision to Institute, where we further clarified “revenue grade metrology to

include measurement techniques and meters that measure power consumption with sufficient accuracy to be used in revenue collecting applications.” *See* Dec. to Inst. 8–9. To the extent the entire phrase “at least one power consuming device has an actual value based on revenue grade metrology” requires further clarification, we find this phrase to mean that the actual value of a power consuming device is determined by applying techniques and/or meters that measure power consumption with sufficient accuracy to be used in revenue collecting applications.

VI. ANALYSIS OF PRIOR ART CHALLENGES

A. Petitioner’s Challenge To Claims 1–3, 5–6, 8–9, 13–15, and 17 As Obvious Over Ehlers and Rose

1. Ehlers (Ex. 1005)

Ehlers discloses a system that manages the delivery of energy from a distribution network to one or more sites, where the energy consumption of at least one device coupled to the distribution network can be controlled. Ex. 1005 ¶ 15. A node coupled to the device senses and controls energy to the device based on at least one distribution network characteristic delivered to the node via a control system coupled to the node and the distribution network. *Id.*

Ehlers also discloses a method in which energy usage by a controlled device is measured and cut off during a first time period. *Id.* ¶ 16. A customer rebate is provided based on actual energy savings as a function of the first time period, the measured energy usage, and a known power requirement. *Id.*

Figure 1A of Ehlers is reproduced below.

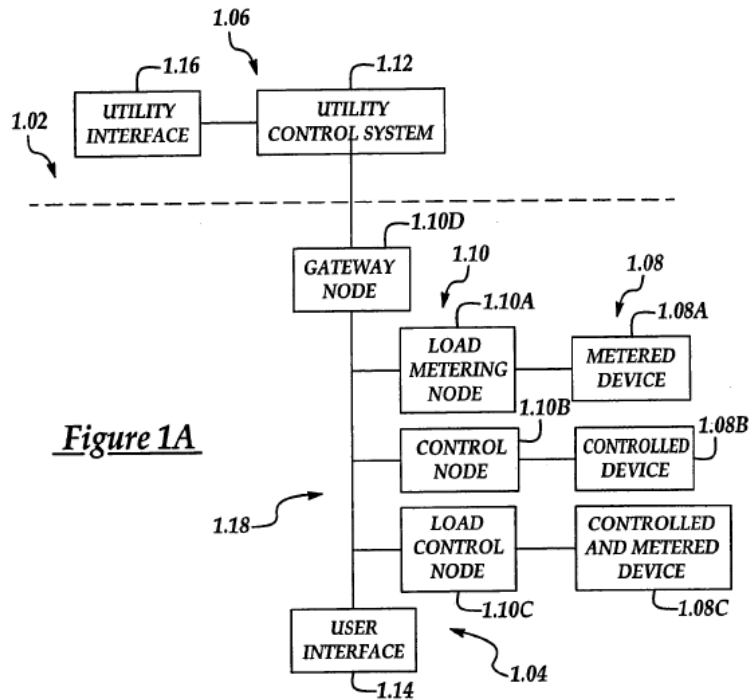


Figure 1A is a block diagram of Ehlers' energy management system. *Id.*

¶ 19. Utility 1.06 may monitor and control electricity usage by controlling nodes 1.10 and/or devices 1.08 using a PROGRAM (or PSP). *Id.* ¶ 78.

Customer site 1.04 includes node 1.10 and three exemplary devices: metered device 1.08A, controlled device 1.08B, and metered and controlled device 1.08C. *Id.* ¶ 60. Gateway node 1.10D communicates with utility control system 1.12 and provides instructions to load control nodes 1.08A, 1.08B, 1.08C. *Id.* ¶ 62. Gateway 1.10D also may generate a message when a controlled device 1.08 has a change of state that alters its contributable supply for the electrical distribution network by more than a predetermined range. *Id.* ¶¶ 113–114. System 1.02 may use these updates to keep a live running total of available supply for the electrical distribution network or maintain a history of consumption rates as a function of time to create historical usage by device type and program to aid in planning and

forecasting demand by device type. *Id.* Such information is available to utility 1.06 through interface 1.16. *Id.*

Load metering node 1.10A measures instantaneous power being delivered to the associated metered device 1.08A, e.g., metered device 1.08A may be an electricity meter that measures all power being supplied to customer site 1.04, such as a house. *Id.* ¶ 63. Control node 1.10B controls device 1.08B by turning it on or off or controlling features, such as start time, end time, and duration. *Id.* ¶ 64. Load control node 1.10C measures instantaneous power being delivered to controlled metered device 1.08C and controls device 1.08C accordingly. *Id.* ¶ 65. Load control node 1.10B and load control node 1.10C receive data, control parameters and Power Supply Program (PSP or PROGRAM) schedules from gateway node 1.10D—based on the received parameters and/or schedules, they control operation of controlled devices 1.08B and 1.08C, respectively, e.g., by shutting down or curtailing operation of the nodes upon receipt of a curtailment signal. *Id.* ¶¶ 78, 189, 349. The system credits rebates to consumers based on their actual curtailment, e.g., “a PROGRAM may automatically shift discretionary residential loads out of peak demand periods and credit customers who participate with KWH [kilowatt hour] rebates based on their actual (measured and verified) contributions.” *Id.* ¶ 79; *see also* Ex. 1003, Ehsani Decl. ¶¶ 39–40.

When utility 1.06 requires an increase in electrical supply, it reviews its current capacity and issues a “[s]upply [r]equest” that commands one or more customer sites enrolled in a PROGRAM to contribute to the system’s power generation supply. Ex. 1005 ¶ 98. System 1.02 can track, record, and compute which customers participate in a PSP and how much demand was reduced in the home for the PROGRAM period. *Id.* ¶ 104. For example,

when system 1.02 activates a PROGRAM, a “supply request” is generated. *Id.* ¶ 135. The supply request includes a Curtailment ID, Device Type Identifiers for the devices that are to contribute, a transaction identifier, and time information, e.g. start and stop times. *Id.* Gateway node 1.10D takes a whole-house meter reading (demand and consumption) and reports back to the system, which collects responses and provides accurate analysis and billing information for the activated PROGRAM. *Id.* ¶ 136. Gateway node 1.10D then controls specified devices 1.08 and reports device status back to system 1.02. *Id.* ¶ 137. Devices 1.08 currently drawing power report the total watts contributed and open the relays for controlled devices 1.08B and 1.08C, so they can be shut off or controlled to some predetermined state, e.g. the HVAC heating/cooling offsets. *Id.* ¶ 138. In one embodiment, the contribution of a device 1.08 equals the power consumption rate prior to activation of the program, i.e., the amount of energy being saved. *Id.* ¶ 140. At the end of the supply request period, gateway node 1.10D enables devices 1.08 and reports to system 1.02 a completion message that includes whole house demand and total consumption data. *Id.* ¶ 142. Thermostatically controlled devices can be controlled using a reverse ramp to reduce the potential for excess demand at the end of the curtailment period. *Id.*

2. *Rose (Ex. 1006)*

Rose discloses a “revenue grade power meter capable of detecting and recording high-speed power quality events.” Ex. 1006, code (57). Rose provides “high-speed electrical monitoring along with revenue metering functions in an electric meter provided to a customer used for billing.” *See id.* at 1:15–24, 2:6–12, 2:43–53, 3:37–48.

3. *Reasons to Combine Teachings of Ehlers and Rose*

Petitioner argues that, to the extent Ehlers' energy management system does not teach the exact form of metering or suggest the actual value of power is based on revenue grade metrology, a person of ordinary skill would have had reason to combine Ehlers' teachings with those of Rose, which teaches a revenue grade power meter used for customer billing. Pet. 18, 21.

Petitioner cites Ehlers as explicitly suggesting a reason to combine its teachings with those of Rose, emphasizing that Ehlers "explicitly describes the use of revenue grade power meters in certain circumstances, noting that a 'whole house meter 2.22A could be associated with revenue grade power.'" Pet. 19–20 (quoting Ex. 1005 ¶ 191). For example, Petitioner notes that Ehlers teaches load control node 1.10C performing metering and control functions, including measuring instantaneous power and total power over time. Pet. 19 (citing Ex. 1005 ¶¶ 178, 175). Petitioner also notes that, although "*Ehlers* is not explicit about implementation details," Ehlers states that "the metering node 'may be a separate device which is coupled to an electric meter (for retro-fit purposes)." *Id.* at 19 (quoting Ex. 1005 ¶ 58). As Ehlers' load control node is used to cut off energy to the control device and provide a rebate to the customer based on actual energy savings, Petitioner contends a person of ordinary skill would have had reason to look to references that teach a meter that can make measurements suitable for use in monetary determinations. *Id.* at 19 (citing Ex. 1005 ¶ 16; Ex. 1003, Ehsani Decl. ¶ 58).

Petitioner cites Rose as disclosing its revenue grade power meter monitors and records a user's consumption of power for metering purposes. *Id.* at 18 (citing Ex. 1006, 2:43–53, 3:37–48; Ex. 1003, Ehsani Decl. ¶¶ 57–

62). Petitioner further states that a person of ordinary skill “would be motivated to utilize the revenue grade power meter functionality of *Rose* in the electrical distribution system of *Ehlers* because this revenue grade power meter functionality would be used in exactly the same way, i.e., to meter power consumption for the purposes of revenue calculations.” *Id.* at 20 (citing Ex. 1006, 1:45–49). Petitioner also notes that a person of ordinary skill would have had a reasonable expectation of successfully adding *Rose*’s revenue grade functionality into *Ehlers*’ system as a simple substitution of interchangeable hardware. *Id.* at 21 (citing Ex. 1003, Ehsani Decl. ¶ 61).

Patent Owner contends that a person of ordinary skill would not have had reason to implement *Ehlers*’ load control node 1.10C as a revenue grade meter because *Ehlers* already discloses a revenue grade power meter as the whole house meter that determines charges for power usage. PO Resp. 44–45. According to Patent Owner, a person of ordinary skill would have had no reason to modify *Ehlers*’ load control nodes 1.10C to include separate revenue grade meters when *Ehlers* provides a manner for charging a customer for power usage that is different from how Petitioner attempts to modify *Ehlers*. *Id.* at 45–46 (citing Ex. 2010, Ehsani Tr. 76:24–77:4, 78:8–22 as evidence that only a single revenue grade meter is needed at a site and implementing each load control node as a revenue grade meter would be superfluous).

According to Petitioner, Patent Owner misunderstands its reasons for combining the teachings of the references. Reply 14. Arguing that the Petition asserts *Ehlers* discloses revenue grade metrology, Petitioner cites *Rose*’s more explicit disclosure to the extent it is argued *Ehlers* does not explicitly teach using revenue grade meters. *Id.* According to Petitioner, Dr. Ehsani testified that it would have been obvious to make the load control

node that measures and verifies a value of energy a revenue grade meter, noting that metering at the control node with a revenue grade meter would be consistent with overall revenue grade measurement. *Id.* at 15 (citing Ex. 2010, Ehsani Tr. 93:3–13, 94:13–95:3). According to Petitioner, “[w]hile Patent Owner is correct that *Ehlers* discloses that a ‘whole house meter 2.22A could be associated with revenue grade power (electricity),’ the assumption that load control nodes 1.10C would therefore necessarily not use revenue grade metrology also, or instead, is wrong.” *Id.* at 14 (citing Ex. 1005, Ehsani Decl. ¶ 191; Ex. 1003 ¶ 59; Pet. 19–20).

We understand Petitioner’s argument to be that in circumstances where customer billing occurs, a person of ordinary skill would have had reason to use revenue grade meters, such as those disclosed by Rose. Rose recognizes the need for a revenue grade power meter that measures and records high-speed electrical events along with revenue metering functions in a meter provided to a customer used for billing. Ex. 1006, 1:66–2:9. Ehlers discloses examples in which node 1.10C includes a metering module and performs control functions and metering functions, while communicating with the programming device over a two-way communications channel. Ex. 1005 ¶ 178, Fig. 2D. Ehlers discusses an “always on” system that allows utility 1.06 “to know exactly how much load is available from each participating end use device 1.08 at a customer site 1.04.” *Id.* ¶ 96. The utility may aggregate the load up to a desired combined total, or may target specific loads and manage demand by getting verification of control requests as curtailment commands are initiated. *Id.* Utility 106 can then pass detailed load curtailment data to back-office billing programs at the utility where credits can be applied to consumer bills commensurate with their contributions. *Id.* In view of these disclosures in

Ehlers, we agree with Petitioner that, in applications where customer billing occurs, a person of ordinary skill would have had reason to use a revenue grade meter, such as that taught by Rose, at a load control node, as taught by Ehlers, with a reasonable expectation of success.

4. *Claim 1*

a) *Preamble*

Petitioner identifies claim paragraph 1.0 as the preamble, which recites “[a] system for managing power on an electric power grid.” Pet. 10. Petitioner contends that, to the extent the preamble is limiting, Ehlers explicitly discloses that its system operates on an electric power grid and that a person of ordinary skill would have understood that the distribution system disclosed by Ehlers operates on such a grid because that is how electricity is distributed. *Id.* (citing Ex. 1005, code (57), ¶¶ 2, 15, 203, 209; Ex. 1003, Ehsani Decl. ¶¶ 44–45).

The Patent Owner Response does not address the preamble of claim 1 under this ground. To the extent that the preamble is limiting, we find that Petitioner has demonstrated that Ehlers discloses this feature.

b) *Claim Limitation 1.1*

Claim limitation 1.1 recites “at least one power consuming device, at least one controllable device, and at least one client device constructed and configured in network communication.” Pet. 11. Petitioner cites local control node 1.10C in Ehlers as disclosing the claimed controllable device because it controls and meters power consuming device 1.08C. *Id.* (citing Ex. 1005, code (57), ¶¶ 60, 65–66). Petitioner cites Ehlers’ gateway node 1.10D as disclosing the claimed client device because it communicates to utility control system 1.12 via a secured network that is always on and sends control parameters to load control node 1.08C. *Id.* at 11–12 (citing

Ex. 1005, Fig. 1.1, ¶¶ 15, 71–72, 189). Petitioner notes that the network can be wired or wireless and that gateway node 1.10D can include a processor and an Ethernet connection. *Id.* (citing Ex. 1005 ¶¶ 84–85).

The Patent Owner Response does not address claim limitation 1.1 under this ground. We find that Petitioner has demonstrated that Ehlers teaches this limitation.

c) Claim Limitation 1.2

Petitioner identifies as claim limitation 1.2 the recitation “wherein the at least one controllable device is operably coupled to the at least one power consuming device.” Pet. 13. As evidence that Ehlers discloses that the controllable device is operably connected to the power consuming device as claimed, Petitioner cites Ehlers’ disclosure that each device 1.08 may have an associated node 1.10 and that control nodes 1.10B, 1.10C may control operation of an associated device 1.08. *Id.* (citing Ex. 1005, Fig. 1A, ¶¶ 60, 68, 81, 189; Ex. 1003, Ehsani Decl. ¶¶ 49–50).

The Patent Owner Response does not address claim limitation 1.2 under this ground. We find that Petitioner has demonstrated that Ehlers teaches this limitation.

d) Claim Limitation 1.3

Petitioner identifies as claim limitation 1.3 the recitation “wherein the at least one controllable device is operable to control a power flow from the electric power grid to the at least one power consuming device responsive to power control instructions from the at least one client device.” Pet. 14–15. Petitioner cites Ehlers’ disclosure that load control nodes 1.10B, 1.10C may receive data, control parameters, and program schedule through and from gateway node 1.10D and that, based on received data, parameters and schedules, control and load nodes 1.10B, 1.10C may control operation of

associated device 1.08. *Id.* at 15 (citing Ex. 1005 ¶¶ 15, 78, 177, 189). Thus, Petitioner argues that Ehlers teaches or suggests that at least one controllable device (e.g., control node 1.10C) is operable to control power flow (energy from the electric utility) delivered from the electric power grid, to at least one power consuming device (controlled device 1.08), responsive to power control instructions, e.g., as received from at least one client device (gateway node 1.10D). *Id.* (citing Ex. 1003, Ehsani Decl. ¶¶ 51–52).

The Patent Owner Response does not address claim limitation 1.3 under this ground. We find that Petitioner has demonstrated that Ehlers teaches this limitation.

e) Claim Limitation 1.4

Petitioner identifies as claim limitation 1.4 the recitation “wherein the at least one power consuming device has an actual value of power reduced based on revenue grade metrology, and confirmed by measurement and verification.” Pet. 16. Petitioner argues that Ehlers alone or combined with Rose teaches or suggests claim limitation 1.4. *Id.*

Petitioner cites Ehlers as disclosing a Power Supply Program designed to alleviate or reduce energy demand during peak periods and credit participating consumers with a variable rebate based on their actual contributions. *Id.* (citing Ex. 1005 ¶¶ 78–80, 84, 96, 140–141). Petitioner points out that Ehlers implements energy use reductions by

measuring energy usage of a controlled device [e.g., power consuming device] operated by a customer, cutting off energy to the controlled device during the first time period, and providing a rebate to the customer based on actual energy savings as a function of the first time period, the measured energy usage, and known power requirements.”

Id. (quoting Ex. 1005 ¶ 16) (emphasis by Petitioner); *see also* Ex. 1005, Fig. 1C. As evidence that Ehlers discloses the actual value of power reduction is confirmed by measurement and verification, as claimed, Petitioner cites Ehlers' disclosure that "the system can monitor and **verify load control reductions.**" *Id.* at 17 (quoting Ex. 1005 ¶ 79) (emphasis by Petitioner). According to Petitioner, "even if it is argued that *Ehlers*' system does not use *revenue grade metrology*, it would have at least been obvious to a POSITA⁵ to make the load control node 1.10C a revenue grade meter because it is used for charging and rebate determinations," i.e., in a way that revenue grade meters are intended to be used. *Id.* at 17–18 (citing Ex. 1003, Ehsani Decl. ¶¶ 53–55).

Petitioner argues that, to the extent Ehlers' energy management system does not teach the exact form of metering or suggest the actual value of power is based on revenue grade metrology, a person of ordinary skill would have had reason to combine Ehlers' teachings with those of Rose, which teaches a revenue grade power meter used for customer billing. Pet. 18, 21. Petitioner cites Rose as disclosing its revenue grade power meter monitors and records a user's consumption of power for metering purposes. *Id.* at 18 (citing Ex. 1006, 2:43–53, 3:37–48; Ex. 1003, Ehsani Decl. ¶¶ 57–62).

Patent Owner argues that "Ehlers fails to disclose that any reduction in power demand is 'based on revenue grade metrology' or is 'confirmed by measurement and verification.'" PO Resp. 18; *see id.* at 18–28. Patent Owner contends that "[u]nlike Ehlers, the '592 Patent comprehends that actual energy savings cannot be assumed only from projections or forecasts

⁵ Person of Ordinary Skill in the Art.

for a variety of reasons, and therefore also measures the actual energy usage during an event and at related times.” PO Resp. 18 (citing Ex. 1001, 21:40–45, Fig. 12). Patent Owner’s arguments distinguish revenue grade metrology (“the use of stored data or forecasts to scientifically determine or estimate values of reduced power during a control event,” *id.* at 10–14) as not based on measurement (revenue grade metrology excludes measurement, Hr’g Tr. 28:15–18) and as being from a separate “measurement and verification of the interrupted load during the control event itself.” PO Resp. 18.

As to confirmation by measurement and verification of a power reduction value, Patent Owner argues that Ehlers is a “rudimentary method” that “provides a rebate based on a measurement of energy usage that occurs *before* energy is cut off to the controlled device, i.e. before Ehlers’ PROGRAM is implemented.” *Id.* at 19 (citing Ex. 1005 ¶ 16) (emphasis by Patent Owner); *see also* Sur-reply 10–14. According to Patent Owner, what Ehlers defines as “actual energy savings” is not “actual,” but merely a “forecasted energy savings,” and Petitioner does not show how Ehlers teaches confirmation of the forecasted reduction by measurement and verification. *Id.* at 20–21 (citing Ex. 2008, Madisetti Decl. ¶¶ 55, 70, 78).

Patent Owner points to Ehlers’ discussion of HVAC system as evaluating HVAC usage over time to compute reduction values, such as savings of 0.4 kwh where the setpoint changes from 72 to 76. PO Resp. 23. Patent Owner contends that this is merely an assumption of constants that assumes power consumption and savings match the calculation, but does not include any confirmation by measurement and verification that the computed savings is actually achieved by the system. *Id.* at 23–24.

Petitioner points out that limitation 1.4 does not require the actual value of power reduced to be measured, and instead only requires that the actual value be confirmed by measurement. Reply 7. Petitioner further notes that a person of ordinary skill would have understood that “the way such a value is determined [] to measure the amount of power being used at one time and measure the amount of power being used at another time and then subtract the two.” *Id.* at 7–8 (citing Ex. 1023, Ehsani Reply Decl. ¶ 13). Petitioner further notes that the ’592 patent discloses its ALD employs a similar method by calculating the difference between two values. *Id.* at 8 (citing Ex. 1001, 21:2–8, Fig. 11). Turning to the HVAC set-point example discussed by Patent Owner, Petitioner notes that Ehlers discloses computing the reduction in consumed power by subtracting the two actual values to arrive at an actual savings, such that the example performs both measurement of the actual value of power reduced and verification of that measurement. *Id.* (citing Ex. 1023, Ehsani Reply Decl. ¶ 11–12; Ex. 1005 ¶ 141). Dr. Ehsani explains that Ehlers teaches measuring power consumption at a baseline temperature setting of 76 degrees and a reduced setting of 72 degrees with a meter and computing the reduction in consumed power to actual values to arrive at the actual savings, e.g., 0.4 kilowatts. Ex. 1023, Ehsani Reply Decl. ¶ 12.

Petitioner’s arguments as to measurement and verification are persuasive. Patent Owner contends that Ehlers includes “issuing a rebate based on the measured usage while the device was operational, and the period of time that power was cut off . . . assumes the forecasted power savings is accurate . . . and fails to show any confirmation of the power savings by ‘measurement and verification’” (PO Resp. 16–17). Patent Owner’s arguments overlook other disclosure in Ehlers. In particular, Ehlers

discloses that, upon receipt of a PROGRAM generated supply request, gateway node 1.10D first takes a whole house meter reading and reports the demand and consumption status of each controlled device 1.08 to system 1.02, then controls devices 1.08 in accordance with the Curtailment ID and Device Identities in the supply request, and at the end of the curtailment re enables devices 1.08 and reports the whole house demand and consumption to system 1.02. Ex. 1005 ¶¶ 136–138, 140, 142, 144. We agree with Petitioner that a person of ordinary skill would have understood that the difference between the consumption reported at the beginning of the supply request and at the end of the supply request execution is the actual measured and verified curtailment, a measurement that confirms the actual reduction in power.

Patent Owner next argues that Petitioner advances a flawed theory with respect to the claimed feature “based on revenue grade metrology.” PO Resp. 28. According to Patent Owner, “the ’592 Patent discloses and claims a science-based approach whereby a utility can ‘respond to increased demand and maintain line frequency regulation,’” as opposed to demand side management (DSM), in which a power utility uses statistics to approximate average amounts of projected load removed by DSM and carries out actions, e.g., modifying process and direct load control, during peak periods. *Id.* at 28–29 (citing Ex. 1001, 4:19–39). Other than referencing its claim construction arguments, the Patent Owner Response does not explain the meaning of revenue grade metrology as a “science-based approach.” *Id.*

Citing page 15 of the Patent Owner Response, at the hearing Patent Owner argued:

the '592 is explaining before you commence the control event, in other words, before there is any sort of reduction in power or anything, there are some estimates that are made. You're estimating your power consumption behavior expected of the devices during time period of the control event based on stored power consumption data. In other words, based on past data collection.

Then there is a determining projected energy savings resulting from the control event, again, based on estimated power consumption behavior of devices based on prior data, and then determining operating reserve based on the projected energy savings. All we have here, I think, in slide 24 is discussion of what we're talking about with revenue-grade metrology.

... we have here use of data that had been collected over a period of time to come up with what the '592 patent believes will be the actual value of power reduced through these computations, through these calculations.

Hr'g Tr. 24:4–22; *see also* Ex. 1001, 8:32–64. It is unclear how this description of purported revenue grade metrology in the '592 patent undermines Petitioner's arguments concerning the cited teachings in Ehlers. For example, Ehlers discloses the system maintains a history of consumption rates as a function of time to create historical usages by device type and program to aid in planning and forecasting demand by device type and, based on the state of controllable device, keeps a live running total of available supply based on real-time demand that is available to the utility. Ex. 1005 ¶ 113.

As discussed above, Petitioner cites Rose as disclosing a system incorporating revenue grade metering for monitoring and recording power consumption. Pet. 18–19 (citing Ex. 1006, 2:43–53, 3:37–48; Ex. 1003, Ehsani Decl. ¶¶ 57–62). Patent Owner contends that revenue grade metrology excludes measurement. Hr'g Tr. 28:15–18. Although it is

unclear how the claimed “power consuming device has an actual value of power reduced” without being determined by measurement, as we discuss in our claim construction analysis, we need not determine how measurement relates to metrology. To the extent that metrology is limited to estimates and projections based on information stored in a database, as suggested by Patent Owner’s proposed construction, Ehlers discloses such features. Ex. 1005

¶ 113. Ehlers further discloses that the “consuming device has an actual value of power reduced” as determined by actual measurement. *See* Ex. 1005 ¶¶ 90–96 (disclosing an “always on” system that “allows the utility 1.06 to know exactly how much load is available from each participating end use device 1.08 at a customer site 1.04 and allows the utility 1.06 to aggregate that load up to a circuit . . . then pass detailed load curtailment data on to the back-office billing programs at the utility where credits can be applied to consumer bills commensurate with their contributions.”)

Having reviewed the evidence and arguments of record, we determine that, Petitioner has demonstrated that a person of ordinary skill would have understood the combined teachings of Ehlers and Rose disclose a “power consuming device has an actual value of power reduced based on revenue grade metrology, and confirmed by measurement and verification,” as recited in claim limitation 1.4.

f) Claim Limitation 1.5

Petitioner identifies as claim limitation 1.5 the recitation “wherein the actual value of power reduced is a curtailment value as supply equivalence and provides operating reserve for the electric power grid.” Pet. 21. As evidence that Ehlers discloses this limitation, Petitioner cites Ehlers’ discussion of curtailment commands. *Id.* Petitioner points out that Ehlers teaches initiating curtailment commands with the system passing detailed

load curtailment data to the utility's back-office billing programs where credits can be applied to consumer bills commensurate with their contributions. *Id.* (citing Ex. 1005 ¶¶ 96, 107, 346). Petitioner notes Ehlers' description of a program that rewards consumers with lower rates for managed consumption in order to reduce the utility's need to maintain large reserve margins. *Id.* at 22. Noting that Ehlers explicitly states that "the **energy saved** through engagement of a PROGRAM **may be viewed as capacity in the same manner as the capacity of a power plant**," Petitioner contends that a person of ordinary skill would have understood Ehlers' disclosure "to mean that the power saved by *Ehlers*' programmed curtailments is equivalent to power supplied to the grid and is used by the utility to provide additional operating reserve." *Id.* at 21–22 (citing Ex. 1005 ¶¶ 83, 97–98, 140, 187, 200, 344; Ex. 1003, Ehsani Decl. ¶¶ 63–64).

Patent Owner contends that because Ehlers operates with forecasts, Ehlers does not possess information about an actual energy savings that occurs during the PROGRAM activation and cannot pinpoint a "curtailment value as supply equivalence" as claimed. PO Resp. 31. According to Patent Owner, Petitioner fails to address any processing, transformation, or load shaping that would be viewed as creating supply equivalence or providing operating reserve. *Id.* at 33–34. Patent Owner further asserts that "Ehlers' oversimplistic treatment of general energy reduction as 'capacity' does not disclose any requirements that transform 'energy saved' into operating reserves." Sur-reply 16 (citing Ex. 1001, 22:12–21 (discussing spinning reserve, and non-spinning reserve); *see also* PO Resp. 33–34).

Petitioner replies that Patent Owner's discussion of types of operating reserve and supply equivalence awarded by a power generating entity as permitted by a power grid's governing body attempts to incorporate details

from the Specification that are not are not recited in the claim. Reply 11–12. Petitioner contends that Ehlers explicitly discloses the “curtailment value as a supply equivalence and provides operating reserve for the electric power grid,” (*id.* at 10) noting that Ehlers states “[t]he reasoning for such a program is that suppliers of ‘utility’ products must commit to meet all demands on their system and therefore they reward consumers with consistent, managed consumption patterns with lower rates, **because to meet their needs they do not have to [] maintain large reserve margins.**” *Id.* at 13 (quoting Ex. 1005 ¶ 200).

Patent Owner’s contentions appear related to those it presented concerning claim limitation 1.4. Ehlers discloses that when the utility requires an increase in electrical supply it commands one or more sites enrolled in a PROGRAM to provide their power contribution. Ex. 1005 ¶ 98. Ehlers explicitly discloses an “always on” system that monitors power, allows the utility to know how much load is available from each end use device at a site, and targets specific loads to manage demand by getting verification of control requests as curtailment commands are initiated. Ex. 1005 ¶¶ 90–96. The utility then passes on the load curtailment data to back-office billing programs that credit consumer bills commensurate with the contributions. *Id.* ¶ 96. As Petitioner points out, Ehlers “explicitly states that “the **energy saved** through engagement of a PROGRAM **may be viewed as capacity in the same manner as the capacity of a power plant.**” Reply 13 (emphasis by Petitioner) (quoting Ex. 1005 ¶ 83) (citing Ex. 1005 ¶¶ 97, 98 140, 187, 344).

Having considered the arguments and evidence of record, we find that Petitioner has demonstrated that Ehlers teaches the features recited in claim limitation 1.5.

g) Summary of Claim 1 Findings

Having considered the arguments and evidence of record, we conclude that Petitioner has demonstrated by a preponderance of the evidence that a person of ordinary skill would have had reason to combine the teachings of Ehlers and Rose and that their combined teachings would have disclosed or suggested all the limitations of claim 1.

5. Claims 2 and 3

Claim 2 depends from claim 1 and further recites a system “comprising a remote system control component, and wherein the remote system control component is operable for aggregating the actual value of power reduced and/or to be reduced from each of the at least one power consuming device.” As evidence that Ehlers teaches this limitation, Petitioner cites Ehlers’ disclosure that access to utility control system 1.12 may be provided at utility 1.06 through secure network 1.26, e.g., a virtual private network (VPN). Pet. 23 (citing Ex. 1005 ¶ 74, Fig. 1A). Petitioner notes that in Ehlers’s system, when a PROGRAM for a node is activated, utility control system 1.12 broadcasts a curtailment signal to gateway nodes 1.10D to shut down or curtail power consumption of affected devices 1.08. *Id.* at 24 (citing Ex. 1005 ¶ 346). Petitioner points out that, knowing the load available from each load device, Ehlers’ system aggregates the load up to a circuit or substation to target specific loads or geographic areas to manage demand and passes curtailment information to back-office billing programs that credit customers commensurate with contributions. *Id.* at 24–25 (citing Ex. 1005 ¶ 96).

As to claim 3, which depends from claim 2 and recites that the remote control component is a utility server, Petitioner cites Ehlers’ disclosure that

utility control system 1.12 may be implemented in software stored on back-end server 1.22. *Id.* at 25 (citing Ex. 1005 ¶ 72, Fig. 1B).

According to Patent Owner, Petitioner incorrectly represents what Ehlers discloses in paragraph 96. PO Resp. 35. Patent Owner asserts that Ehlers teaches monitoring an idealized amount of load that would be available for a PROGRAM, but does not teach a measurement during the PROGRAM. *Id.* Patent Owner further argues that Ehlers “merely teaches that its pre-calculated power savings (not confirmed by measurement and verification) may be available, and aggregates this ‘available’ load only from ‘participating end use’ devices.” *Id.* According to Patent Owner, claim 2 is more specific and requires “aggregating the actual value of power reduced and/or to be reduced from *each* of the at least one power consuming device.” *Id.* at 35–36 (emphasis by Patent Owner).

As Petitioner points out, the non-participating devices identified by Patent Owner are irrelevant to claim 2. As claim 2 is drawn to aggregating the actual value of power reduced from each of the at least one power consuming device, claim 2 does not recite every possible device, but the power consuming devices that have an actual value of power reduced. *See* Reply 16. As Petitioner further points out, Ehlers discloses a system that “allows the utility ‘to know exactly how much load is available **from each participating end use device 1.08** at a customer site 1.04 and allows the utility 1.06 to **aggregate that load** up to a circuit, substation or to any other desired combined total.’” *Id.* (citing Ex. 1005 ¶ 96). We further note that because Ehlers discloses a system that is “always on,” Ehlers “allows the system 1.02 to provide much higher levels of monitoring and management of loads.” Ex. 1005 ¶ 96.

Having considered the arguments and evidence of record, we conclude that Petitioner has demonstrated by a preponderance of the evidence that a person of ordinary skill would have had reason to combine the teachings of Ehlers and Rose (*see* Section VI.A.3) and that their combined teachings would have disclosed or suggested all the limitations of claim 2 to an ordinarily skilled artisan. Patent Owner does not advance any further arguments concerning claim 3, which depends from claim 2, and we reach the same conclusion as to claim 3.

6. *Claims 5 and 6*

Claim 5 depends from claim 1 and recites that the system further comprises “a backup power subsystem operable to automatically supply electric power to the at least one power consuming device when the power flow from the electric power grid to the at least one power consuming device drops below a threshold.” As evidence that Ehlers teaches this limitation, Petitioner cites Ehlers’ disclosure that its system can monitor and control remote generating capacity, such as photovoltaic systems. *Id.* at 27 (citing Ex. 1005 ¶ 97, Fig. 2E). Noting that Ehlers’ programs may be implemented when a predetermined set of conditions occurs, Petitioner states that Ehlers discloses that a distributed generation resource, such as a photovoltaic system, can dispatch on site capacity to meet the site’s energy needs to power devices 1.08. *Id.* at 27–28 (citing Ex. 1005 ¶¶ 72, 78, 172, 203; Ex. 1003, Ehsani Decl. ¶¶ 73–75). Claim 6 depends from claim 5 and further recites that “backup power subsystem comprises at least one of a battery backup system, a backup generator system, a backup solar power system, and a backup hydrogen fuel cell system.” Petitioner cites Ehlers’ disclosure of a photovoltaic system at consumer site 1.04 as a backup power

system. *Id.* at 28–29 (citing Ex. 1005 ¶¶ 72, 97, 203, Fig. 2E; Ex. 1003, Ehsani Decl. ¶ 78).

Patent Owner contends that Petitioner incorrectly interprets claim 5 as defining a threshold based on power demand, and that claim 5 instead requires the supplied power flow to drop. PO Resp. 36. According to Patent Owner, under Petitioner’s interpretation of claim 5, the power flow from the grid to the at least one power consuming device could remain constant or even increase during an energy shortage when demand exceeds supply. *Id.*

As Petitioner notes, a prior art product that sometimes, but not always, practices a claimed method teaches that aspect of the claimed invention. Reply 17 (citing *Hewlett-Packard Co. v. Mustek Systems, Inc.*, 340 F.3d 1314, 1326 (Fed. Cir. 2003)). We also agree with Petitioner that Ehlers explicitly discloses a backup system that dispatches on site capacity when demand exceeds supply, creating an energy shortage, i.e., when the power flow (the supply) drops below a threshold, backup power is supplied. *Id.*

Having considered the arguments and evidence of record, we conclude that Petitioner has demonstrated by a preponderance of the evidence that a person of ordinary skill would have had reason to combine the teachings of Ehlers and Rose and that their combined teachings would have disclosed or suggested all the limitations of claim 5 to such an ordinarily skilled artisan. Patent Owner does not advance any further arguments concerning claim 6, which depends from claim 5, and we reach the same conclusion as to claim 6.

7. Claim 8

Claim 8 depends from claim 1 and recites that “the at least one client device is further operable to communicate with the at least one controllable device and the at least one power consuming device via at least one of

Ethernet solution, wireless or wired communication.” As evidence that Ehlers teaches this limitation, Petitioner cites Ehlers’ disclosure that load control node 1.10C is coupled to power consuming device 1.08 and communicates with gateway node 1.10D, such that the gateway node communicates with the claimed controllable device and the claimed power consuming device, and that the nodes are interconnected by network 1.18, which may be a wired network, such as an ethernet network, or a wireless network. Pet. 29–30 (citing, e.g., Ex. 1005 ¶¶ 71, 84; Ex. 1003, Ehsani Decl. ¶¶ 80–83).

The Patent Owner Response does not address claim 8 under this ground. Having considered the arguments and evidence of record, we conclude that Petitioner has demonstrated by a preponderance of the evidence that a person of ordinary skill would have had reason to combine the teachings of Ehlers and Rose and that their combined teachings would have disclosed or suggested all the limitations of claim 8 to such an ordinarily skilled artisan.

8. *Claim 9*

Claim 9 depends from claim 1 and recites “the at least one power consuming device comprises at least one environmentally-dependent device, wherein the at least one environmentally-dependent device comprises at least one of a washer, a dryer, a hot water heater, a pool pump, and a smart appliance.” Petitioner cites Ehlers’ disclosure that controlled device 1.08B is any type of device for which it is desirable to measure and control power consumption, including a pool pump used to filter a pool or a water heater. Pet. 31–33 (citing Ex. 1005 ¶¶ 66, 81, 303, Figs. 1B, 2E).

The Patent Owner Response does not address claim 9 under this ground. Having considered the arguments and evidence of record, we

conclude that Petitioner has demonstrated by a preponderance of the evidence that a person of ordinary skill would have had reason to combine the teachings of Ehlers and Rose and that their combined teachings would have disclosed or suggested all the limitations of claim 9 to such an ordinarily skilled artisan.

9. *Claim 11*

Claim 11 depends from claim 1 and recites that “the operating reserve is operable to be sold to a utility.” As evidence that Ehlers teaches this limitation, Petitioner asserts that “*Ehlers* discloses a curtailment value that is a supply equivalence and provides operating reserve for the electric grid.” Pet. 33. Petitioner cites Ehlers’ disclosure that the operating reserve is sold and customers receive a rebate in the form of a billing credit based on the actual contributions. *Id.* (citing Ex. 1005 ¶¶ 16, 79, 96; Ex. 1003, Ehsani Decl. ¶¶ 88–91).

Asserting that the claimed operating reserve is an asset of a utility, not a consumer-side concept, Patent Owner argues that Ehlers involves a utility providing rebates to customers for forecasted energy savings and does not suggest selling anything to a utility. PO Resp. 37–38. We agree with Petitioner that the ’592 patent and Ehlers both concern providing operating reserve to the electric power grid and that Ehlers discloses a customer sells operating reserve to the utility by receiving a rebate in return for reducing actual power consumption. Reply 17–18.

Having considered the arguments and evidence of record, we conclude that Petitioner has demonstrated by a preponderance of the evidence that a person of ordinary skill would have had reason to combine the teachings of Ehlers and Rose and that their combined teachings would

have disclosed or suggested all the limitations of claim 11 to such an ordinarily skilled artisan.

10. Claim 13

Claim 13 depends from claim 1 and recites that “the actual value of power to be reduced is a power supply value (PSV); wherein the PSV is generated at a control center, a meter, a submeter, a building control system, or any device or controller that measures power within the standard as supplied by regulatory bodies that govern regulation of the electric power grid.” Petitioner cites Ehlers as disclosing that the claimed power supply value is generated at the load control node and that Ehlers’ system can monitor and verify load control reductions and credit rebates to consumers. Pet. 34–35 (citing Ex. 1005 ¶¶ 79, 97). Petitioner notes that Ehlers’ load control node contains metering module 210 and performs metering functions, including measuring the instantaneous power being delivered to a metered device 1.08A and the total power delivered to the metered device over a predetermined time. Pet. 35 (citing Ex. 1005 ¶¶ 175, 178, Fig. 2D). Petitioner also argues that, even if Ehlers’ meter does not meet the requirements of claim 13, it would have been obvious to include the revenue meter functionality of Rose, as explained in the discussion of claim 1. *Id.* (citing Ex. 1003, Ehsani Decl. ¶¶ 93–95, 54–62).

Patent Owner argues that, similar to its arguments with respect to claim 1, Petitioner fails to identify any confirmation by measurement and verification of forecasted energy savings and Ehlers fails to disclose an actual value that is confirmed by measurement and verification. PO Resp. 39. Patent Owner further notes that claim 13 recites the PSV is a value “generated at a control center, a meter, a submeter, a building control system, or any device or controller that measures power within the standard

as supplied by regulatory bodies that govern regulation of the electric power grid.” *Id.* at 40. Patent Owner contends that, although Petitioner relies on the metering functionality of Ehlers’ local control node 1.10C, measuring power consumed is not tantamount to generating a PSV that is the actual value of power reduced. *Id.* at 40–41.

Petitioner contends that Patent Owner’s arguments concerning claim 13 fail for the same reasons its arguments fail concerning claim limitation 1.4. Reply 18. As we noted in our analysis of claim limitation 1.4, Patent Owner fails to recognize Ehlers discloses that, upon receipt of a PROGRAM generated supply request, gateway node 1.10D first takes a whole house meter reading and reports the demand and consumption status of each controlled device 1.08 to system 1.02, then controls devices 1.08 in accordance with the Curtailment ID and Device Identities in the supply request, and at the end of the supply request curtailment re-enables devices 1.08 and reports the whole house demand and consumption to system 1.02. Ex. 1005 ¶¶ 136–138, 140, 142, 144. Thus, we agree with Petitioner that Ehlers discloses measuring an actual savings at a control node, meter, etc. i.e., a PSV as recited in claim 13.

Having considered the arguments and evidence of record, we conclude that Petitioner has demonstrated by a preponderance of the evidence that a person of ordinary skill would have had reason to combine the teachings of Ehlers and Rose and that their combined teachings would have disclosed or suggested all the limitations of claim 13 to such an ordinarily skilled artisan.

11. Claim 14

Claim 14 depends from claim 13 and recites that “the PSV is operable to determine a power consumption behavior and/or a commercial value for a

response to a control event associated with the at least one power consuming device.” As evidence that Ehlers teaches the limitations recited in claim 14, Petitioner cites Ehlers’ disclosure of determining a customer rebate based on energy savings resulting from a curtailment event (i.e., the recited “commercial value”). Pet. 36–37.

Patent Owner contends that Ehlers does not disclose the limitations of claim 14 for reasons similar to those it argued concerning claim 13. *See* PO Resp. 41–42. For the same reasons as those discussed in our analysis of claim 13, we reach the same conclusion as to claim 14.

Having considered the arguments and evidence of record, we conclude that Petitioner has demonstrated by a preponderance of the evidence that a person of ordinary skill would have had reason to combine the teachings of Ehlers and Rose and that their combined teachings would have disclosed or suggested all the limitations of claim 14 to such an ordinarily skilled artisan.

12. Claim 15

Claim 15 depends from claim 13 and recites that “the PSV is provided in units of monetary equivalent, and wherein the PSV indicates a compensation for providing supply equivalence to the electric power grid.” As evidence Ehlers teaches equivalence, Petitioner cites Ehlers’ disclosure that a device’s contribution equals the power consumption rate prior to activation of a PROGRAM resulting in curtailment, such that the energy saved by engaging the PROGRAM may be viewed as capacity in the same manner as the capacity of a power plant. *Id.* at 37–38 (citing Ex. 1005 ¶¶ 83, 140). Petitioner further cites Ehlers’ disclosure of verifying control requests as curtailment commands are issued and applying monetary credits to a consumer’s bill. *Id.* (citing Ex. 1005 ¶ 96).

Patent Owner contends that Ehlers does not disclose the limitations of claim 15 for reasons similar to those it argued concerning claims 1 and 13. *See* PO Resp. 42. For the same reasons as those discussed in our analysis of claims 1 and 13, we reach the same conclusion as to claim 15.

Having considered the arguments and evidence of record, we conclude that Petitioner has demonstrated by a preponderance of the evidence that a person of ordinary skill would have had reason to combine the teachings of Ehlers and Rose and that their combined teachings would have disclosed or suggested all the limitations of claim 15 to such an ordinarily skilled artisan.

13. Claim 17

Claim 17 depends from claim 13 and recites the system “further comprising a repository operable to store a measured power consumption of the at least one power consuming device during at least one past time period.” As evidence that Ehlers discloses the claimed repository, Petitioner cites Ehlers’ disclosure that a node, e.g., gateway node 1.10D, can store in a memory data that includes a breakdown by individual appliances of energy units consumed and their cost and supplier, historical energy usage data, and time stamped usage data, i.e., cumulative consumption over a predetermined period. Pet. 38–39 (citing Ex. 1005 ¶¶ 80–81, 163, 175, 179, 191, 268, 275, 280; Ex. 1003, Ehsani Decl. ¶¶ 103–107).

The Patent Owner Response does not address claim 17 under this ground. Having considered the arguments and evidence of record, we conclude that Petitioner has demonstrated by a preponderance of the evidence that a person of ordinary skill would have had reason to combine the teachings of Ehlers and Rose and that their combined teachings would

have disclosed or suggested all the limitations of claim 17 to such an ordinarily skilled artisan.

*B. Petitioner's Challenge to Claims 1, 2, 5, 6, 8, 9, 11, 13–16, and 17 As Obvious Over Chen in View of Benson and/or Rose*⁶

1. Chen

Chen is directed to a system and method for remotely monitoring and controlling electrical or mechanical equipment. Ex. 1007 ¶ 18. Chen discloses that, in order to reduce demand and add to the resource supply, the use, state, or characteristics of one or more devices may be adjusted remotely by a device user, a supplier, or a distributor of resources, e.g., a utility or a trader in resources that operate the devices. *Id.* ¶ 19. The resource adjustment may be based on a trigger event, a predetermined schedule, or other defined scheme, e.g., predicted demand or peak pricing. *Id.* ¶¶ 19–21. Using wireless and other networks, a central server may receive monitor messages related to resource consumption and transmit command messages to devices, causing the devices to reduce resource consumption to accommodate trading activity associated with the resource. *Id.* ¶¶ 20–21. Compliance, audit, and billing data may be collected automatically. *See generally id.* ¶¶ 18–21.

Figure 17 of Chen is reproduced below.

⁶ In the Decision to Institute, we noted that Petitioner's arguments diverge from this articulation of this challenge ground and that we addressed only those arguments made in the Petition. Dec. to Inst. 25; *see also id.*, concurrence by Hudalla, 1–2.

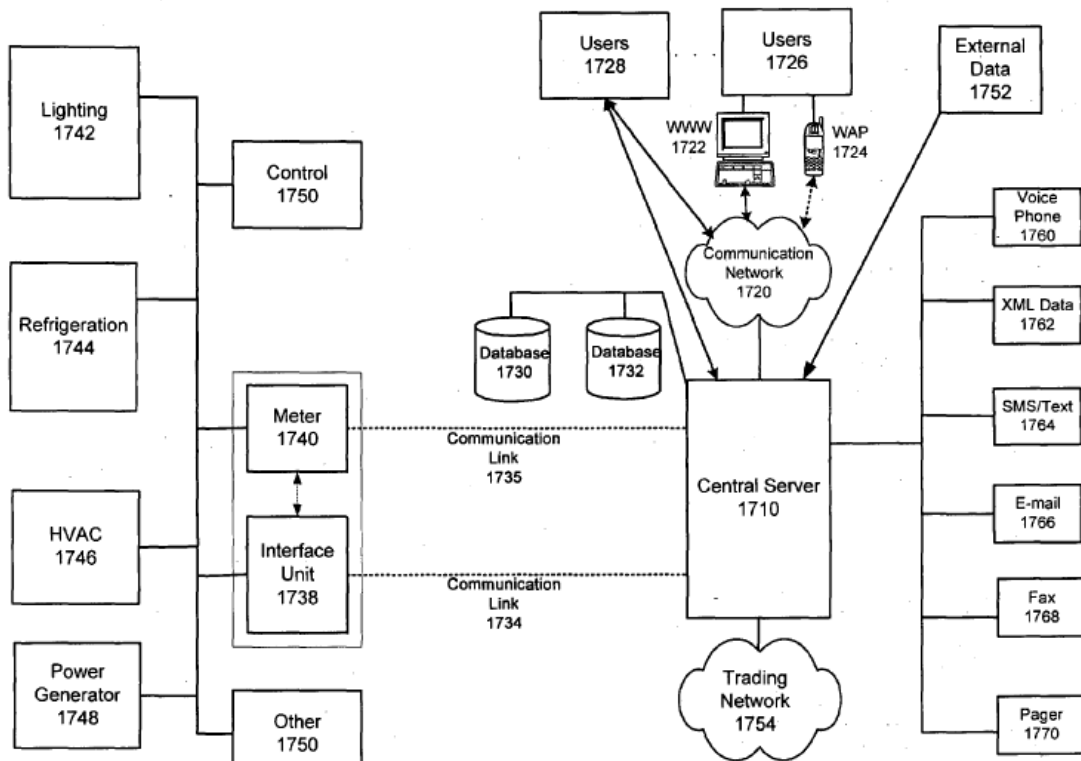


FIG. 17

Figure 17 illustrates a system for monitoring and controlling remote devices. Ex. 1007 ¶¶ 40, 50. In Figure 17, interface unit 1738 receives command messages from central server 1710 and sends control signals to control 1750 to adjust the power used by devices, such as refrigeration unit 1744. *Id.* ¶¶ 18, 21, 56–60, 85.

Figure 22 of Chen is shown below.

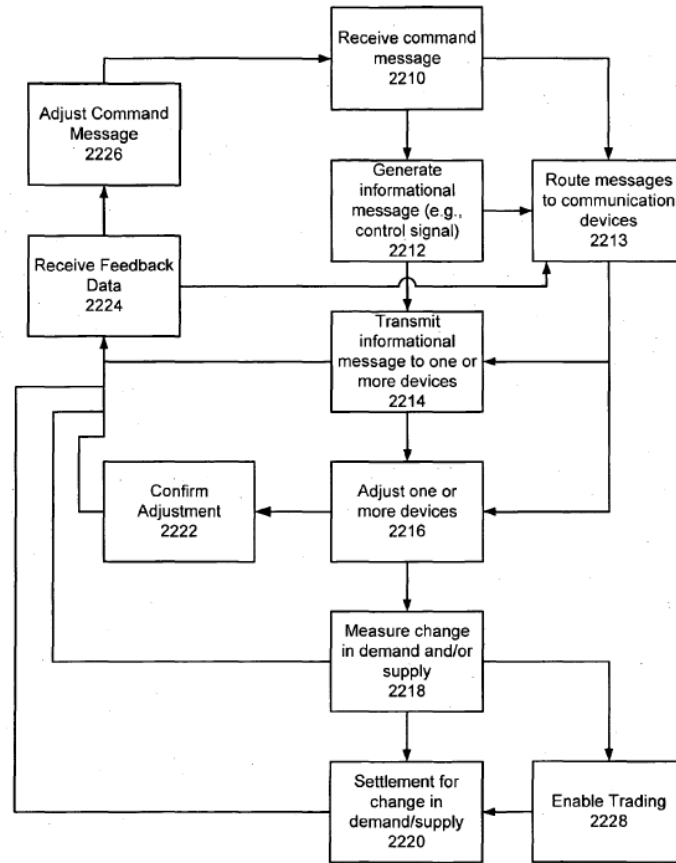


FIG. 22

Figure 22 is a flowchart illustrating a method for managing resource-consumption and/or resource-production of devices. *Id.* ¶ 144. In Figure 22 at step 2212, an informational message, e.g., a control signal, is transmitted to the interface unit via a communication channel to take an action that will alter the resource consumption of a device; at step 2214, the informational message is transmitted to the device; and at step 2216, the device is adjusted, e.g., the power consumption is reduced. *See id.* ¶¶ 144–147. At step 2218, the change in resource consumption is measured, and at step 2220, the user may receive economic compensation of the curtailment of the resource, e.g., the reduction in power. Alternatively, at step 2028, the user may trade the

adjustment in resource consumption via a trading system. *Id.* ¶ 147; *see also* Ex. 1003, Ehsani Decl. ¶¶ 108–110.

2. *Benson (Ex. 1008)*

Benson discloses a method of remotely regulating the power consumption of a line powered device by sending a message from a remote location over a wide area network to a controller locally attached to the device. Ex. 1008 ¶ 7. The method includes adjusting at the controller the power supplied to the device based on the message. *Id.* The device may be any type that uses electricity obtained from a main power source, such as a standard AC current obtained from a utility power grid. *Id.* ¶ 20.

3. *Claim 1*

a) *Preamble*

As evidence that Chen discloses a system for managing power on an electric power grid, as recited in the preamble of claim 1, Petitioner cites Chen’s disclosure of a system and method that remotely monitors electrical and/or mechanical equipment, and particularly the “resource-consumption amount.” Pet. 43 (citing Ex. 1007, code (57)). Petitioner also notes that Chen discloses an embodiment in which users can reduce demand and/or increase distributed supply across a large number of facilities and assets throughout an affected portion of a power grid or other resource distribution network. *Id.* at 43–44 (citing Ex. 1007 ¶ 23; Ex. 1003, Ehsani Decl. ¶¶ 114–115).

The Patent Owner Response does not address the preamble of claim 1 under this ground. To the extent that the preamble is limiting, we find that Petitioner has demonstrated that Chen teaches this feature.

b) Claim limitation 1.1

Petitioner cites Chen as teaching or suggesting at least one power consuming device, a controllable device, and a client device, constructed and configured in network communication, as recited in claim limitation 1.1. Pet. 44–45. As evidence that Chen teaches claim limitation 1.1, Petitioner cites Chen’s disclosure of an interface unit comprised of hardware and/or software that communicates over a wired or wireless network with power consuming remote devices, e.g., a refrigeration system, to monitor, adjust, control, and manipulate such devices. Pet. 44–45 (citing Ex. 1007 ¶¶ 21, 56–59, 158, 205, Figs. 2, 7).

The Patent Owner Response does not address claim limitation 1.1 under this ground. We find that Petitioner has demonstrated that Chen teaches this limitation.

c) Claim limitation 1.2

Petitioner asserts that Chen teaches a controllable device is operably coupled to a power consuming device, as recited in claim limitation 1.2. Pet. 46–47 (citing Ex. 1003, Ehsani Decl. ¶¶ 119–120). As evidence that Chen teaches claim limitation 1.2, Petitioner cites Chen’s disclosure that control 1750 may adjust an associated device or plurality of devices and may be integrated with or separate from the device. Pet. 46–47 (citing Ex. 1007, ¶¶ 58, 60, 197, Fig. 17).

The Patent Owner Response does not address claim limitation 1.2 under this ground. We find that Petitioner has demonstrated that Chen teaches this limitation.

d) Claim limitation 1.3

Petitioner contends that Chen, alone or in combination with Benson, teaches claim limitation 1.3, and that a person of ordinary skill would have had reason to combine the teachings of Chen and Benson. Pet. 47–55. Claim limitation 1.3 recites that the controllable device operates to control power from the electric grid to a power consuming device in response to power control instructions from a server. Petitioner cites Chen’s disclosure of transmitting control signals over a communication channel from central server 1710 to interface unit 1738; Petitioner notes that Chen’s control signals instruct controllable device 1750 to alter power consumption of power consuming device 1744 to reduce resource demand or add to resource supply. *Id.* at 47–50 (citing Ex. 1007 ¶¶ 19–21, 50, 57, 85, 144–146, Fig. 22).

Petitioner also argues that, to the extent it is not clear that Chen’s control 1750 controls power flow from the electric power grid to a power consuming device, this feature is taught by Benson. Pet. 51. Petitioner cites Benson’s disclosure of remote controller 106 between a power outlet and appliance 104 configured to adjust the power from the outlet to the appliance based on instructions received from master controller 102, where the power is obtained from the utility grid. *Id.* at 51–52.

Although Petitioner contends that a person of ordinary skill in the art would have understood that Chen’s control 1750 may adjust associated devices in accordance with informational messages, Petitioner acknowledges that Chen is not explicit as to that feature. Pet. 53. Thus, Petitioner contends that a person of ordinary skill would have had reason to look to Benson for further control device details, using known techniques in a similar way that would yield predictable results, because Benson is

configured to adjust the power supply from the outlet to appliance 104 based on instructions received from a master controller. *Id.* at 53–54 (citing Ex. 1003, Ehsani Decl. ¶¶ 129–131; Ex. 1007 ¶¶ 85, 144–147, Fig. 22; Ex. 1008 ¶¶ 7, 21).

The Patent Owner Response does not address claim limitation 1.3 under this ground. We find that Petitioner has demonstrated that Chen, alone or in combination with Benson, teaches this limitation.

e) Claim limitation 1.4

Petitioner asserts that Chen, alone or in combination with Rose, teaches that the power consuming device has an actual value of power reduced based on revenue grade metrology and confirmed by measurement and verification, as recited in claim limitation 1.4. Pet. 55–61. Petitioner cites Chen’s disclosure of a command message from an entity (e.g., a provider) to reduce resource consumption, where the level of curtailment may be calculated for end users, and captured energy readings determine how much energy was drawn for a utility during a curtailment. Pet. 61 (citing Ex. 1007 ¶¶ 53, 60, 74, 79, 81–83, 102). Based on this disclosure, Petitioner contends that a person of ordinary skill would have understood that the reduction in power is based on revenue grade metrology, as claimed, because a utility would not base its compensation on measurements from a meter that is not revenue grade. *Id.* at 56–57 (citing Ex. 1003, Ehsani Decl. ¶¶ 134–137). Petitioner cites Rose as teaching performing the measurement using a revenue grade meter. *Id.* at 58–59.

According to Petitioner, Chen teaches a metering node that may transmit or store information for billing and captures energy related readings to determine how much energy was drawn from a utility during a curtailment. *Id.* at 59 (citing Ex. 1007 ¶ 60). Petitioner argues that, to the

extent Chen does not teach or suggest using revenue grade metrology, a person of ordinary skill would have had reason to consider using meters that are suitable for measuring power in revenue calculation, such as the meter disclosed by Rose. *Id.* at 59–61.

Patent Owner argues that Petitioner has not shown Chen discloses an actual value of power reduced that is based on revenue grade metrology (PO Resp. 50–51) or an actual value of power reduced that is confirmed by measurement and verification (*id.* at 51–55). Patent Owner’s arguments are similar to arguments it presented in its discussion of Petitioner’s challenge based on Ehlers and Rose. Asserting that Petitioner relies on Chen to disclose that data measured and verified by a meter is used to provide a specific dollar amount compensation for each kilowatt of energy curtailed, Patent Owner contends Petitioner improperly consolidates the claimed features of revenue grade metrology and actual value confirmed by measurement and verification into a single concept. *Id.* at 50–51. According to Patent Owner, Petitioner’s reference to meter device 1740 in its discussion of Chen’s disclosure of capturing energy-related readings to determine how much energy was drawn from a utility during a curtailment does not indicate that Chen confirms an actual value of power that is reduced for at least one power consuming device. *Id.* at 52.

As previously discussed, although we do not construe revenue grade metrology to exclude measurement, we need not decide how measurement relates to metrology. *See* Section V.B *supra*. Chen discloses issuing power reduction or curtailment commands based on various criteria, including a trigger event, a predetermined schedule, or other defined scheme, e.g., predicted demand or peak pricing. Ex. 1007 ¶¶ 19–22. Chen further discloses that consumption amounts may be adjusted based on assessed

consumption or supply amount or estimates thereof and that individual devices may be adjusted in a priority order. *Id.* ¶¶ 92–93. Chen further discloses that, in response to receipt of a command message, the command module may generate control signals that adjust the devices as instructed, and may receive confirmation that the adjustments were made. Reply 21 (citing Ex. 1007 ¶¶ 85, 88); *see also, e.g., id.* ¶¶ 74, 75. We agree with Petitioner that such adjustments made according to a schedule or a trigger event and confirmation of such adjustments at least suggests a verification of the curtailment, i.e., that the device has been controlled to reduce the actual power as commanded. Reply 21–22 (citing Ex. 1023, Ehsani Reply Decl. ¶ 29). Chen also discloses that “actual amounts of change may be determined by a meter that measures actual usage of a resource, such as electrical usage,” and “a user may receive an appropriate price or incentive amount for an action taken (e.g., reduction in energy consumption, curtailment by a certain deadline, or other).” *Id.* ¶¶ 100–101.

Having reviewed the evidence and arguments of record, we determine that, whether revenue grade metrology is construed to include or preclude measurement, Petitioner has demonstrated that Chen, alone or in combination with Rose, would have disclosed to a person of ordinary skill a “power consuming device has an actual value of power reduced based on revenue grade metrology, and confirmed by measurement and verification,” as recited in claim limitation 1.4.

f) Claim limitation 1.5

Petitioner asserts that Chen teaches that the actual power reduction is a curtailment value that is a supply equivalence and provides operating reserve for the electric power grid, as recited in claim limitation 1.5.

Pet. 61–63. As evidence that Chen teaches claim limitation 1.5, Petitioner

cites Chen’s disclosure that users relinquishing the right to use all resources available to them in exchange for certain considerations results in negative demand that can be viewed as a positive supply (or spare generation and distribution capacity) in a trading exchange or market. *Id.* at 62 (citing Ex. 1007 ¶¶ 14, 63, 103, Fig. 22; Ex. 1003, Ehsani Decl. ¶¶ 145–146).

Referencing its arguments concerning Ehlers, Patent Owner contends that Petitioner treats “supply equivalence” and providing “operating reserve for the electric power grid” as inherent features of a power reduction program, fails to show that Chen confirms an actual value of power reduction, and does not identify disclosure in Chen that “curtailment value as supply equivalence”, as recited in claim 1. PO Resp. 55–56.

We agree with Petitioner that Chen discloses claim limitation 1.5. Petitioner correctly points out that Chen captures energy related readings to determine how much energy was drawn from a utility during a curtailment and that Chen teaches the curtailment is a supply equivalence because Chen explicitly states that the resulting “‘negative demand’ could be viewed as ‘positive supply’ in a market or trading exchange.” Reply 22–23 (citing Ex. 1007 ¶¶ 14, 31, 103).

Having reviewed the evidence and arguments of record, we determine that Petitioner has demonstrated that Chen, alone or in combination with Rose, would have disclosed claim limitation 1.5 to a person of ordinary skill.

g) Reasons to combine the teachings of Chen, Benson and/or Rose

We addressed Petitioner’s basis or combining teachings of Chen, Benson, and/or Rose in our discussion of each of claim 1’s limitations above. The Patent Owner Response does not explicitly address Petitioner’s contentions concerning the reasons a person of ordinary skill would have

combined the teachings of these references. We agree with Petitioner that a person of ordinary skill would have had reason to combine the teachings of Chen, Benson, and Rose with a reasonable expectation of success, as discussed above.

h) Summary of claim 1 findings

Having considered the arguments and evidence of record, we conclude that Petitioner has demonstrated by a preponderance of the evidence that a person of ordinary skill would have had reason to combine the teachings of Chen, Benson, and Rose and that their combined teachings would have disclosed or suggested all the limitations of claim 1 to such an ordinarily skilled artisan.

4. Claim 2

Petitioner cites Chen as teaching a remote system control component operable to aggregate the actual value of power reduced for each of the power consuming devices, as recited in claim 2. Pet. 64–67 (citing Ex. 1003, Ehsani Decl. ¶¶ 149–153). As evidence that Chen discloses the limitations recited in claim 2, Petitioner cites Chen’s disclosure that central server 1710 communicates with meter device 1740 through communication link 1735. *Id.* at 64 (citing Ex. 1007 ¶ 56). As Petitioner notes, meter device 1740 measures consumption and provides that data to interface unit 1738 or central server 1710. *Id.* (citing Ex. 1007 ¶ 56, Fig. 17). Referring to central server 1800, Petitioner further contends that Chen’s Capacity Determining Module 1820 determines a change in source demand or production associated with an adjustment, and credit module 1822 credits the user to compensate for adjustments. *Id.* at 66–67 (citing Ex. 1007 ¶¶ 96–97, Fig. 18).

Patent Owner contends that Petitioner’s identification of modules that aggregate the actual value of power reduced in Chen fails to identify a module that performs any aggregation of reduced power values for each power consuming device. PO Resp. 57–58 (citing Pet. 64–65; Ex. 1007 ¶ 60).

Petitioner’s reply arguments are persuasive. As Petitioner argues, Chen discloses “[t]he meter device 1740 may, for example, capture energy-related readings to determine how much energy was drawn from a utility during an adjustment (e.g., a curtailment) or the quality of energy produced by **a device** and provided to a utility grid during an adjustment (e.g., activation of distributed power generation equipment).” Reply 25 (quoting Ex. 1007 ¶ 60) (emphasis by Petitioner). Petitioner further notes that Chen’s User Profile Module 1919 in trigger condition/event module 1818 of central server 1710 discloses a user profile that may provide information related to how device or group of devices are operating, including the amount of their consumption. *Id.* (citing Ex. 1007 ¶¶ 114, 141). Finally, as Petitioner also points out, Chen satisfies claim 2’s limitations of aggregating from “at least one” device because, in the case of controlling a single device, Chen would send the actual value of power reduced for that device being controlled.

Having considered the arguments and evidence of record, we conclude that Petitioner has demonstrated by a preponderance of the evidence that a person of ordinary skill would have had reason to combine the teachings of Chen, Benson, and Rose and that their combined teachings would have disclosed or suggested all the limitations of claim 2 to such an ordinarily skilled artisan.

5. *Claims 5 and 6*

Petitioner cites Chen as teaching a backup power subsystem operable to automatically supply electric power to the power consuming device when power flow from the grid drops below a threshold, as recited in claim 5. Pet. 67–69; *see* Ex. 1003, Ehsani Decl. ¶¶ 154–157. As evidence Chen teaches such a backup power system, Petitioner cites Chen’s disclosure that additional backup power generators may be brought online when supply is less than internal demand, e.g., using generator 1748, and that a command message may be sent to increase supply by activating such generators. *Id.* at 68–69 (citing Ex. 1007 ¶¶ 58, 63, 68–69, 91). Petitioner also cites Chen’s disclosure of an informational message advising of anticipated decreases in available energy and instructions to activate or deactivate a device. *Id.* at 69 (citing Ex. 1007 ¶ 145). Petitioner cites Chen’s generator 1748 as teaching that the backup power system comprises a battery, backup generator, backup solar system, or backup hydrogen fuel cell system, as recited in claim 6. Pet. 69–70 (citing Ex. 1007, Fig. 17).

The Patent Owner Response does not address claims 5 and 6 under this ground. Having considered the arguments and evidence of record, we conclude that Petitioner has demonstrated by a preponderance of the evidence that a person of ordinary skill would have had reason to combine the teachings of Chen, Benson, and Rose that their combined teachings would have disclosed or suggested all the limitations of claims 5 and 6 to such an ordinarily skilled artisan.

6. *Claim 8*

Petitioner cites Chen as teaching a client device communicating with a controllable device and a power consuming device via an Ethernet solution, wired or wired communications, as recited in claim 8. Pet. 71. As evidence

Chen teaches the limitations recited in claim 8, Petitioner cites Chen's disclosure that interface unit 1738 (the claimed client device) may communicate with the remote devices to monitor and manipulate them and, based on such communications, individual control 1750 (the claimed controllable device) may adjust an associated device, e.g., refrigeration system 1744 (the claimed power consuming device). *Id.* (citing Ex. 1007 ¶¶ 57–58). Petitioner also notes that Chen provides an example in which wireless networking is used when monitoring energy-related assets and Chen's disclosure that transmission may occur over a cellular network, or an Ethernet network. *Id.* (citing Ex. 1007 ¶¶ 21, 25, 158, 205, Fig. 2).

The Patent Owner Response does not address claim 8 under this ground. Having considered the arguments and evidence of record, we conclude that Petitioner has demonstrated by a preponderance of the evidence that a person of ordinary skill would have had reason to combine the teachings of Chen, Benson, and Rose that their combined teachings would have disclosed or suggested all the limitations of claim 8 to such an ordinarily skilled artisan.

7. *Claim 9*

Petitioner cites Chen as teaching the power consuming device comprises an environmentally-dependent device, such as a washer, dryer, hot water heater, pool pump, or smart appliance, as recited in claim 9. Pet. 72. As evidence Chen teaches the limitations recited in claim 9, Petitioner cites Chen's disclosure that external data 1752, such as weather conditions, may be considered in monitoring and manipulating devices. *Id.* (citing Ex. 1007 ¶¶ 62, 112 (describing an Assess Weather Module)). Petitioner also notes that Chen discloses smart ID chips that can identify a device and that the devices can respond to a more generalized goal-oriented

control signal to assess how to reduce demand. *Id.* at 73 (citing Ex. 1007 ¶ 140).

Patent Owner contends that Chen discloses smart ID chips that may participate in identifying each device but that such smart ID chips do not control device operation according to environmentally-dependent conditions such as weather conditions. PO Resp. 58–59. Petitioner points out that Chen discloses “external data 1752 may also be considered in monitoring, controlling, adjusting, and/or otherwise manipulating the devices” and that such conditions include “weather conditions.” Reply 26 (citing Ex. 1007 ¶ 62). Petitioner also replies that Chen discloses its smart ID chips allow the devices or appliances individually or in a local network to respond to a more generalized, goal-oriented control signal to optimally figure out how to reduce demand. *Id.* at 27. Petitioner emphasizes that the ’592 patent does not define a smart appliance, but describes it as including a power control module that receives commands and controls the operation of the appliance directly. *Id.* (citing Ex. 1001, 11:54–57). We agree with Petitioner that an appliance with Chen’s smart ID chip would function similarly to the smart appliance described in the ’592 patent..

Having considered the arguments and evidence of record, we conclude that Petitioner has demonstrated by a preponderance of the evidence that a person of ordinary skill would have had reason to combine the teachings of Chen, Benson, and Rose and that their combined teachings would have disclosed or suggested all the limitations of claim 9 to such an ordinarily skilled artisan.

8. *Claim 11*

Petitioner cites Chen as teaching that the operating reserve can be sold to a utility, as recited in claim 11. Pet. 73. As evidence Chen discloses the

limitations recited in claim 11, Petitioner cites Chen’s disclosure that curtailment is negative demand that represents positive supply; according to Petitioner, via a trading system, users may offer the excess energy resulting from such curtailment for sale to bidders, such as utility companies. Pet. 73–75 (citing Ex. 1007 ¶¶ 102–103, 121, 125, 168, Fig. 22; Ex. 1003, Ehsani Decl. ¶¶ 170–175).

Patent Owner acknowledges Petitioner cites to Chen’s discussion of a user selling the change of resource-consumption and resource-production via a trading system and offering the excess amount of energy to a plurality of bidders. PO Resp. 60 (citing Pet. 74). Patent Owner repeats the arguments it advanced in response to Petitioner’s challenge based on Ehlers, i.e., that “operating reserve” is an asset of the utility or electric power grid and not a consumer-side concept. *Id.* For reasons similar to those we articulated in our analysis of Petitioner’s challenge based on Ehlers and Rose, we agree with Petitioner that Chen discloses the operating reserve is obtained at the user site and provided/sold to the utility. Reply 28 (citing Ex. 1023, Ehsani Decl. ¶ 36).

Having considered the arguments and evidence of record, we conclude that Petitioner has demonstrated by a preponderance of the evidence that a person of ordinary skill would have had reason to combine the teachings of Chen, Benson, and Rose and that their combined teachings would have disclosed or suggested all the limitations of claim 11 to such an ordinarily skilled artisan.

9. *Claim 13*

Petitioner cites Chen as teaching that the actual value of power to be reduced is a power supply value (PSV) generated at a device, such as a control center or meter, that measures power within a standard supplied by

electric power grid regulatory bodies. Pet. 75–77 (citing Ex. 1003, Ehsani Decl. ¶¶ 176–180). As evidence Chen teaches the limitations of claim 13, Petitioner cites Chen’s disclosure that meter device 1740 determines how much energy was drawn from a utility during an adjustment or curtailment and that informational messages confirm and verify the amount of power used. *Id.* (citing Ex. 1007 ¶¶ 8, 60, 87, 96, 162). Petitioner notes that a person of ordinary skill would have understood that such meters must be sufficiently accurate for use on trading exchanges. *Id.* at 76 (citing Ex. 1007 ¶¶ 14, 53, 63, 74, 79, 81–83, 102–103, Fig. 22). To the extent that Chen does not disclose a meter meeting such requirement, Petitioner contends that a person of ordinary skill would have looked to Rose’s meter to provide the requisite functionality, for reasons addressed in the discussion of claim 1. *Id.* at 77 (citing Ex. 1003, Ehsani Decl. ¶¶ 135–144, 177–179).

Patent Owner contends that Chen’s measurement during a curtailment is not device specific and does not disclose an actual value of power to be reduced. PO Resp. 61 (citing Ex. 2008, Madisetti Decl. ¶ 143). Patent Owner further argues that Chen’s meter measurements are not equivalent to generating a PSV at the meter and that Chen’s disclosure of trading exchanges do not disclose or teach generating a PSV. *Id.*

As Petitioner’s Reply emphasizes, Chen discloses “[t]he meter device 1740 . . . determine[s] how much energy was drawn from a utility during an adjustment (e.g., a curtailment) or the quality of energy produced by a device and provided to a utility grid during an adjustment (e.g., activation of distributed power generation equipment.” Reply 25, 28 (emphasis by Petitioner) (citing Ex. 1007 ¶¶ 87 (“[t]he user or other entity may identify which devices are monitored”), 96 (“a change in resource demand or production associated with the devices . . . may represent

capacity saved . . . the change may represent supply added’’)). We agree with Petitioner that Chen’s meter performs measurement and verification of the actual value of power reduced, i.e., the PSV as claimed. *Id.*

Having considered the arguments and evidence of record, we conclude that Petitioner has demonstrated by a preponderance of the evidence that a person of ordinary skill would have had reason to combine the teachings of Chen, Benson, and Rose and that their combined teachings would have disclosed or suggested all the limitations of claim 13 to such an ordinarily skilled artisan.

10. Claim 14

As to claim 14’s recitation that the PSV determines power consumption behavior and/or a commercial value for a response to a control event, Petitioner cites Chen as disclosing that users give up the right to freely use all of the resources available to them in exchange for certain considerations, e.g., monetary considerations and discounts. Pet. 77–78.

Patent Owner argues Chen’s relationship between reduced energy consumption and financial incentives are designed to entice curtailment, but that a PSV as claimed is operable to determine power consumption and/or commercial value for responding to a control event.

We agree with Petitioner that Chen determines a commercial value when it determines the actual value of power reduced to a device, such that the user can receive compensation in the form of rebates and discounts. *See* Reply 28–29 (citing Ex. 1007 ¶¶ 53, 79, 81–83, 102–103, Fig. 22; Ex. 1023, Ehsani Reply Decl. ¶ 37).

Having considered the arguments and evidence of record, we conclude that Petitioner has demonstrated by a preponderance of the evidence that a person of ordinary skill would have had reason to combine

the teachings of Chen, Benson, and Rose and that their combined teachings would have disclosed or suggested all the limitations of claim 14 to such an ordinarily skilled artisan.

11. Claim 15

Petitioner cites Chen as disclosing the PSV is provided in monetary units and indicates a compensation for providing supply equivalence to the electric power grid, as recited in claim 15. Pet. 78 (citing Ex. 1003, Ehsani Decl. ¶¶ 184–187). As evidence that Chen teaches the limitations of claim 15, Petitioner cites Chen’s disclosure that users forego rights to use all the resources available to them in exchange for certain consideration, e.g., monetary compensation of specific levels of curtailment. *Id.* at 78–79 (citing Ex. 1007 ¶¶ 14, 83). Petitioner also notes that Chen discloses that utility companies may receive the benefit of the excess amount of energy from the user. *Id.* at 79 (citing Ex. 1007 ¶¶ 102–103, 125, 131, 149, Figs. 20, 22–23). Petitioner further asserts that a person of ordinary skill would have understood that the utility could distribute through the electric grid the excess supply it obtains from the end user. *Id.*

Patent Owner argues that Petitioner’s theory for Chen’s disclosure of PSV is that Chen generates a PSV by a meter and there is no disclosure in Chen that incentives, compensation and discounts are generated by a meter. PO Resp. 63.

We have construed the PSV to be an actual value that includes measurement and verification of the reduction in consumed power. We agree with Petitioner (Reply 29) that claim 15 does not require that the incentives, compensation, or discounts must be generated by a meter.

Having considered the arguments and evidence of record, we conclude that Petitioner has demonstrated by a preponderance of the

evidence that a person of ordinary skill would have had reason to combine the teachings of Chen, Benson, and Rose and that their combined teachings would have disclosed or suggested all the limitations of claim 15 to such an ordinarily skilled artisan.

12. Claim 17

Petitioner cites Chen as teaching a repository that stores measured power consumption of a power consuming device during a past time period, as recited in claim 17. Pet. 80–81 (citing Ex. 1003, Ehsani Decl. ¶¶ 188–191). As evidence that Chen teaches the limitation recited in claim 17, Petitioner cites Chen’s disclosure of Consumption/Supply Database 1940 that stores the consumption data of one or more devices or data regarding average consumption over a predetermined time frame. *Id.* at 80 (citing Ex. 1007 ¶¶ 54, 97, 87, 107, Fig. 19).

The Patent Owner Response does not address claim 17 under this ground. Having considered the arguments and evidence of record, we conclude that Petitioner has demonstrated by a preponderance of the evidence that a person of ordinary skill would have had reason to combine the teachings of Chen, Benson, and Rose that their combined teachings would have disclosed or suggested all the limitations of claim 17 to such an ordinarily skilled artisan.

VII. CONCLUSION⁷

Having considered all the arguments and evidence of record, we conclude that Petitioner has demonstrated by a preponderance of the evidence that all challenged claims are unpatentable.

⁷ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 *Notice*

In summary:

Claims	35 U.S.C. §	Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
1–3, 5, 6, 8, 9, 11, 13–15, 17	103	Ehlers, Rose	1–3, 5, 6, 8, 9, 11, 13–15, 17	
1, 2, 5, 6, 8, 9, 11, 13–15, 17	103	Chen, Benson, Rose	1, 2, 5, 6, 8, 9, 11, 13–15, 17	
Overall Outcome			1–3, 5, 6, 8, 9, 11, 13–15, 17	

VIII. ORDER

In consideration of the above it is:

ORDERED that claims 1–3, 5, 6, 8, 9, 11, 13–15, and 17 are unpatentable; and

FURTHER ORDERED that that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

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Patent 10,396,592 B2

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