IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

JOHNSON CONTROLS TECHNOLOGY COMPANY, Plaintiff, v. BUILDINGIQ, INC., Defendant.	)	Civil Action No. 20-521-MN JURY TRIAL DEMANDED

AMENDED COMPLAINT

Plaintiff Johnson Controls Technology Company ("Johnson Controls"), by and for its Amended Complaint for patent infringement against Defendant BuildingIQ, Inc. ("BuildingIQ"), alleges to the Court as follows:

PARTIES

1. Johnson Controls is a company organized and existing under the laws of the State of Michigan, with a principal place of business located at 2875 High Meadow Circle, Auburn Hills, Michigan 48326.

2. Johnson Controls is informed and believes that BuildingIQ is a corporation organized and existing under the laws of the State of Delaware, with a principal place of business located at 2121 South El Camino Real, Suite 200, San Mateo, California 94403.

JURISDICTION AND VENUE

3. This is an action for patent infringement arising out of BuildingIQ's unauthorized manufacturing, using, distributing, offering for sale, and selling of building and energy management systems in violation of Johnson Controls' patent rights. Because this action for

infringement arises under the patent laws of the United States, 35 U.S.C. § 271, *et seq*., this Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

4. This Court has personal jurisdiction over BuildingIQ in that at all times pertinent hereto, upon information and belief, BuildingIQ is a corporation incorporated in Delaware and does business within this Judicial District.

5. Venue is proper in the District of Delaware pursuant to 28 U.S.C. §§ 1391(b) and 1391(c) and 1400(b) because BuildingIQ at least resides in and is subject to personal jurisdiction in this District.

BACKGROUND

JOHNSON CONTROLS IS A LEADER OF BUILDING AND ENERGY MANAGEMENT SYSTEMS

6. Johnson Controls International, plc ("JCI") has been a leader in the field of building and energy management systems since it was founded in 1885 as Johnson Electric Services Company—two years after its founder, Warren Johnson, first patented an electric room thermostat. JCI transforms the environments where people live, work, learn and play. From optimizing building performance to improving safety and enhancing comfort, JCI drives the outcomes that matter most. JCI delivers on this promise in industries such as healthcare, education, data centers, and manufacturing. JCI has a global team of 105,000 experts in more than 150 countries and counts over 130 years of innovation. JCI's leading portfolio of building technology and solutions includes some of the most trusted names in the industry, such as Tyco®, York®, Metasys®, Ruskin®, Titus®, Frick®, Penn®, Sabroe®, Simplex®, Ansul®, and Grinnell®.

7. Since its founding, JCI has made significant investments in the engineering, design, and development of building and energy management systems and technologies and has

secured patent protection for its innovations. In 1990, for example, JCI introduced its breakthrough Metasys® Building Automation System, linking a building's environmental control, energy management, lighting, fire management, and security systems, which is protected by patents and other valuable intellectual property.

8. In addition, JCI has developed a broad portfolio of digital, artificial intelligence, IoT-based [Internet of Things], and/or software solutions to particular building and energy management challenges. For example, JCI's Central Plant Optimization (CPO) software uses predictive control to optimize cooling, heating, and power consumption associated with a central plant, thereby minimizing both cost and energy use. CPO is protected by patents and other valuable intellectual property.

9. Today, JCI remains an industry and market leader. Johnson Controls, as JCI's technology holding company, holds over 210 issued U.S. patents and more than 240 pending U.S. patent applications in areas relevant to its Metasys® System and CPO including building automation, plant optimization, energy optimization, and similar technologies. Just this year, JCI was recognized by IoT Breakthrough as the "Overall IoT Company of the Year" based on its portfolio of software solutions, including its Central Plant Optimization solution.

THE PATENTS-IN-SUIT

10. Johnson Controls is the assignee and owner of United States Patent No. 8,843,238 ("the '238 patent"). The '238 patent, which is entitled "Systems and methods for controlling energy use in a building management system using energy budgets," was duly and legally issued by the U.S. Patent and Trademark Office on September 23, 2014. A true and correct copy of the '238 patent is attached hereto as **Exhibit A**.

11. Johnson Controls is the assignee and owner of United States Patent No. 9,322,566 ("the '566 patent"). The '566 patent, which is entitled "Systems and methods for controlling

energy use during a demand limiting period," was duly and legally issued by the U.S. Patent and Trademark Office on April 26, 2016. A true and correct copy of the '566 patent is attached hereto as **Exhibit B**.

12. Johnson Controls is the assignee and owner of United States Patent No. 10,254,721 ("the '721 patent"). The '721 patent, which is entitled "Cascaded systems and methods for controlling energy use during a demand limiting period," was duly and legally issued by the U.S. Patent and Trademark Office on April 9, 2019. A true and correct copy of the '721 patent is attached hereto as **Exhibit C**.

13. Johnson Controls is the assignee and owner of United States Patent No. 10,175,681 ("the '681 patent"). The '681 patent, which is entitled "High level central plant optimization," was duly and legally issued by the U.S. Patent and Trademark Office on January 8, 2019. A true and correct copy of the '681 patent is attached hereto as **Exhibit D**.

14. Johnson Controls is the assignee and owner of United States Patent No. 10,580,097 ("the '097 patent"). The '097 patent, which is entitled "Systems and methods for cascaded model predictive control," was duly and legally issued by the U.S. Patent and Trademark Office on March 3, 2020. A true and correct copy of the '097 patent is attached hereto as **Exhibit E**.

15. Johnson Controls is the assignee and owner of United States Patent No. 8,600,556 ("the '556 patent"). The '556 patent, which is entitled "Smart building manager," was duly and legally issued by the U.S. Patent and Trademark Office on December 3, 2013. A true and correct copy of the '556 patent is attached hereto as **Exhibit F**.

16. The '238, '566, '721, '681, '097, and '556 patents are collectively referred to herein as the "Patents-in-Suit."

COUNT I

INFRINGEMENT OF UNITED STATES PATENT NO. 8,843,238

17. Johnson Controls repeats and re-alleges each and every allegation contained in paragraphs 1-16 inclusive, as though fully set forth herein.

18. The ’238 patent is valid and enforceable.

19. The ’238 patent describing the improved method and device for controlling energy use in a building management system was filed with the U.S. Patent and Trademark Office on September 30, 2011, and issued on September 23, 2014. The U.S. Patent Office carefully examined the claims that ultimately issued as the ’238 patent. Consistent with 35 U.S.C. § 282 and the limitations of the claims of the ’238 patent, a person having ordinary skill in the art would understand that each claim of the ’238 patent (independent or dependent) relates to a separate invention distinct from other claims as for example with dependent claim 2 which is distinct from independent claim 1.

20. The U.S. Patent Office considered the claims of the ’238 patent against the background of prior technology to determine if the claims of the ’238 patent identified a patentable advance over prior art systems before issuing the patent. Among other things, the U.S. Patent Office searched multiple sets of prior art in classifications including, but not limited to, 700/28, 33, 36, 37, 277, 286, 291, 295, 300; 702/60-62; 705/7.29, 7.31, 7.35; 236/44 C, 49.3, 91 D; 340/539.22, 539.26-28, 540; 374/29, 30. As an example, classification 700/28 included patents relating to optimization and adaptive control of control systems. The face of the ’238 patent identifies some of the prior art from the classifications and other prior art considered in allowing the various claims of the ’238 patent, including for example U.S. Patent No. 5,568,377 entitled “Fast automatic tuning of a feedback controller”.

21. A person having ordinary skill in the art would understand that the separate claims in the '238 patent did not pre-empt any field, but are improvements in methods and systems for controlling energy use in a building management system. A person having ordinary skill in the art would also recognize that the claims of the '238 patent do not relate to implementation of a business method on a general purpose computer, but are specific improvements to a building management system to better control energy use.

22. The filing of the Complaint (ECF No. 1) constitutes notice and actual knowledge in accordance with 35 U.S.C. § 287.

23. Without permission or authorization from Johnson Controls, BuildingIQ has manufactured, used, offered for sale, and sold and continues to manufacture, use, offer for sale, and sell certain building and energy management systems, including, without limitation, BuildingIQ's 5i Intelligent Energy Platform including Predictive Control with Demand Response, which infringes at least claim 1 of the '238 patent in violation of 35 U.S.C. § 271(a).

24. Without permission or authorization from Johnson Controls and in violation of 35 U.S.C. § 271(b), BuildingIQ is inducing the direct infringement of at least claim 1 of the '238 patent by aiding, abetting, and encouraging its customers' use of its 5i Intelligent Energy Platform including Predictive Control with Demand Response with knowledge of the infringement of the '238 patent and with the intent to cause such infringement.

25. For example, the following chart describes how the 5i Intelligent Energy Platform including Predictive Control with Demand Response meets each and every claim limitation of claim 1 of the '238 patent:

U.S. Pat. No. 8,843,238	
1. A method for controlling power consumption by an	BuildingIQ's Predictive Control with Demand Response product controls a building's HVAC system to reduce energy consumption

U.S. Pat. No. 8,843,238	
HVAC system of a building, comprising:	and cost. "Predictive Control. 24/7 optimized control, in-built measurement & verification, and demand response uniquely tailored to your building. With the addition of forward looking models, buildings can be continually, intelligently optimized to stay one-step ahead of high costs while keeping tenants comfortable." (https://buildingiq.com/products/predictive-control/, at 2, attached hereto as **Exhibit G**.) "BuildingIQ's automated demand response service enables owner/operators to participate, and take full benefit from, utility driven demand response programs simply, easily, repeatedly, and measurably. Demand Response is akin to a specialized form of Predictive Energy Optimization™ (PEO), but instead of an energy cost driven optimization paradigm, Demand Response achieves event goals through a more aggressive time-based curtailment strategy that still seeks to optimize comfort. Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone- leveraging learning models for the building's thermal behavior, BMS capabilities, and tenant comfort." (**Ex. G** at 3.) "BuildingIQ's Demand Response service gives owner/operators a more intelligent, optimized way of responding to demand response (DR) events. Part of BuildingIQ's predictive control set of offerings, Demand Response uses modeling unique to each building - thermal, building management system (BMS) capabilities, occupancy, and weather - to first create a prediction of how the building will respond to BMS changes designed to achieve energy saving goals, and then implements those changes in the BMS balanced against an optimization model for tenant comfort. The resulting behavior of the BMS system before, during, and after the demand event achieves the desired energy consumption target with little to no impact on the tenant or productivity - automatically, intelligently, transparently." (Demand Response Datasheet at 2, attached hereto as **Exhibit H**.) "Demand Response is akin to a specialized form of Predictive Energy Optimization™ (PEO) — shifting the balanced approach of PEO from energy cost & tenant comfort to a goal-based energy use and tenant comfort approach. The algorithms that drive Demand Response typically output a more aggressive curtailment sequence than PEO yet still achieves comfort optimization. When deployed as

U.S. Pat. No. 8,843,238	
	a combined service, PEO serves to maximize building efficiency, comfort and operations 24/7 - automatically switching to Demand Response mode for events. The machine learning and adaptive BMS performance modeling that inform PEO's predictive control are utilized by Demand Response. While Demand Response can be implemented as a standalone service, tenants and owner/operators benefit from the inherent synergies of the two services." (**Ex. H**, at 2.) "Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone —accounting for the learning models for the building's thermal behavior, BMS capabilities, and tenant comfort. BuildingIQ's Demand Response service creates and executes control strategies before, during, and after the DR event to ensure curtailment targets are met while adhering to occupant comfort specifications." (**Ex. H**, at 3.)
using an energy use setpoint as a reference input for a feedback controller;	BuildingIQ's Predictive Control with Demand Response product uses an energy consumption target in its control algorithm. "BuildingIQ's Demand Response service gives owner/operators a more intelligent, optimized way of responding to demand response (DR) events. Part of BuildingIQ's predictive control set of offerings, Demand Response uses modeling unique to each building - thermal, building management system (BMS) capabilities, occupancy, and weather - to first create a prediction of how the building will respond to BMS changes designed to achieve energy saving goals, and then implements those changes in the BMS balanced against an optimization model for tenant comfort. The resulting behavior of the BMS system before, during, and after the demand event achieves the desired energy consumption target with little to no impact on the tenant or productivity - automatically, intelligently, transparently." (**Ex. H**, at 2.) "Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone —accounting for the learning models for the building's thermal behavior, BMS capabilities, and tenant comfort. BuildingIQ's Demand Response service creates and executes control strategies before, during, and after the DR event to ensure curtailment targets are met while adhering to occupant comfort specifications." (**Ex. H**, at 3.) "BuildingIQ's automated demand response service enables owner/operators to participate, and take full benefit from, utility

U.S. Pat. No. 8,843,238	
	driven demand response programs simply, easily, repeatedly, and measurably. Demand Response is akin to a specialized form of Predictive Energy Optimization™ (PEO), but instead of an energy cost driven optimization paradigm, Demand Response achieves event goals through a more aggressive time-based curtailment strategy that still seeks to optimize comfort. Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone- leveraging learning models for the building's thermal behavior, BMS capabilities, and tenant comfort." (**Ex. G**, at 3.) "As a mathematical optimization problem, it should not make a difference in the result whether we pick [zone temperature] ZT as our optimization variable or any other variable that has a deterministic relationship with ZT through the dynamic model, for example, the HVAC load." (Optimizing Room Temperature to Tame Power Demand at 6, attached hereto as **Exhibit I**.)
using a measured energy use as a measured input for the feedback controller;	BuildingIQ's Predictive Control with Demand Response product collects power usage measurements and uses these measurements in its control algorithm. "With BuildingIQ's Demand Response You Get: • Automatic and intelligent creation and execution of control strategies before, during, and after the event • Adherence to occupant comfort commitments • Autonomous response to OpenADR calls • Flexible manual override by building or zone The underlying 5i Platform's sophisticated Automated Measurement & Verification capabilities can be configured to measure demand reduction using agreed upon methodologies with the utility." (**Ex. G**, at 4.) "BuildingIQ's automated demand response service enables owner/operators to participate, and take full benefit from, utility driven demand response programs simply, easily, repeatedly, and measurably. Demand Response is akin to a specialized form of Predictive Energy Optimization™ (PEO), but instead of an energy cost driven optimization paradigm, Demand Response achieves event goals through a more aggressive time-based curtailment strategy that still seeks to optimize comfort. Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone- leveraging learning models for the building's thermal behavior, BMS capabilities, and tenant comfort." (**Ex. G**, at

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	3.) "Connectivity Requirements: . . . Utility meter interval data. Flexible access mechanisms Smart meter access Utility access Aggregator access Sub-meter." (**Ex. H**, at 2.) "Power Datafeed" and "Actual Usage." (EERE Demonstration for Advanced Retro-commissioning Technology: Predictive Energy Optimization (PEO) and Automated Demand Response for Commercial Building HVAC at 11, attached hereto as **Exhibit J**.) "Baseline Energy Use (metered)" and "Metered" energy use. (**Ex. J**, at 14.)
using the feedback controller to generate a manipulated variable output for adjusting the operation of an HVAC device; and	BuildingIQ's Predictive Control with Demand Response product controls a building's HVAC system by adjusting the control signals provided as inputs to HVAC devices. "Predictive Control. 24/7 optimized control, in-built measurement & verification, and demand response uniquely tailored to your building. With the addition of forward looking models, buildings can be continually, intelligently optimized to stay one-step ahead of high costs while keeping tenants comfortable." (**Ex. G**, at 2.) "BuildingIQ's automated demand response service enables owner/operators to participate, and take full benefit from, utility driven demand response programs simply, easily, repeatedly, and measurably. Demand Response is akin to a specialized form of Predictive Energy Optimization™ (PEO), but instead of an energy cost driven optimization paradigm, Demand Response achieves event goals through a more aggressive time-based curtailment strategy that still seeks to optimize comfort. Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone- leveraging learning models for the building's thermal behavior, BMS capabilities, and tenant comfort." (**Ex. G**, at 3.) "BuildingIQ's Demand Response service gives owner/operators a more intelligent, optimized way of responding to demand response (DR) events. Part of BuildingIQ's predictive control set of offerings, Demand Response uses modeling unique to each building - thermal, building management system (BMS) capabilities, occupancy, and weather - to first create a prediction of how the building will respond to BMS changes designed to achieve energy saving goals, and then

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	implements those changes in the BMS balanced against an optimization model for tenant comfort. The resulting behavior of the BMS system before, during, and after the demand event achieves the desired energy consumption target with little to no impact on the tenant or productivity - automatically, intelligently, transparently." (**Ex. H**, at 2.) "Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone —accounting for the learning models for the building's thermal behavior, BMS capabilities, and tenant comfort. BuildingIQ's Demand Response service creates and executes control strategies before, during, and after the DR event to ensure curtailment targets are met while adhering to occupant comfort specifications." (**Ex. H**, at 3.) "As a control strategy, we are not implementing a feedback control loop to achieve a specific room temperature setpoint. Instead, we are generating the room temperature setpoint itself." (**Ex. I**, at 6.)
calculating the energy use setpoint using a zone temperature threshold value and a history of building zone temperatures from a previous demand limiting period, wherein the energy use setpoint is estimated to cause the highest building zone temperature at the end of the demand limiting period to be less than or equal to the zone temperature threshold value.	BuildingIQ's Predictive Control with Demand Response product sets an energy consumption target based on building zone temperatures from a previous demand limiting period and a temperature threshold value such that the predicted zone temperature will increase towards, but not exceed, the maximum comfort limit during the demand limiting period if the energy consumption target is met. "The key advantage of BuildingIQ's energy management solution is the ability to intelligently load-shift energy consumption, based on the knowledge of building thermal and power dynamics (obtained during the learning period), as well as weather forecasts, in order to constrain power consumption below the max demand limit as imposed by the utility. Our machine-learning algorithm does this automatically. 'Learning the building' is inherent in BuildingIQ's model. The model has the capability of learning the thermal properties and dynamics of the building based upon materials, mass, and physics. Key questions such as how fast the building cools, or conversely, how fast a cooled building converges to the ambient temperature are key. Also, what does the power response of your building look like during cooling? The building physics and power profile, in addition to max demand and time-of-use charges, are all factored within BuildingIQ's predictive optimization algorithms, which then optimizes building operations to minimize energy costs while ensuring occupant

U.S. Pat. No. 8,843,238	
	comfort." (Managing Maximum Demand Through Optimization at 5, attached hereto as **Exhibit K**.) "Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone —accounting for the learning models for the building's thermal behavior, BMS capabilities, and tenant comfort. BuildingIQ's Demand Response service creates and executes control strategies before, during, and after the DR event to ensure curtailment targets are met while adhering to occupant comfort specifications." (**Ex. H**, at 3.) "BuildingIQ's automated demand response service enables owner/operators to participate, and take full benefit from, utility driven demand response programs simply, easily, repeatedly, and measurably. Demand Response is akin to a specialized form of Predictive Energy Optimization™ (PEO), but instead of an energy cost driven optimization paradigm, Demand Response achieves event goals through a more aggressive time-based curtailment strategy that still seeks to optimize comfort. Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone- leveraging learning models for the building's thermal behavior, BMS capabilities, and tenant comfort." (**Ex. G**, at 3.) "BuildingIQ's Demand Response service gives owner/operators a more intelligent, optimized way of responding to demand response (DR) events. Part of BuildingIQ's predictive control set of offerings, Demand Response uses modeling unique to each building - thermal, building management system (BMS) capabilities, occupancy, and weather - to first create a prediction of how the building will respond to BMS changes designed to achieve energy saving goals, and then implements those changes in the BMS balanced against an optimization model for tenant comfort. The resulting behavior of the BMS system before, during, and after the demand event achieves the desired energy consumption target with little to no impact on the tenant or productivity - automatically, intelligently, transparently." (**Ex. H**, at 2.) "The BuildingIQ optimization process is automated and relies upon pre-cooling the building, notably shifting the cooling load to the early morning hours, when ambient temperatures and humidity are lower and power is cheaper. It then lets the temperature of the building drift slowly upward— cooling in moderation—as outside ambient temperatures climb. Shifting and moderating the cooling load can

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	keep power consumption below the maximum demand limitations even at the hottest time of the day. The optimization process runs counter to the traditional practice of static temperature control throughout the day, using a fixed setpoint with little to no coordination between zones/rooms." (**Ex. K**, at 2.) "The recommended answer is to use pre-cooling –while power is cheap– and to do so in a more gradual manner than is typical of more rigid fixed- point approaches. Similarly, allowing the building temperature to drift upward gradually – when power costs are high– to the maximum comfort level allows power consumption to be moderated and held below the max demand. The use of cooling energy is thus minimized at times when max demand charges and cost of cooling are at their highest." (**Ex. K**, at 3.) "Using the basic architecture of BuildingIQ's PEO model, max demand optimization can be achieved while adhering to the requirement that total power consumption never go beyond the Maximum Demand Limit." (**Ex. K**, at 4.) "every day the model gets updated at the end of the day, based on the behavior of the building on that particular day, and you're able to go ahead and use this latest model to predict what's going to happen the next day" (Transcript of Predictive Energy Optimization Video, attached hereto as **Exhibit L**.)

26. Johnson Controls reserves the right to modify its infringement theories as discovery progresses in this case; it shall not be estopped for infringement contention or claim construction purposes by the information contained herein. This chart is intended to satisfy the notice requirements of Rule 8(a)(2) of the Federal Rules of Civil Procedure; it does not represent Johnson Controls' preliminary or final infringement contentions or preliminary or final claim construction positions.

27. BuildingIQ's continued infringement of the '238 patent subsequent to the filing of the Complaint (ECF No. 1) is willful and deliberate.

28. BuildingIQ's conduct has caused and will continue to cause Johnson Controls substantial damage, including irreparable harm, for which Johnson Controls has no adequate remedy at law, unless and until BuildingIQ is enjoined from infringing the '238 patent.

COUNT II

INFRINGEMENT OF UNITED STATES PATENT NO. 9,322,566

29. Johnson Controls repeats and re-alleges each and every allegation contained in paragraphs 1-16, inclusive, as though fully set forth herein.

30. The '566 patent is valid and enforceable.

31. The '566 patent describing the improved system and method for controlling energy use in a building management system was filed with the U.S. Patent and Trademark Office on September 22, 2014 and issued on April 26, 2016. The U.S. Patent Office carefully examined the claims that ultimately issued as the '566 patent. Consistent with 35 U.S.C. § 282 and the limitations of the claims of the '566 patent, a person having ordinary skill in the art would understand that each claim of the '566 patent (independent or dependent) relates to a separate invention distinct from other claims as for example with dependent claim 2 which is distinct from independent claim 1.

32. The U.S. Patent Office considered the claims of the '566 patent against the background of prior technology to determine if the claims of the '566 patent identified a patentable advance over prior art systems before issuing the patent. Among other things, the U.S. Patent Office searched multiple sets of prior art in classifications including, but not limited to, 700/28, 33, 36, 37, 277, 286, 291, 295, 300; 702/57, 60-62; 705/7.29, 7.31, 7.35; 236/44 C, 49.3, 91 D; 340/539.22, 539.26-28, 540; 374/29, 30. As an example, classification 700/28 included patents relating to optimization and adaptive control of control systems. The face of the '566 patent identifies some of the prior art from the classifications and other prior art considered

in allowing the various claims of the ’566 patent, including for example U.S. Patent No. 8,180,493 entitled “Method and apparatus for effecting temperature difference in a respective zone”.

33. A person having ordinary skill in the art would understand that the separate claims in the ’566 patent did not pre-empt any field, but are improvements in methods and systems for controlling energy use in a building management system. A person having ordinary skill in the art would also recognize that the claims of the ’566 patent do not relate to implementation of a business method on a general purpose computer, but are specific improvements to a building management system to better control energy use.

34. The filing of the Complaint (ECF No. 1) constitutes notice and actual knowledge in accordance with 35 U.S.C. § 287.

35. Without permission or authorization from Johnson Controls, BuildingIQ has manufactured, used, offered for sale, and sold and continues to manufacture, use, offer for sale, and sell certain building and energy management systems, including, without limitation, BuildingIQ’s 5i Intelligent Energy Platform including Predictive Control with Demand Response, which infringes at least claim 1 of the ’566 patent in violation of 35 U.S.C. § 271(a).

36. Without permission or authorization from Johnson Controls and in violation of 35 U.S.C. § 271(b), BuildingIQ is inducing the direct infringement of at least claim 1 of the ’566 patent by aiding, abetting, and encouraging its customers’ use of its 5i Intelligent Energy Platform including Predictive Control with Demand Response with knowledge of the infringement of the ’566 patent and with the intent to cause such infringement.

37. For example, the following chart describes how the 5i Intelligent Energy Platform including Predictive Control with Demand Response meets each and every claim limitation of claim 1 of the '566 patent:

U.S. Pat. No. 9,322,566	
1. A feedback controller for controlling power consumption by an HVAC system of a building during a demand limiting period, the controller comprising:	BuildingIQ's Predictive Control with Demand Response product controls a building's HVAC system to reduce energy consumption during a demand limiting period. "Predictive Control. 24/7 optimized control, in-built measurement & verification, and demand response uniquely tailored to your building. With the addition of forward looking models, buildings can be continually, intelligently optimized to stay one-step ahead of high costs while keeping tenants comfortable." (**Ex. G**, at 2.) "BuildingIQ's automated demand response service enables owner/operators to participate, and take full benefit from, utility driven demand response programs simply, easily, repeatedly, and measurably. Demand Response is akin to a specialized form of Predictive Energy Optimization™ (PEO), but instead of an energy cost driven optimization paradigm, Demand Response achieves event goals through a more aggressive time-based curtailment strategy that still seeks to optimize comfort. Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone- leveraging learning models for the building's thermal behavior, BMS capabilities, and tenant comfort." (**Ex. G**, at 3.) "BuildingIQ's Demand Response service gives owner/operators a more intelligent, optimized way of responding to demand response (DR) events. Part of BuildingIQ's predictive control set of offerings, Demand Response uses modeling unique to each building - thermal, building management system (BMS) capabilities, occupancy, and weather - to first create a prediction of how the building will respond to BMS changes designed to achieve energy saving goals, and then implements those changes in the BMS balanced against an optimization model for tenant comfort. The resulting behavior of the BMS system before, during, and after the demand event achieves the desired energy consumption target with little to no impact on the tenant or productivity - automatically, intelligently, transparently." (**Ex. H**, at 2.) "Demand Response is akin to a specialized form of Predictive Energy Optimization™ (PEO) — shifting the balanced approach of PEO

U.S. Pat. No. 9,322,566	
	from energy cost & tenant comfort to a goal-based energy use and tenant comfort approach. The algorithms that drive Demand Response typically output a more aggressive curtailment sequence than PEO yet still achieves comfort optimization. When deployed as a combined service, PEO serves to maximize building efficiency, comfort and operations 24/7 - automatically switching to Demand Response mode for events. The machine learning and adaptive BMS performance modeling that inform PEO's predictive control are utilized by Demand Response. While Demand Response can be implemented as a standalone service, tenants and owner/operators benefit from the inherent synergies of the two services." (**Ex. H**, at 2.) "Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone —accounting for the learning models for the building's thermal behavior, BMS capabilities, and tenant comfort. BuildingIQ's Demand Response service creates and executes control strategies before, during, and after the DR event to ensure curtailment targets are met while adhering to occupant comfort specifications." (**Ex. H**, at 3.)
a processing circuit configured to generate a value of a manipulated variable for adjusting the operation of an HVAC device, wherein the processing circuit comprises:	BuildingIQ's Predictive Control with Demand Response product controls a building's HVAC system by adjusting the control signals provided as inputs to HVAC devices. "Predictive Control. 24/7 optimized control, in-built measurement & verification, and demand response uniquely tailored to your building. With the addition of forward looking models, buildings can be continually, intelligently optimized to stay one-step ahead of high costs while keeping tenants comfortable." (**Ex. G**, at 2.) "BuildingIQ's automated demand response service enables owner/operators to participate, and take full benefit from, utility driven demand response programs simply, easily, repeatedly, and measurably. Demand Response is akin to a specialized form of Predictive Energy Optimization™ (PEO), but instead of an energy cost driven optimization paradigm, Demand Response achieves event goals through a more aggressive time-based curtailment strategy that still seeks to optimize comfort. Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone- leveraging learning models for the building's thermal behavior, BMS capabilities, and tenant comfort." (**Ex. G**, at 3.) "BuildingIQ's Demand Response service gives owner/operators a more intelligent, optimized way of responding to demand response

U.S. Pat. No. 9,322,566	
	(DR) events. Part of BuildingIQ's predictive control set of offerings, Demand Response uses modeling unique to each building - thermal, building management system (BMS) capabilities, occupancy, and weather - to first create a prediction of how the building will respond to BMS changes designed to achieve energy saving goals, and then implements those changes in the BMS balanced against an optimization model for tenant comfort. The resulting behavior of the BMS system before, during, and after the demand event achieves the desired energy consumption target with little to no impact on the tenant or productivity - automatically, intelligently, transparently." (**Ex. H**, at 2.) "Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone —accounting for the learning models for the building's thermal behavior, BMS capabilities, and tenant comfort. BuildingIQ's Demand Response service creates and executes control strategies before, during, and after the DR event to ensure curtailment targets are met while adhering to occupant comfort specifications." (**Ex. H**, at 3.) "As a control strategy, we are not implementing a feedback control loop to achieve a specific room temperature setpoint. Instead, we are generating the room temperature setpoint itself." (**Ex. I**, at 6.)
an error analyzer configured to receive an energy use setpoint as a reference input and to receive a measured energy use as a measured input, wherein the error analyzer is further configured to compare the reference input and the measured input, and to use the comparison to determine an error value;	BuildingIQ's Predictive Control with Demand Response product uses an energy consumption target in its control algorithm and continually collects and monitors actual energy usage against that target. "BuildingIQ's automated demand response service enables owner/operators to participate, and take full benefit from, utility driven demand response programs simply, easily, repeatedly, and measurably. Demand Response is akin to a specialized form of Predictive Energy Optimization™ (PEO), but instead of an energy cost driven optimization paradigm, Demand Response achieves event goals through a more aggressive time-based curtailment strategy that still seeks to optimize comfort. Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone- leveraging learning models for the building's thermal behavior, BMS capabilities, and tenant comfort." (**Ex. G**, at 3.) "BuildingIQ's Demand Response service gives owner/operators a more intelligent, optimized way of responding to demand response (DR) events. Part of BuildingIQ's predictive control set of offerings, Demand Response uses modeling unique to each building - thermal,

U.S. Pat. No. 9,322,566	
	building management system (BMS) capabilities, occupancy, and weather - to first create a prediction of how the building will respond to BMS changes designed to achieve energy saving goals, and then implements those changes in the BMS balanced against an optimization model for tenant comfort. The resulting behavior of the BMS system before, during, and after the demand event achieves the desired energy consumption target with little to no impact on the tenant or productivity - automatically, intelligently, transparently." (**Ex. H**, at 2.) "Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone —accounting for the learning models for the building's thermal behavior, BMS capabilities, and tenant comfort. BuildingIQ's Demand Response service creates and executes control strategies before, during, and after the DR event to ensure curtailment targets are met while adhering to occupant comfort specifications." (**Ex. H**, at 3.) "As a mathematical optimization problem, it should not make a difference in the result whether we pick [zone temperature] ZT as our optimization variable or any other variable that has a deterministic relationship with ZT through the dynamic model, for example, the HVAC load." (**Ex. I**, at 6.) "With BuildingIQ's Demand Response You Get: • Automatic and intelligent creation and execution of control strategies before, during, and after the event • Adherence to occupant comfort commitments • Autonomous response to OpenADR calls • Flexible manual override by building or zone The underlying 5i Platform's sophisticated Automated Measurement & Verification capabilities can be configured to measure demand reduction using agreed upon methodologies with the utility." (**Ex. G**, at 4.) "Connectivity Requirements: . . . Utility meter interval data. Flexible access mechanisms Smart meter access Utility access Aggregator access Sub-meter." (**Ex. H**, at 3.) "Power Datafeed" and "Actual Usage." (**Ex. J**, at 11.)

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	"Baseline Energy Use (metered)" and "Metered" energy use. (**Ex. J**, at 14.) "Minimize the error between actual data and the model estimate." (Frequently Asked Questions – Controls Approach, FAQ 2, at 3, attached hereto as **Exhibit M**.)
an error corrector configured to receive the error value and to use the error value to generate the value of the manipulated variable during the demand limiting period; and	BuildingIQ's Predictive Control with Demand Response product uses an energy consumption target in its control algorithm and continually collects and monitors actual energy usage against that target. The product makes control changes to the building in response to the comparison. "BuildingIQ's automated demand response service enables owner/operators to participate, and take full benefit from, utility driven demand response programs simply, easily, repeatedly, and measurably. Demand Response is akin to a specialized form of Predictive Energy Optimization™ (PEO), but instead of an energy cost driven optimization paradigm, Demand Response achieves event goals through a more aggressive time-based curtailment strategy that still seeks to optimize comfort. Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone- leveraging learning models for the building's thermal behavior, BMS capabilities, and tenant comfort." (**Ex. G**, at 3.) "BuildingIQ's Demand Response service gives owner/operators a more intelligent, optimized way of responding to demand response (DR) events. Part of BuildingIQ's predictive control set of offerings, Demand Response uses modeling unique to each building - thermal, building management system (BMS) capabilities, occupancy, and weather - to first create a prediction of how the building will respond to BMS changes designed to achieve energy saving goals, and then implements those changes in the BMS balanced against an optimization model for tenant comfort. The resulting behavior of the BMS system before, during, and after the demand event achieves the desired energy consumption target with little to no impact on the tenant or productivity - automatically, intelligently, transparently." (**Ex. H**, at 2.) "Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone —accounting for the learning models for the building's thermal behavior, BMS capabilities, and tenant comfort. BuildingIQ's Demand Response service creates and executes control strategies before, during, and after the DR event to ensure curtailment targets are met while

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	adhering to occupant comfort specifications." (**Ex. H**, at 3.) "The algorithm used to fit parameters is essentially the same "cost function" approach used in the subsequent optimization process whereby instead of adjusting model parameters so as to minimize model error" (**Ex. M**, at 3.)
an energy use setpoint generator configured to calculate the energy use setpoint using a demand limiting technique subject to a constraint defining a threshold value for a condition affected by the energy use setpoint.	BuildingIQ's Predictive Control with Demand Response product uses an energy consumption target in its control algorithm and continually collects and monitors actual energy usage against that target. The product makes control changes to the building in response to the comparison. The control changes are subject to threshold constraints on occupant comfort. "BuildingIQ's automated demand response service enables owner/operators to participate, and take full benefit from, utility driven demand response programs simply, easily, repeatedly, and measurably. Demand Response is akin to a specialized form of Predictive Energy Optimization™ (PEO), but instead of an energy cost driven optimization paradigm, Demand Response achieves event goals through a more aggressive time-based curtailment strategy that still seeks to optimize comfort. Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone- leveraging learning models for the building's thermal behavior, BMS capabilities, and tenant comfort." (**Ex. G**, at 3.) "BuildingIQ's Demand Response service gives owner/operators a more intelligent, optimized way of responding to demand response (DR) events. Part of BuildingIQ's predictive control set of offerings, Demand Response uses modeling unique to each building - thermal, building management system (BMS) capabilities, occupancy, and weather - to first create a prediction of how the building will respond to BMS changes designed to achieve energy saving goals, and then implements those changes in the BMS balanced against an optimization model for tenant comfort. The resulting behavior of the BMS system before, during, and after the demand event achieves the desired energy consumption target with little to no impact on the tenant or productivity - automatically, intelligently, transparently." (**Ex. H**, at 2.) "Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone —accounting for the learning models for the building's thermal behavior, BMS capabilities, and tenant comfort. BuildingIQ's Demand Response service creates and executes control strategies before, during, and

U.S. Pat. No. 9,322,566	
	after the DR event to ensure curtailment targets are met while adhering to occupant comfort specifications." (**Ex. H**, at 3.) "The BuildingIQ optimization process is automated and relies upon pre-cooling the building, notably shifting the cooling load to the early morning hours, when ambient temperatures and humidity are lower and power is cheaper. It then lets the temperature of the building drift slowly upward— cooling in moderation—as outside ambient temperatures climb. Shifting and moderating the cooling load can keep power consumption below the maximum demand limitations even at the hottest time of the day. The optimization process runs counter to the traditional practice of static temperature control throughout the day, using a fixed setpoint with little to no coordination between zones/rooms." (**Ex. K**, at 2.) "The recommended answer is to use pre-cooling –while power is cheap– and to do so in a more gradual manner than is typical of more rigid fixed- point approaches. Similarly, allowing the building temperature to drift upward gradually – when power costs are high– to the maximum comfort level allows power consumption to be moderated and held below the max demand. The use of cooling energy is thus minimized at times when max demand charges and cost of cooling are at their highest." (**Ex. K**, at 3.) "Using the basic architecture of BuildingIQ's PEO model, max demand optimization can be achieved while adhering to the requirement that total power consumption never go beyond the Maximum Demand Limit." (**Ex. K**, at 4.) "The key advantage of BuildingIQ's energy management solution is the ability to intelligently load-shift energy consumption, based on the knowledge of building thermal and power dynamics (obtained during the learning period), as well as weather forecasts, in order to constrain power consumption below the max demand limit as imposed by the utility. Our machine-learning algorithm does this automatically. 'Learning the building' is inherent in BuildingIQ's model. The model has the capability of learning the thermal properties and dynamics of the building based upon materials, mass, and physics. Key questions such as how fast the building cools, or conversely, how fast a cooled building converges to the ambient temperature are key. Also, what does the power response of your building look like during cooling? The building physics and power profile, in addition to max demand and time-of-use charges, are all factored within BuildingIQ's predictive optimization algorithms, which then optimizes building

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	operations to minimize energy costs while ensuring occupant comfort." (**Ex. K**, at 5.)

38. Johnson Controls reserves the right to modify its infringement theories as discovery progresses in this case; it shall not be estopped for infringement contention or claim construction purposes by the information contained herein. This chart is intended to satisfy the notice requirements of Rule 8(a)(2) of the Federal Rules of Civil Procedure; it does not represent Johnson Controls' preliminary or final infringement contentions or preliminary or final claim construction positions.

39. BuildingIQ's continued infringement of the '566 patent subsequent to the filing of the Complaint (ECF No. 1) is willful and deliberate.

40. BuildingIQ's conduct has caused and will continue to cause Johnson Controls substantial damage, including irreparable harm, for which Johnson Controls has no adequate remedy at law, unless and until BuildingIQ is enjoined from infringing the '566 patent.

COUNT III

INFRINGEMENT OF UNITED STATES PATENT NO. 10,254,721

41. Johnson Controls repeats and re-alleges each and every allegation contained in paragraphs 1-16, inclusive, as though fully set forth herein.

42. The '721 patent is valid and enforceable.

43. The '721 patent describing the improved method and system for controlling energy use in a building management system was filed with the U.S. Patent and Trademark Office on March 11, 2016, and issued on April 9, 2019. The U.S. Patent Office carefully examined the claims that ultimately issued as the '721 patent. Consistent with 35 U.S.C. § 282 and the limitations of the claims of the '721 patent, a person having ordinary skill in the art

would understand that each claim of the ’721 patent (independent or dependent) relates to a separate invention distinct from other claims as for example with dependent claim 17 which is distinct from independent claim 16.

44. The U.S. Patent Office considered the claims of the ’721 patent against the background of prior technology to determine if the claims of the ’721 patent identified a patentable advance over prior art systems before issuing the patent. Among other things, the U.S. Patent Office searched multiple sets of prior art in classifications including, but not limited to, G06F 1/3203; G06Q 30/0201; G06Q 30/0202; G06Q 30/206; F24F 11/0012; F24F 2011/075; F24F 2011/0016; F24F 2011/0049; F24F 2011/0063; H04L 12/14; H04L 12/2803. As an example, classification G06F 1/3203 included patents relating to power management, *i.e.*, event-based initiation of power-saving mode. The face of the ’721 patent identifies some of the prior art from the classifications and other prior art considered in allowing the various claims of the ’721 patent, including for example U.S. Patent No. 9,898,787 entitled “Allocation of energy production changes to meet demand changes”.

45. A person having ordinary skill in the art would understand that the separate claims in the ’721 patent did not pre-empt any field, but are improvements in methods and systems for controlling energy use in a building management system. A person having ordinary skill in the art would also recognize that the claims of the ’721 patent do not relate to implementation of a business method on a general purpose computer, but are specific improvements to a building management system to better control energy use.

46. The filing of the Complaint (ECF No. 1) constitutes notice and actual knowledge in accordance with 35 U.S.C. § 287.

47. Without permission or authorization from Johnson Controls, BuildingIQ has manufactured, used, offered for sale, and sold and continues to manufacture, use, offer for sale, and sell certain building and energy management systems, including, without limitation, BuildingIQ's 5i Intelligent Energy Platform including Predictive Control with Demand Response, which infringes at least claim 17 of the '721 patent in violation of 35 U.S.C. § 271(a).

48. Without permission or authorization from Johnson Controls and in violation of 35 U.S.C. § 271(b), BuildingIQ is inducing the direct infringement of at least claim 17 of the '721 patent by aiding, abetting, and encouraging its customers' use of its 5i Intelligent Energy Platform including Predictive Control with Demand Response with knowledge of the infringement of the '721 patent and with the intent to cause such infringement.

49. For example, the following chart describes how the 5i Intelligent Energy Platform including Predictive Control with Demand Response meets each and every claim limitation of claim 17 of the '721 patent:

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17. The method of claim 16…	
16. A method for controlling power consumption of a building during a demand limiting period using a cascaded control strategy, the method comprising:	BuildingIQ's Predictive Control with Demand Response product controls a building's HVAC system to reduce energy consumption and cost. "Predictive Control. 24/7 optimized control, in-built measurement & verification, and demand response uniquely tailored to your building. With the addition of forward looking models, buildings can be continually, intelligently optimized to stay one-step ahead of high costs while keeping tenants comfortable." (**Ex. G**, at 2.) "BuildingIQ's automated demand response service enables owner/operators to participate, and take full benefit from, utility driven demand response programs simply, easily, repeatedly, and measurably. Demand Response is akin to a specialized form of Predictive Energy Optimization™ (PEO), but instead of an energy cost driven optimization paradigm, Demand Response achieves event goals through a more aggressive time-based curtailment strategy that still seeks to optimize comfort. Unlike other DR solutions,

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	BuildingIQ's Demand Response automatically controls the BMS down to the zone- leveraging learning models for the building's thermal behavior, BMS capabilities, and tenant comfort." (**Ex. G**, at 3.) "BuildingIQ's Demand Response service gives owner/operators a more intelligent, optimized way of responding to demand response (DR) events. Part of BuildingIQ's predictive control set of offerings, Demand Response uses modeling unique to each building - thermal, building management system (BMS) capabilities, occupancy, and weather - to first create a prediction of how the building will respond to BMS changes designed to achieve energy saving goals, and then implements those changes in the BMS balanced against an optimization model for tenant comfort. The resulting behavior of the BMS system before, during, and after the demand event achieves the desired energy consumption target with little to no impact on the tenant or productivity - automatically, intelligently, transparently." (**Ex. H**, at 2.) "Demand Response is akin to a specialized form of Predictive Energy Optimization™ (PEO) — shifting the balanced approach of PEO from energy cost & tenant comfort to a goal-based energy use and tenant comfort approach. The algorithms that drive Demand Response typically output a more aggressive curtailment sequence than PEO yet still achieves comfort optimization. When deployed as a combined service, PEO serves to maximize building efficiency, comfort and operations 24/7 - automatically switching to Demand Response mode for events. The machine learning and adaptive BMS performance modeling that inform PEO's predictive control are utilized by Demand Response. While Demand Response can be implemented as a standalone service, tenants and owner/operators benefit from the inherent synergies of the two services." (**Ex. H**, at 2.) "Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone —accounting for the learning models for the building's thermal behavior, BMS capabilities, and tenant comfort. BuildingIQ's Demand Response service creates and executes control strategies before, during, and after the DR event to ensure curtailment targets are met while adhering to occupant comfort specifications." (**Ex. H**, at 3.)
generating an energy use setpoint during the demand limiting period based on energy pricing	BuildingIQ's Predictive Control with Demand Response product uses an energy consumption target in its control algorithm which is based on utility information and a variable condition within the building

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data and measurements of a variable condition within the building; and	(*e.g.*, zone temperature). "BuildingIQ's automated demand response service enables owner/operators to participate, and take full benefit from, utility driven demand response programs simply, easily, repeatedly, and measurably. Demand Response is akin to a specialized form of Predictive Energy Optimization™ (PEO), but instead of an energy cost driven optimization paradigm, Demand Response achieves event goals through a more aggressive time-based curtailment strategy that still seeks to optimize comfort. Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone- leveraging learning models for the building's thermal behavior, BMS capabilities, and tenant comfort." (**Ex. G**, at 3.) "BuildingIQ's Demand Response service gives owner/operators a more intelligent, optimized way of responding to demand response (DR) events. Part of BuildingIQ's predictive control set of offerings, Demand Response uses modeling unique to each building - thermal, building management system (BMS) capabilities, occupancy, and weather - to first create a prediction of how the building will respond to BMS changes designed to achieve energy saving goals, and then implements those changes in the BMS balanced against an optimization model for tenant comfort. The resulting behavior of the BMS system before, during, and after the demand event achieves the desired energy consumption target with little to no impact on the tenant or productivity - automatically, intelligently, transparently." (**Ex. H**, at 2.) "Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone —accounting for the learning models for the building's thermal behavior, BMS capabilities, and tenant comfort. BuildingIQ's Demand Response service creates and executes control strategies before, during, and after the DR event to ensure curtailment targets are met while adhering to occupant comfort specifications." (**Ex. H**, at 3.) "The key advantage of BuildingIQ's energy management solution is the ability to intelligently load-shift energy consumption, based on the knowledge of building thermal and power dynamics (obtained during the learning period), as well as weather forecasts, in order to constrain power consumption below the max demand limit as imposed by the utility. Our machine-learning algorithm does this automatically.

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	'Learning the building' is inherent in BuildingIQ's model. The model has the capability of learning the thermal properties and dynamics of the building based upon materials, mass, and physics. Key questions such as how fast the building cools, or conversely, how fast a cooled building converges to the ambient temperature are key. Also, what does the power response of your building look like during cooling? The building physics and power profile, in addition to max demand and time-of-use charges, are all factored within BuildingIQ's predictive optimization algorithms, which then optimizes building operations to minimize energy costs while ensuring occupant comfort." (**Ex. K**, at 5.) "As a mathematical optimization problem, it should not make a difference in the result whether we pick [zone temperature] ZT as our optimization variable or any other variable that has a deterministic relationship with ZT through the dynamic model, for example, the HVAC load." (**Ex. I**, at 6.)
generating a control signal for building equipment based on a difference between the energy use setpoint and a measured energy use; and	BuildingIQ's Predictive Control with Demand Response product uses an energy consumption target in its control algorithm and continually collects and monitors actual energy usage against that target. The product makes control changes to the building in response to the comparison. "BuildingIQ's Demand Response service gives owner/operators a more intelligent, optimized way of responding to demand response (DR) events. Part of BuildingIQ's predictive control set of offerings, Demand Response uses modeling unique to each building - thermal, building management system (BMS) capabilities, occupancy, and weather - to first create a prediction of how the building will respond to BMS changes designed to achieve energy saving goals, and then implements those changes in the BMS balanced against an optimization model for tenant comfort. The resulting behavior of the BMS system before, during, and after the demand event achieves the desired energy consumption target with little to no impact on the tenant or productivity - automatically, intelligently, transparently." (**Ex. H**, at 2.) "Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone —accounting for the learning models for the building's thermal behavior, BMS capabilities, and tenant comfort. BuildingIQ's Demand Response service creates and executes control strategies before, during, and after the DR event to ensure curtailment targets are met while

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	adhering to occupant comfort specifications." (**Ex. H**, at 3.) "The key advantage of BuildingIQ's energy management solution is the ability to intelligently load-shift energy consumption, based on the knowledge of building thermal and power dynamics (obtained during the learning period), as well as weather forecasts, in order to constrain power consumption below the max demand limit as imposed by the utility. Our machine-learning algorithm does this automatically. 'Learning the building' is inherent in BuildingIQ's model. The model has the capability of learning the thermal properties and dynamics of the building based upon materials, mass, and physics. Key questions such as how fast the building cools, or conversely, how fast a cooled building converges to the ambient temperature are key. Also, what does the power response of your building look like during cooling? The building physics and power profile, in addition to max demand and time-of-use charges, are all factored within BuildingIQ's predictive optimization algorithms, which then optimizes building operations to minimize energy costs while ensuring occupant comfort." (**Ex. K**, at 5.) "The algorithm used to fit parameters is essentially the same "cost function" approach used in the subsequent optimization process whereby instead of adjusting model parameters so as to minimize model error" (**Ex. M**, at 3.) "every day the model gets updated at the end of the day, based on the behavior of the building on that particular day, and you're able to go ahead and use this latest model to predict what's going to happen the next day" (**Ex. L**.)
providing the control signal to the building equipment, wherein the building equipment operate to affect the variable condition within the building during the demand limiting period.	BuildingIQ's Predictive Control with Demand Response product provides controls a building's HVAC system according to its algorithm. "BuildingIQ's automated demand response service enables owner/operators to participate, and take full benefit from, utility driven demand response programs simply, easily, repeatedly, and measurably. Demand Response is akin to a specialized form of Predictive Energy Optimization™ (PEO), but instead of an energy cost driven optimization paradigm, Demand Response achieves event goals through a more aggressive time-based curtailment strategy that still seeks to optimize comfort. Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS

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	down to the zone- leveraging learning models for the building's thermal behavior, BMS capabilities, and tenant comfort." (**Ex. G**, at 3.) "BuildingIQ's Demand Response service gives owner/operators a more intelligent, optimized way of responding to demand response (DR) events. Part of BuildingIQ's predictive control set of offerings, Demand Response uses modeling unique to each building - thermal, building management system (BMS) capabilities, occupancy, and weather - to first create a prediction of how the building will respond to BMS changes designed to achieve energy saving goals, and then implements those changes in the BMS balanced against an optimization model for tenant comfort. The resulting behavior of the BMS system before, during, and after the demand event achieves the desired energy consumption target with little to no impact on the tenant or productivity - automatically, intelligently, transparently." (**Ex. H**, at 2.) "Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone —accounting for the learning models for the building's thermal behavior, BMS capabilities, and tenant comfort. BuildingIQ's Demand Response service creates and executes control strategies before, during, and after the DR event to ensure curtailment targets are met while adhering to occupant comfort specifications." (**Ex. H**, at 3.) "The key advantage of BuildingIQ's energy management solution is the ability to intelligently load-shift energy consumption, based on the knowledge of building thermal and power dynamics (obtained during the learning period), as well as weather forecasts, in order to constrain power consumption below the max demand limit as imposed by the utility. Our machine-learning algorithm does this automatically. 'Learning the building' is inherent in BuildingIQ's model. The model has the capability of learning the thermal properties and dynamics of the building based upon materials, mass, and physics. Key questions such as how fast the building cools, or conversely, how fast a cooled building converges to the ambient temperature are key. Also, what does the power response of your building look like during cooling? The building physics and power profile, in addition to max demand and time-of-use charges, are all factored within BuildingIQ's predictive optimization algorithms, which then optimizes building operations to minimize energy costs while ensuring occupant

U.S. Pat. No. 10,254,721	
	comfort." (**Ex. K**, at 5.)
17. …wherein…	
generating the energy use setpoint comprises using a demand limiting technique subject to a constraint defining a threshold value for the variable condition within the building.	BuildingIQ's Predictive Control with Demand Response product sets an energy consumption target using a temperature threshold value such that the predicted zone temperature will increase towards, but not exceed, the maximum comfort limit during the demand limiting period if the energy consumption target is met. "Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone —accounting for the learning models for the building's thermal behavior, BMS capabilities, and tenant comfort. BuildingIQ's Demand Response service creates and executes control strategies before, during, and after the DR event to ensure curtailment targets are met while adhering to occupant comfort specifications." (**Ex. H**, at 3.) "BuildingIQ's automated demand response service enables owner/operators to participate, and take full benefit from, utility driven demand response programs simply, easily, repeatedly, and measurably. Demand Response is akin to a specialized form of Predictive Energy Optimization™ (PEO), but instead of an energy cost driven optimization paradigm, Demand Response achieves event goals through a more aggressive time-based curtailment strategy that still seeks to optimize comfort. Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone- leveraging learning models for the building's thermal behavior, BMS capabilities, and tenant comfort." (**Ex. G**, at 3.) "BuildingIQ's Demand Response service gives owner/operators a more intelligent, optimized way of responding to demand response (DR) events. Part of BuildingIQ's predictive control set of offerings, Demand Response uses modeling unique to each building - thermal, building management system (BMS) capabilities, occupancy, and weather - to first create a prediction of how the building will respond to BMS changes designed to achieve energy saving goals, and then implements those changes in the BMS balanced against an optimization model for tenant comfort. The resulting behavior of the BMS system before, during, and after the demand event achieves the desired energy consumption target with little to no impact on the tenant or productivity - automatically, intelligently, transparently." (**Ex. H**, at 2.) "The BuildingIQ optimization process is automated and relies upon

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	pre-cooling the building, notably shifting the cooling load to the early morning hours, when ambient temperatures and humidity are lower and power is cheaper. It then lets the temperature of the building drift slowly upward— cooling in moderation—as outside ambient temperatures climb. Shifting and moderating the cooling load can keep power consumption below the maximum demand limitations even at the hottest time of the day. The optimization process runs counter to the traditional practice of static temperature control throughout the day, using a fixed setpoint with little to no coordination between zones/rooms." (**Ex. K**, at 2.) "The recommended answer is to use pre-cooling –while power is cheap– and to do so in a more gradual manner than is typical of more rigid fixed- point approaches. Similarly, allowing the building temperature to drift upward gradually – when power costs are high– to the maximum comfort level allows power consumption to be moderated and held below the max demand. The use of cooling energy is thus minimized at times when max demand charges and cost of cooling are at their highest." (**Ex. K**, at 3.) "Using the basic architecture of BuildingIQ's PEO model, max demand optimization can be achieved while adhering to the requirement that total power consumption never go beyond the Maximum Demand Limit." (**Ex. K**, at 4.) "The key advantage of BuildingIQ's energy management solution is the ability to intelligently load-shift energy consumption, based on the knowledge of building thermal and power dynamics (obtained during the learning period), as well as weather forecasts, in order to constrain power consumption below the max demand limit as imposed by the utility. Our machine-learning algorithm does this automatically. 'Learning the building' is inherent in BuildingIQ's model. The model has the capability of learning the thermal properties and dynamics of the building based upon materials, mass, and physics. Key questions such as how fast the building cools, or conversely, how fast a cooled building converges to the ambient temperature are key. Also, what does the power response of your building look like during cooling? The building physics and power profile, in addition to max demand and time-of-use charges, are all factored within BuildingIQ's predictive optimization algorithms, which then optimizes building operations to minimize energy costs while ensuring occupant comfort." (**Ex. K**, at 5.)

50. Johnson Controls reserves the right to modify its infringement theories as discovery progresses in this case; it shall not be estopped for infringement contention or claim construction purposes by the information contained herein. This chart is intended to satisfy the notice requirements of Rule 8(a)(2) of the Federal Rules of Civil Procedure; it does not represent Johnson Controls' preliminary or final infringement contentions or preliminary or final claim construction positions.

51. BuildingIQ's continued infringement of the '721 patent subsequent to the filing of the Complaint (ECF No. 1) is willful and deliberate.

52. BuildingIQ's conduct has caused and will continue to cause Johnson Controls substantial damage, including irreparable harm, for which Johnson Controls has no adequate remedy at law, unless and until BuildingIQ is enjoined from infringing the '721 patent.

COUNT IV

INFRINGEMENT OF UNITED STATES PATENT NO. 10,175,681

53. Johnson Controls repeats and re-alleges each and every allegation contained in paragraphs 1-16, inclusive, as though fully set forth herein.

54. The '681 patent is valid and enforceable.

55. The '681 patent describing the improved optimization and control system for central plants was filed with the U.S. Patent and Trademark Office on February 27, 2015, and issued on January 8, 2019. The U.S. Patent Office carefully examined the claims that ultimately issued as the '681 patent. Consistent with 35 U.S.C. § 282 and the limitations of the claims of the '681 patent, a person having ordinary skill in the art would understand that each claim of the '681 patent (independent or dependent) relates to a separate invention distinct from other claims as for example with dependent claim 2 which is distinct from independent claim 1.

56. The U.S. Patent Office considered the claims of the ’681 patent against the background of prior technology to determine if the claims of the ’681 patent identified a patentable advance over prior art systems before issuing the patent. Among other things, the U.S. Patent Office searched multiple sets of prior art in classifications including, but not limited to, G05B 19/418; G05B 15/02; G05B 13/048; G05B 13/021; G05B 2219/2642; G05B 2219/31414; G05B 2219/32021; Y02P 70/161; Y02P 80/114; Y02P 90/86; G06Q 10/04; G06Q 10/06; G06Q 50/06; G06N 99/105; G05F 1/66; and 700/291. As an example, classification 700/291 included patents relating to energy consumption or demand prediction or estimation. The face of the ’681 patent identifies some of the prior art from the classifications and other prior art considered in allowing the various claims of the ’681 patent, including for example U.S. Patent No. 9,002,532 entitled “Systems and methods for controlling a chiller plant for a building”.

57. A person having ordinary skill in the art would understand that the separate claims in the ’681 patent did not pre-empt any field, but are improvements in methods and systems for optimizing building energy loads. A person having ordinary skill in the art would also recognize that the claims of the ’681 patent do not relate to implementation of a business method on a general purpose computer, but are specific improvements to systems and methods for optimizing building energy loads based on cost and constraints.

58. The filing of the Complaint (ECF No. 1) constitutes notice and actual knowledge in accordance with 35 U.S.C. § 287.

59. Without permission or authorization from Johnson Controls, BuildingIQ has manufactured, used, offered for sale, and sold and continues to manufacture, use, offer for sale, and sell certain building and energy management systems, including, without limitation,

BuildingIQ's 5i Intelligent Energy Platform including Predictive Control with Predictive Energy Optimization product, which infringes at least claim 1 of the '681 patent in violation of 35 U.S.C. § 271(a).

60. Without permission or authorization from Johnson Controls and in violation of 35 U.S.C. § 271(b), BuildingIQ is inducing the direct infringement of at least claim 1 of the '681 patent by aiding, abetting, and encouraging its customers' use of its 5i Intelligent Energy Platform including Predictive Control with Predictive Energy Optimization with knowledge of the infringement of the '681 patent and with the intent to cause such infringement.

61. For example, the following chart describes how the 5i Intelligent Energy Platform including Predictive Control with Predictive Energy Optimization product meets each and every claim limitation of claim 1 of the '681 patent:

U.S. Pat. No. 10,175,681	
1. An optimization and control system for a central plant configured to serve building energy loads, the optimization and control system comprising:	BuildingIQ's Predictive Control with Predictive Energy Optimization product optimizes and controls a building's energy consumption. "Predictive Energy Optimization™ (PEO) is BuildingIQ's premier service. PEO leverages a responsive and well maintained HVAC system - so is often the service provided after Smart Tune re-commissioning has been completed. PEO improves the energy efficiency of commercial, public, or academic buildings regardless of BMS. Running as a software-as-service (SaaS), PEO optimizes around system efficiency, occupancy comfort, and lowest cost. The service utilizes the full capabilities of the 5i platform, learning from and adapting to the building and BMS over time as it automatically fine-tunes temperature and pressure set points at the air handler or zone. PEO automatically and continuously obtains data on the local weather forecast, the occupancy for the building, energy prices, and tariffs. Based on those inputs, it runs thousands of simulations to arrive at the most efficient HVAC operating strategy for the next 12 hours. BuildingIQ's network operations center maintains oversight of the data for 24/7 anomaly detection, data analysis, and diagnosis to assist on-site facility teams." (**Ex. G**, at 6.) "The Cloud-based Predictive Energy Optimization™ (PEO) platform is a paradigm-shifting technology used to reduce energy consumption in commercial, academic, and government buildings. The multi-objective optimization process involves three basic steps: first learning the thermal dynamics of the building; second, refining the model through the slow convergence between parameter prediction and actual readings from the building; and finally optimization, in terms of both energy efficiency and cost." (**Ex. K**, at 2.) "The BuildingIQ optimization model can be programmed, based on the building's changing max demand limit, to respect a firm upper limit on power consumption. The rate of power consumption is then kept below the max demand limit by providing 'wiggle room' for the internal temperatures, notably by allowing temperatures to fluctuate within a tolerable band. These additional degrees of freedom open up the possibility of load shifting as a central strategy by varying internal temperature throughout the day but while ensuring internal occupant comfort." (**Ex. K**, at 3.)

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a central plant controller configured to receive utility rate data indicating a price of one or more resources consumed by equipment of the central plant to serve building energy loads at each of the plurality of time steps, the central plant controller comprising:	BuildingIQ's Predictive Control with Predictive Energy Optimization receives utility pricing data. "Predictive Energy Optimization™ (PEO) is BuildingIQ's premier service. PEO leverages a responsive and well maintained HVAC system - so is often the service provided after Smart Tune re-commissioning has been completed. PEO improves the energy efficiency of commercial, public, or academic buildings regardless of BMS. Running as a software-as-service (SaaS), PEO optimizes around system efficiency, occupancy comfort, and lowest cost. The service utilizes the full capabilities of the 5i platform, learning from and adapting to the building and BMS over time as it automatically fine-tunes temperature and pressure set points at the air handler or zone. PEO automatically and continuously obtains data on the local weather forecast, the occupancy for the building, energy prices, and tariffs. Based on those inputs, it runs thousands of simulations to arrive at the most efficient HVAC operating strategy for the next 12 hours. BuildingIQ's network operations center maintains oversight of the data for 24/7 anomaly detection, data analysis, and diagnosis to assist on-site facility teams." (**Ex. G**, at 6.) "The key advantage of BuildingIQ's energy management solution is the ability to intelligently load-shift energy consumption, based on the knowledge of building thermal and power dynamics (obtained during the learning period), as well as weather forecasts, in order to constrain power consumption below the max demand limit as imposed by the utility. Our machine-learning algorithm does this automatically. 'Learning the building' is inherent in BuildingIQ's model. The model has the capability of learning the thermal properties and dynamics of the building based upon materials, mass, and physics. Key questions such as how fast the building cools, or conversely, how fast a cooled building converges to the ambient temperature are key. Also, what does the power response of your building look like during cooling? The building physics and power profile, in addition to max demand and time-of-use charges, are all factored within BuildingIQ's predictive optimization algorithms, which then optimizes building operations to minimize energy costs while ensuring occupant comfort." (**Ex. K**, at 5.)
a load/rate prediction module configured to use feedback from a	BuildingIQ's Predictive Control with Predictive Energy Optimization receives measurements from sensors within the building and forecasts demand for the building.

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building automation system to predict the building energy loads for a plurality of time steps in an optimization period, the feedback from the building automation system comprising input from one or more sensors configured to monitor conditions within a controlled building; and	"Predictive Energy Optimization™ (PEO) is BuildingIQ's premier service. PEO leverages a responsive and well maintained HVAC system - so is often the service provided after Smart Tune re-commissioning has been completed. PEO improves the energy efficiency of commercial, public, or academic buildings regardless of BMS. Running as a software-as-service (SaaS), PEO optimizes around system efficiency, occupancy comfort, and lowest cost. The service utilizes the full capabilities of the 5i platform, learning from and adapting to the building and BMS over time as it automatically fine-tunes temperature and pressure set points at the air handler or zone. PEO automatically and continuously obtains data on the local weather forecast, the occupancy for the building, energy prices, and tariffs. Based on those inputs, it runs thousands of simulations to arrive at the most efficient HVAC operating strategy for the next 12 hours. BuildingIQ's network operations center maintains oversight of the data for 24/7 anomaly detection, data analysis, and diagnosis to assist on-site facility teams." (**Ex. G**, at 6.) "The Cloud-based Predictive Energy Optimization™ (PEO) platform is a paradigm-shifting technology used to reduce energy consumption in commercial, academic, and government buildings. The multi-objective optimization process involves three basic steps: first learning the thermal dynamics of the building; second, refining the model through the slow convergence between parameter prediction and actual readings from the building; and finally optimization, in terms of both energy efficiency and cost." (**Ex. K**, at 2.) "The key advantage of BuildingIQ's energy management solution is the ability to intelligently load-shift energy consumption, based on the knowledge of building thermal and power dynamics (obtained during the learning period), as well as weather forecasts, in order to constrain power consumption below the max demand limit as imposed by the utility. Our machine-learning algorithm does this automatically. 'Learning the building' is inherent in BuildingIQ's model. The model has the capability of learning the thermal properties and dynamics of the building based upon materials, mass, and physics. Key questions such as how fast the building cools, or conversely, how fast a cooled building converges to the ambient temperature are key. Also, what does the power response of your building look like during cooling? The building physics and power profile, in addition to max demand and time-of-use charges, are all factored within BuildingIQ's

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	predictive optimization algorithms, which then optimizes building operations to minimize energy costs while ensuring occupant comfort." (**Ex. K**, at 5.) ". . . actual readings from the building . . . ." (**Ex. K**, at 2.) "The key objective is to find the most efficient temperature and power consumption profile over time . . . ." (**Ex. K**, at 3.) "every day the model gets updated at the end of the day, based on the behavior of the building on that particular day, and you're able to go ahead and use this latest model to predict what's going to happen the next day" (**Ex. L**.)
a high level optimization module configured to generate an objective function that expresses a total monetary cost of operating the central plant over the optimization period as a function of the utility rate data and an amount of the one or more resources consumed by the central plant equipment at each of the plurality of time steps;	BuildingIQ's Predictive Control with Predictive Energy Optimization generates a power profile for the building system by optimizing a cost function that accounts for the cost of electricity consumed in the optimization period. "Predictive Energy Optimization™ (PEO) is BuildingIQ's premier service. PEO leverages a responsive and well maintained HVAC system - so is often the service provided after Smart Tune re-commissioning has been completed. PEO improves the energy efficiency of commercial, public, or academic buildings regardless of BMS. Running as a software-as-service (SaaS), PEO optimizes around system efficiency, occupancy comfort, and lowest cost. The service utilizes the full capabilities of the 5i platform, learning from and adapting to the building and BMS over time as it automatically fine-tunes temperature and pressure set points at the air handler or zone. PEO automatically and continuously obtains data on the local weather forecast, the occupancy for the building, energy prices, and tariffs. Based on those inputs, it runs thousands of simulations to arrive at the most efficient HVAC operating strategy for the next 12 hours. BuildingIQ's network operations center maintains oversight of the data for 24/7 anomaly detection, data analysis, and diagnosis to assist on-site facility teams." (**Ex. G**, at 6.)

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	"The Cloud-based Predictive Energy Optimization™ (PEO) platform is a paradigm-shifting technology used to reduce energy consumption in commercial, academic, and government buildings. The multi-objective optimization process involves three basic steps: first learning the thermal dynamics of the building; second, refining the model through the slow convergence between parameter prediction and actual readings from the building; and finally optimization, in terms of both energy efficiency and cost." (**Ex. K**, at 2.) "The key advantage of BuildingIQ's energy management solution is the ability to intelligently load-shift energy consumption, based on the knowledge of building thermal and power dynamics (obtained during the learning period), as well as weather forecasts, in order to constrain power consumption below the max demand limit as imposed by the utility. Our machine-learning algorithm does this automatically. 'Learning the building' is inherent in BuildingIQ's model. The model has the capability of learning the thermal properties and dynamics of the building based upon materials, mass, and physics. Key questions such as how fast the building cools, or conversely, how fast a cooled building converges to the ambient temperature are key. Also, what does the power response of your building look like during cooling? The building physics and power profile, in addition to max demand and time-of-use charges, are all factored within BuildingIQ's predictive optimization algorithms, which then optimizes building operations to minimize energy costs while ensuring occupant comfort." (**Ex. K**, at 5.) "The algorithm used to fit parameters is essentially the same 'cost function' approach used in the subsequent optimization process whereby instead of adjusting model parameters so as to minimize model error, the optimization adjusts space temperature targets to minimize 24 hour operating costs." (**Ex. M**, at 3.)

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wherein the high level optimization module is configured to optimize the objective function over the optimization period subject to load equality constraints and capacity constraints on the central plant equipment to determine an optimal distribution of the predicted building energy loads over multiple groups of the central plant equipment at each of the plurality of time steps, wherein the load equality constraints ensure that the optimal distribution satisfies the predicted building energy loads at each of the plurality of time steps;	BuildingIQ's Predictive Control with Predictive Energy Optimization generates a power profile for the building system by optimizing a cost function. The optimization process is subject to constraints that ensure the temperature stays within range and constraints that limit the capacity of the building's equipment. "Predictive Energy Optimization™ (PEO) is BuildingIQ's premier service. PEO leverages a responsive and well maintained HVAC system - so is often the service provided after Smart Tune re-commissioning has been completed. PEO improves the energy efficiency of commercial, public, or academic buildings regardless of BMS. Running as a software-as-service (SaaS), PEO optimizes around system efficiency, occupancy comfort, and lowest cost. The service utilizes the full capabilities of the 5i platform, learning from and adapting to the building and BMS over time as it automatically fine-tunes temperature and pressure set points at the air handler or zone. PEO automatically and continuously obtains data on the local weather forecast, the occupancy for the building, energy prices, and tariffs. Based on those inputs, it runs thousands of simulations to arrive at the most efficient HVAC operating strategy for the next 12 hours. BuildingIQ's network operations center maintains oversight of the data for 24/7 anomaly detection, data analysis, and diagnosis to assist on-site facility teams." (**Ex. G**, at 6.) "The Cloud-based Predictive Energy Optimization™ (PEO) platform is a paradigm-shifting technology used to reduce energy consumption in commercial, academic, and government buildings. The multi-objective optimization process involves three basic steps: first learning the thermal dynamics of the building; second, refining the model through the slow convergence between parameter prediction and actual readings from the building; and finally optimization, in terms of both energy efficiency and cost." (**Ex. K**, at 2.) "The BuildingIQ optimization model can be programmed, based on the building's changing max demand limit, to respect a firm upper limit on power consumption. The rate of power consumption is then kept below the max demand limit by providing "wiggle room" for the internal temperatures, notably by allowing temperatures to fluctuate within a tolerable band. These additional degrees of freedom open up the possibility of load shifting as a central strategy by varying internal temperature throughout the day but while ensuring internal occupant comfort." (**Ex. K**, at 3.)

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	"A number of large facilities, ranging from university campuses to major commercial, medical, or government complexes are constrained in how much power they can use. They haven't the luxury of increasing consumption by adding another power station. They are capacity constrained, which makes combining energy efficiency with the management of Maximum Demand Limits particularly important." (**Ex. K**, at 5.) "The key advantage of BuildingIQ's energy management solution is the ability to intelligently load-shift energy consumption, based on the knowledge of building thermal and power dynamics (obtained during the learning period), as well as weather forecasts, in order to constrain power consumption below the max demand limit as imposed by the utility. Our machine-learning algorithm does this automatically. 'Learning the building' is inherent in BuildingIQ's model. The model has the capability of learning the thermal properties and dynamics of the building based upon materials, mass, and physics. Key questions such as how fast the building cools, or conversely, how fast a cooled building converges to the ambient temperature are key. Also, what does the power response of your building look like during cooling? The building physics and power profile, in addition to max demand and time-of-use charges, are all factored within BuildingIQ's predictive optimization algorithms, which then optimizes building operations to minimize energy costs while ensuring occupant comfort." (**Ex. K**, at 5.) "The algorithm used to fit parameters is essentially the same 'cost function' approach used in the subsequent optimization process whereby instead of adjusting model parameters so as to minimize model error, the optimization adjusts space temperature targets to minimize 24 hour operating costs." (**Ex. M**, at 3.) "BuildingIQ's Demand Response automatically controls the BMS down to the zone —accounting for the learning models for the building's thermal behavior, BMS capabilities, and tenant comfort." (**Ex. H**, at 3.) "BuildingIQ is also able to implement a range of additional controls constraints that are developed in conjunction with the site's operators. These controls constraints capture a range of important site limitations and may include a range of measures such as ensuring a

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	certain static pressure range is not implemented or that supply temperatures must be kept within a certain range at certain temperatures." (Frequently Asked Questions – Controls Approach, FAQ 5, at 3, attached hereto as **Exhibit N**.) "Our optimized room temperature setpoint profile is not generated from a fixed set of rules but is the result of some mathematical (i.e., numerical) optimization (for example, constrained optimization, dynamic programming, and reinforcement learning." (**Ex. I**, at 6.)
wherein the central plant controller is configured to control the central plant equipment such that the central plant equipment operate to achieve the optimal distribution of the building energy loads at each of the plurality of time steps.	BuildingIQ's Predictive Control with Predictive Energy Optimization controls the building's equipment based on the output of the optimization process. "Predictive Energy Optimization™ (PEO) is BuildingIQ's premier service. PEO leverages a responsive and well maintained HVAC system - so is often the service provided after Smart Tune re-commissioning has been completed. PEO improves the energy efficiency of commercial, public, or academic buildings regardless of BMS. Running as a software-as-service (SaaS), PEO optimizes around system efficiency, occupancy comfort, and lowest cost. The service utilizes the full capabilities of the 5i platform, learning from and adapting to the building and BMS over time as it automatically fine-tunes temperature and pressure set points at the air handler or zone. PEO automatically and continuously obtains data on the local weather forecast, the occupancy for the building, energy prices, and tariffs. Based on those inputs, it runs thousands of simulations to arrive at the most efficient HVAC operating strategy for the next 12 hours. BuildingIQ's network operations center maintains oversight of the data for 24/7 anomaly detection, data analysis, and diagnosis to assist on-site facility teams." (**Ex. G**, at 6.) "The Cloud-based Predictive Energy Optimization™ (PEO) platform is a paradigm-shifting technology used to reduce energy consumption in commercial, academic, and government buildings. The multi-objective optimization process involves three basic steps: first learning the thermal dynamics of the building; second, refining the model through the slow convergence between parameter prediction and actual readings from the building; and finally optimization, in terms of both energy efficiency and cost." (**Ex. K**, at 2.) "The key advantage of BuildingIQ's energy management solution is the ability to intelligently load-shift energy consumption, based on the knowledge of building thermal and power dynamics (obtained

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	during the learning period), as well as weather forecasts, in order to constrain power consumption below the max demand limit as imposed by the utility. Our machine-learning algorithm does this automatically. 'Learning the building' is inherent in BuildingIQ's model. The model has the capability of learning the thermal properties and dynamics of the building based upon materials, mass, and physics. Key questions such as how fast the building cools, or conversely, how fast a cooled building converges to the ambient temperature are key. Also, what does the power response of your building look like during cooling? The building physics and power profile, in addition to max demand and time-of-use charges, are all factored within BuildingIQ's predictive optimization algorithms, which then optimizes building operations to minimize energy costs while ensuring occupant comfort." (**Ex. K**, at 5.) "The algorithm used to fit parameters is essentially the same 'cost function' approach used in the subsequent optimization process whereby instead of adjusting model parameters so as to minimize model error, the optimization adjusts space temperature targets to minimize 24 hour operating costs." (**Ex. M**, at 3) "Our optimized room temperature setpoint profile is not generated from a fixed set of rules but is the result of some mathematical (i.e., numerical) optimization (for example, constrained optimization, dynamic programming, and reinforcement learning." (**Ex. I**, at 6.) "BuildingIQ's Demand Response . . . executes control strategies before, during, and after the DR event to ensure curtailment targets are met while adhering to occupant comfort specifications." (**Ex. H**, at 3.)

62. Johnson Controls reserves the right to modify its infringement theories as discovery progresses in this case; it shall not be estopped for infringement contention or claim construction purposes by the information contained herein. This chart is intended to satisfy the notice requirements of Rule 8(a)(2) of the Federal Rules of Civil Procedure; it does not represent Johnson Controls' preliminary or final infringement contentions or preliminary or final claim construction positions.

63. BuildingIQ's continued infringement of the '681 patent subsequent to the filing of the Complaint (ECF No. 1) is willful and deliberate.

64. BuildingIQ's conduct has caused and will continue to cause Johnson Controls substantial damage, including irreparable harm, for which Johnson Controls has no adequate remedy at law, unless and until BuildingIQ is enjoined from infringing the '681 patent.

COUNT V

INFRINGEMENT OF UNITED STATES PATENT NO. 10,580,097

65. Johnson Controls repeats and re-alleges each and every allegation contained in paragraphs 1-16, inclusive, as though fully set forth herein.

66. The '097 patent is valid and enforceable.

67. The '097 patent describing the improved system for optimizing energy use was filed with the U.S. Patent and Trademark Office on November 9, 2017, and issued on March 3, 2020. The U.S. Patent Office carefully examined the claims that ultimately issued as the '097 patent. Consistent with 35 U.S.C. § 282 and the limitations of the claims of the '097 patent, a person having ordinary skill in the art would understand that each claim of the '097 patent (independent or dependent) relates to a separate invention distinct from other claims as for example with dependent claim 2 which is distinct from independent claim 1.

68. The U.S. Patent Office considered the claims of the '097 patent against the background of prior technology to determine if the claims of the '097 patent identified a patentable advance over prior art systems before issuing the patent. Among other things, the U.S. Patent Office searched multiple sets of prior art in classifications including, but not limited to, G06Q 50/06 and G06Q 20/145. As an example, classification G06Q 50/06 included patents relating to systems and methods especially adapted for electricity, gas, or water supply. The face of the '097 patent identifies some of the prior art from the classifications and other prior art

considered in allowing the various claims of the ’097 patent, including for example U.S. Patent No. 9,448,550 entitled “Energy management in a building”.

69. A person having ordinary skill in the art would understand that the separate claims in the ’097 patent did not pre-empt any field, but are improvements in optimizing a building’s energy use based on cost. A person having ordinary skill in the art would also recognize that the claims of the ’097 patent do not relate to implementation of a business method on a general purpose computer, but are specific improvements to a building management system to optimize energy use according to the cost of energy.

70. The filing of the Complaint (ECF No. 1) constitutes notice and actual knowledge in accordance with 35 U.S.C. § 287.

71. Without permission or authorization from Johnson Controls and in violation of 35 U.S.C. § 271(b), BuildingIQ is inducing the direct infringement of at least claim 1 of the ’097 patent by aiding, abetting, and encouraging its customers’ use of its 5i Intelligent Energy Platform including Predictive Control with Demand Response with knowledge of the infringement of the ’097 patent and with the intent to cause such infringement.

72. For example, the following chart describes how the 5i Intelligent Energy Platform including Predictive Control with Demand Response meets each and every claim limitation of claim 1 of the ’097 patent:

U.S. Pat. No. 10,580,097	
1. A heating, ventilation, or air conditioning (HVAC) system for a building, the HVAC system comprising:	BuildingIQ’s Predictive Control with Demand Response product controls a building’s HVAC system. “Predictive Control. 24/7 optimized control, in-built measurement & verification, and demand response uniquely tailored to your building. With the addition of forward looking models, buildings can be continually, intelligently optimized to stay one-step ahead of high costs while keeping tenants comfortable.” (**Ex. G**, at 2.)

U.S. Pat. No. 10,580,097	
	"BuildingIQ's automated demand response service enables owner/operators to participate, and take full benefit from, utility driven demand response programs simply, easily, repeatedly, and measurably. Demand Response is akin to a specialized form of Predictive Energy Optimization™ (PEO), but instead of an energy cost driven optimization paradigm, Demand Response achieves event goals through a more aggressive time-based curtailment strategy that still seeks to optimize comfort. Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone- leveraging learning models for the building's thermal behavior, BMS capabilities, and tenant comfort." (**Ex. G**, at 3.) "BuildingIQ's Demand Response service gives owner/operators a more intelligent, optimized way of responding to demand response (DR) events. Part of BuildingIQ's predictive control set of offerings, Demand Response uses modeling unique to each building - thermal, building management system (BMS) capabilities, occupancy, and weather - to first create a prediction of how the building will respond to BMS changes designed to achieve energy saving goals, and then implements those changes in the BMS balanced against an optimization model for tenant comfort. The resulting behavior of the BMS system before, during, and after the demand event achieves the desired energy consumption target with little to no impact on the tenant or productivity - automatically, intelligently, transparently." (**Ex. H**, at 2.) "Demand Response is akin to a specialized form of Predictive Energy OptimizationTM (PEO) — shifting the balanced approach of PEO from energy cost & tenant comfort to a goal-based energy use and tenant comfort approach. The algorithms that drive Demand Response typically output a more aggressive curtailment sequence than PEO yet still achieves comfort optimization. When deployed as a combined service, PEO serves to maximize building efficiency, comfort and operations 24/7 - automatically switching to Demand Response mode for events. The machine learning and adaptive BMS performance modeling that inform PEO's predictive control are utilized by Demand Response. While Demand Response can be implemented as a standalone service, tenants and owner/operators benefit from the inherent synergies of the two services." (**Ex. H**, at 2.)

U.S. Pat. No. 10,580,097	
	"Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone —accounting for the learning models for the building's thermal behavior, BMS capabilities, and tenant comfort. BuildingIQ's Demand Response service creates and executes control strategies before, during, and after the DR event to ensure curtailment targets are met while adhering to occupant comfort specifications." (**Ex. H**, at 3.)
a building system comprising one or more measurement devices configured to measure at least one of a measured temperature of the building or a measured power usage of the building and generate a feedback signal comprising at least one of the measured temperature of the building or the measured power usage of the building;	BuildingIQ's Predictive Control with Demand Response product collects power usage measurements and zone temperature measurements and uses these measurements in its control algorithm. "With BuildingIQ's Demand Response You Get: • Automatic and intelligent creation and execution of control strategies before, during, and after the event • Adherence to occupant comfort commitments • Autonomous response to OpenADR calls • Flexible manual override by building or zone The underlying 5i Platform's sophisticated Automated Measurement & Verification capabilities can be configured to measure demand reduction using agreed upon methodologies with the utility." (**Ex. G**, at 4.) "BuildingIQ's automated demand response service enables owner/operators to participate, and take full benefit from, utility driven demand response programs simply, easily, repeatedly, and measurably. Demand Response is akin to a specialized form of Predictive Energy Optimization™ (PEO), but instead of an energy cost driven optimization paradigm, Demand Response achieves event goals through a more aggressive time-based curtailment strategy that still seeks to optimize comfort. Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone- leveraging learning models for the building's thermal behavior, BMS capabilities, and tenant comfort." (**Ex. G**, at 3.) "Connectivity Requirements: . . . Utility meter interval data. Flexible access mechanisms Smart meter access Utility access Aggregator access Sub-meter." (**Ex. H**, at 3.) "Power Datafeed" and "Actual Usage." (**Ex. J**, at 11.) "Baseline Energy Use (metered)" and "Metered" energy use. (**Ex. J**,

U.S. Pat. No. 10,580,097	
	at 14.) "BuildingIQ's Demand Response service gives owner/operators a more intelligent, optimized way of responding to demand response (DR) events. Part of BuildingIQ's predictive control set of offerings, Demand Response uses modeling unique to each building - thermal, building management system (BMS) capabilities, occupancy, and weather - to first create a prediction of how the building will respond to BMS changes designed to achieve energy saving goals, and then implements those changes in the BMS balanced against an optimization model for tenant comfort. The resulting behavior of the BMS system before, during, and after the demand event achieves the desired energy consumption target with little to no impact on the tenant or productivity - automatically, intelligently, transparently." (**Ex. H**, at 2.)
a load predictor configured to predict a future power usage of the building;	BuildingIQ's Predictive Control with Demand Response product models a building's energy use and this model is used in its algorithms. "Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone —accounting for the learning models for the building's thermal behavior, BMS capabilities, and tenant comfort. BuildingIQ's Demand Response service creates and executes control strategies before, during, and after the DR event to ensure curtailment targets are met while adhering to occupant comfort specifications." (**Ex. H**, at 3.) "BuildingIQ's automated demand response service enables owner/operators to participate, and take full benefit from, utility driven demand response programs simply, easily, repeatedly, and measurably. Demand Response is akin to a specialized form of Predictive Energy Optimization™ (PEO), but instead of an energy cost driven optimization paradigm, Demand Response achieves event goals through a more aggressive time-based curtailment strategy that still seeks to optimize comfort. Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone- leveraging learning models for the building's thermal behavior, BMS capabilities, and tenant comfort." (**Ex. G**, at 3.) "BuildingIQ's Demand Response service gives owner/operators a more intelligent, optimized way of responding to demand response (DR) events. Part of BuildingIQ's predictive control set of offerings,

U.S. Pat. No. 10,580,097	
	Demand Response uses modeling unique to each building - thermal, building management system (BMS) capabilities, occupancy, and weather - to first create a prediction of how the building will respond to BMS changes designed to achieve energy saving goals, and then implements those changes in the BMS balanced against an optimization model for tenant comfort. The resulting behavior of the BMS system before, during, and after the demand event achieves the desired energy consumption target with little to no impact on the tenant or productivity - automatically, intelligently, transparently." (**Ex. H**, at 2.) "The key advantage of BuildingIQ's energy management solution is the ability to intelligently load-shift energy consumption, based on the knowledge of building thermal and power dynamics (obtained during the learning period), as well as weather forecasts, in order to constrain power consumption below the max demand limit as imposed by the utility. Our machine-learning algorithm does this automatically. 'Learning the building' is inherent in BuildingIQ's model. The model has the capability of learning the thermal properties and dynamics of the building based upon materials, mass, and physics. Key questions such as how fast the building cools, or conversely, how fast a cooled building converges to the ambient temperature are key. Also, what does the power response of your building look like during cooling? The building physics and power profile, in addition to max demand and time-of-use charges, are all factored within BuildingIQ's predictive optimization algorithms, which then optimizes building operations to minimize energy costs while ensuring occupant comfort." (**Ex. K**, at 5.) "every day the model gets updated at the end of the day, based on the behavior of the building on that particular day, and you're able to go ahead and use this latest model to predict what's going to happen the next day" (**Ex. L**.)
an outer controller configured to receive the feedback signal from the building system, receive time-varying pricing information, perform an optimization process to determine an amount of	BuildingIQ's Predictive Control with Demand Response product receives time-varying electricity prices and uses them to generate optimal power setpoints for the building over an optimization period. The power setpoints account for demand response events that cause the system to shed load (*i.e.*, defer energy consumption) to optimize power consumption during the demand response event. "Predictive Control. 24/7 optimized control, in-built measurement &

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power to defer from the predicted future power usage based on the feedback signal and the pricing information, and output a power control signal indicating the amount of power to defer, wherein the amount of power to defer optimizes a total cost of power usage of the building;	verification, and demand response uniquely tailored to your building. With the addition of forward looking models, buildings can be continually, intelligently optimized to stay one-step ahead of high costs while keeping tenants comfortable." (**Ex. G**, at 2.) "Connectivity Requirements: . . . Utility meter interval data. Flexible access mechanisms Smart meter access Utility access Aggregator access Sub-meter." (**Ex. H**, at 3.) "Power Datafeed" and "Actual Usage." (**Ex. J**, at 11.) "Baseline Energy Use (metered)" and "Metered" energy use. (**Ex. J**, at 14.) "Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone —accounting for the learning models for the building's thermal behavior, BMS capabilities, and tenant comfort. BuildingIQ's Demand Response service creates and executes control strategies before, during, and after the DR event to ensure curtailment targets are met while adhering to occupant comfort specifications." (**Ex. H**, at 3.) "BuildingIQ's automated demand response service enables owner/operators to participate, and take full benefit from, utility driven demand response programs simply, easily, repeatedly, and measurably. Demand Response is akin to a specialized form of Predictive Energy Optimization™ (PEO), but instead of an energy cost driven optimization paradigm, Demand Response achieves event goals through a more aggressive time-based curtailment strategy that still seeks to optimize comfort. Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone- leveraging learning models for the building's thermal behavior, BMS capabilities, and tenant comfort." (**Ex. G**, at 3.) "BuildingIQ's Demand Response service gives owner/operators a more intelligent, optimized way of responding to demand response (DR) events. Part of BuildingIQ's predictive control set of offerings, Demand Response uses modeling unique to each building - thermal, building management system (BMS) capabilities, occupancy, and weather - to first create a prediction of how the building will respond to BMS changes designed to achieve energy saving goals, and then implements those changes in the BMS balanced against an optimization model for tenant comfort. The resulting behavior of the

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	BMS system before, during, and after the demand event achieves the desired energy consumption target with little to no impact on the tenant or productivity - automatically, intelligently, transparently." (**Ex. H**, at 2.) "The key advantage of BuildingIQ's energy management solution is the ability to intelligently load-shift energy consumption, based on the knowledge of building thermal and power dynamics (obtained during the learning period), as well as weather forecasts, in order to constrain power consumption below the max demand limit as imposed by the utility. Our machine-learning algorithm does this automatically. 'Learning the building' is inherent in BuildingIQ's model. The model has the capability of learning the thermal properties and dynamics of the building based upon materials, mass, and physics. Key questions such as how fast the building cools, or conversely, how fast a cooled building converges to the ambient temperature are key. Also, what does the power response of your building look like during cooling? The building physics and power profile, in addition to max demand and time-of-use charges, are all factored within BuildingIQ's predictive optimization algorithms, which then optimizes building operations to minimize energy costs while ensuring occupant comfort." (**Ex. K**, at 5.)
an inner controller configured to receive a power setpoint representing a difference between the predicted future power usage and the amount of power to defer, determine an operating setpoint for the building system predicted to achieve the power setpoint, and output a second control signal indicating the operating setpoint; and	BuildingIQ's Predictive Control with Demand Response product generates power setpoints and then calculates temperature setpoints using energy consumption models for the HVAC equipment. The temperature setpoints are then used by the building management system to operate HVAC equipment. "Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone —accounting for the learning models for the building's thermal behavior, BMS capabilities, and tenant comfort. BuildingIQ's Demand Response service creates and executes control strategies before, during, and after the DR event to ensure curtailment targets are met while adhering to occupant comfort specifications." (**Ex. H**, at 3.) "BuildingIQ's automated demand response service enables owner/operators to participate, and take full benefit from, utility driven demand response programs simply, easily, repeatedly, and measurably. Demand Response is akin to a specialized form of Predictive Energy Optimization™ (PEO), but instead of an energy

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	cost driven optimization paradigm, Demand Response achieves event goals through a more aggressive time-based curtailment strategy that still seeks to optimize comfort. Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone- leveraging learning models for the building's thermal behavior, BMS capabilities, and tenant comfort." (**Ex. G**, at 3.) "BuildingIQ's Demand Response service gives owner/operators a more intelligent, optimized way of responding to demand response (DR) events. Part of BuildingIQ's predictive control set of offerings, Demand Response uses modeling unique to each building - thermal, building management system (BMS) capabilities, occupancy, and weather - to first create a prediction of how the building will respond to BMS changes designed to achieve energy saving goals, and then implements those changes in the BMS balanced against an optimization model for tenant comfort. The resulting behavior of the BMS system before, during, and after the demand event achieves the desired energy consumption target with little to no impact on the tenant or productivity - automatically, intelligently, transparently." (**Ex. H**, at 2.) "The key advantage of BuildingIQ's energy management solution is the ability to intelligently load-shift energy consumption, based on the knowledge of building thermal and power dynamics (obtained during the learning period), as well as weather forecasts, in order to constrain power consumption below the max demand limit as imposed by the utility. Our machine-learning algorithm does this automatically. 'Learning the building' is inherent in BuildingIQ's model. The model has the capability of learning the thermal properties and dynamics of the building based upon materials, mass, and physics. Key questions such as how fast the building cools, or conversely, how fast a cooled building converges to the ambient temperature are key. Also, what does the power response of your building look like during cooling? The building physics and power profile, in addition to max demand and time-of-use charges, are all factored within BuildingIQ's predictive optimization algorithms, which then optimizes building operations to minimize energy costs while ensuring occupant comfort." (**Ex. K**, at 5.) "As a control strategy, we are not implementing a feedback control

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	loop to achieve a specific room temperature setpoint. Instead, we are generating the room temperature setpoint itself." (**Ex. I**, at 6.)
HVAC equipment comprising one or more physical devices, wherein the building system is configured to operate the HVAC equipment to achieve the operating setpoint;	BuildingIQ's Predictive Control with Demand Response product controls a building's HVAC system by adjusting the control signals provided as inputs to HVAC devices. "Predictive Control. 24/7 optimized control, in-built measurement & verification, and demand response uniquely tailored to your building. With the addition of forward looking models, buildings can be continually, intelligently optimized to stay one-step ahead of high costs while keeping tenants comfortable." (**Ex. G**, at 2.) "BuildingIQ's automated demand response service enables owner/operators to participate, and take full benefit from, utility driven demand response programs simply, easily, repeatedly, and measurably. Demand Response is akin to a specialized form of Predictive Energy Optimization™ (PEO), but instead of an energy cost driven optimization paradigm, Demand Response achieves event goals through a more aggressive time-based curtailment strategy that still seeks to optimize comfort. Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone- leveraging learning models for the building's thermal behavior, BMS capabilities, and tenant comfort." (**Ex. G**, at 3.) "BuildingIQ's Demand Response service gives owner/operators a more intelligent, optimized way of responding to demand response (DR) events. Part of BuildingIQ's predictive control set of offerings, Demand Response uses modeling unique to each building - thermal, building management system (BMS) capabilities, occupancy, and weather - to first create a prediction of how the building will respond to BMS changes designed to achieve energy saving goals, and then implements those changes in the BMS balanced against an optimization model for tenant comfort. The resulting behavior of the BMS system before, during, and after the demand event achieves the desired energy consumption target with little to no impact on the tenant or productivity - automatically, intelligently, transparently." (**Ex. H**, at 2.) "Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone —accounting for the learning models for the building's thermal behavior, BMS capabilities, and tenant comfort. BuildingIQ's Demand Response

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	service creates and executes control strategies before, during, and after the DR event to ensure curtailment targets are met while adhering to occupant comfort specifications." (**Ex. H**, at 3.) "As a control strategy, we are not implementing a feedback control loop to achieve a specific room temperature setpoint. Instead, we are generating the room temperature setpoint itself." (**Ex. I**, at 6.)
wherein at least one of the outer controller or the inner controller is an electronic device comprising a communications interface and a processing circuit.	BuildingIQ's controllers are inherently electronic devices containing a communication interface and a processing circuit.

73. Johnson Controls reserves the right to modify its infringement theories as discovery progresses in this case; it shall not be estopped for infringement contention or claim construction purposes by the information contained herein. This chart is intended to satisfy the notice requirements of Rule 8(a)(2) of the Federal Rules of Civil Procedure; it does not represent Johnson Controls' preliminary or final infringement contentions or preliminary or final claim construction positions.

74. BuildingIQ's continued infringement of the '097 patent subsequent to the filing of the Complaint (ECF No. 1) is willful and deliberate.

75. BuildingIQ's conduct has caused and will continue to cause Johnson Controls substantial damage, including irreparable harm, for which Johnson Controls has no adequate remedy at law, unless and until BuildingIQ is enjoined from infringing the '097 patent.

COUNT VI

INFRINGEMENT OF UNITED STATES PATENT NO. 8,600,556

76. Johnson Controls repeats and re-alleges each and every allegation contained in paragraphs 1-16, inclusive, as though fully set forth herein.

77. The ’556 patent is valid and enforceable.

78. The ’556 patent describing the improved smart building manager was filed with the U.S. Patent and Trademark Office on June 21, 2010, and issued on December 3, 2013. The U.S. Patent Office carefully examined the claims that ultimately issued as the ’556 patent. Consistent with 35 U.S.C. § 282 and the limitations of the claims of the ’556 patent, a person having ordinary skill in the art would understand that each claim of the ’556 patent (independent or dependent) relates to a separate invention distinct from other claims as for example with dependent claim 40 which is distinct from independent claim 31.

79. The U.S. Patent Office considered the claims of the ’556 patent against the background of prior technology to determine if the claims of the ’556 patent identified a patentable advance over prior art systems before issuing the patent. Among other things, the U.S. Patent Office searched multiple sets of prior art in classifications including, but not limited to, 700/22, 26, 110, 275, 276, 286, 291, 295; 714/37, 38.14, 47.1; 370/395.52, 395.53. As an example, classification 700/22 included patents relating to electrical power distribution. The face of the ’556 patent identifies some of the prior art from the classifications and other prior art considered in allowing the various claims of the ’556 patent, including for example U.S. Patent No. 8,219,250 entitled “Systems and methods to control energy consumption efficiency”.

80. A person having ordinary skill in the art would understand that the separate claims in the ’556 patent did not pre-empt any field, but are improvements in a building management system. A person having ordinary skill in the art would also recognize that the

claims of the ’556 patent do not relate to implementation of a business method on a general purpose computer, but are specific improvements to a building management system to provide integrated control across multiple functional components.

81. The filing of the Complaint (ECF No. 1) constitutes notice and actual knowledge in accordance with 35 U.S.C. § 287.

82. Without permission or authorization from Johnson Controls, BuildingIQ has manufactured, used, offered for sale, and sold and continues to manufacture, use, offer for sale, and sell certain building and energy management systems, including, without limitation, BuildingIQ’s 5i Intelligent Energy Platform, which infringes at least claim 31 of the ’556 patent in violation of 35 U.S.C. § 271(a).

83. Without permission or authorization from Johnson Controls and in violation of 35 U.S.C. § 271(b), BuildingIQ is inducing the direct infringement of at least claim 31 of the ’556 patent by aiding, abetting, and encouraging its customers’ use of the 5i Intelligent Energy Platform with knowledge of the infringement of the ’556 patent and with the intent to cause such infringement.

84. For example, the following chart describes how the 5i Intelligent Energy Platform meets each and every claim limitation of claim 31 of the ’556 patent:

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31. A computerized building management system comprising:	BuildingIQ provides building control software that is able to connect to and control a building or collection of buildings. “The BuildingIQ 5i Platform of technology-enabled services learns and evolves with the needs of your building or portfolio of buildings. Deployment occurs once, when you engage with BuildingIQ, giving you —building owners and operators— the ability to select the services that best solve today's problems, and then easily add new ones to tackle tomorrow's demands. Our services can be deployed selectively to meet the needs of any building across any size portfolio or geography. Services that power our solutions range from ticket

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	management, to retro-commissioning, to closed-loop control to tune your building to optimal performance 24/7." (https://buildingiq.com/products/5i-intelligent-energy-platform/, attached hereto as **Exhibit O**.) "Predictive Energy Optimization™ (PEO) is BuildingIQ's premier service. PEO leverages a responsive and well maintained HVAC system - so is often the service provided after Smart Tune re-commissioning has been completed. PEO improves the energy efficiency of commercial, public, or academic buildings regardless of BMS. Running as a software-as-service (SaaS), PEO optimizes around system efficiency, occupancy comfort, and lowest cost. The service utilizes the full capabilities of the 5i platform, learning from and adapting to the building and BMS over time as it automatically fine-tunes temperature and pressure set points at the air handler or zone. PEO automatically and continuously obtains data on the local weather forecast, the occupancy for the building, energy prices, and tariffs. Based on those inputs, it runs thousands of simulations to arrive at the most efficient HVAC operating strategy for the next 12 hours. BuildingIQ's network operations center maintains oversight of the data for 24/7 anomaly detection, data analysis, and diagnosis to assist on-site facility teams." (**Ex. G**, at 6.) "BuildingIQ's automated demand response service enables owner/operators to participate, and take full benefit from, utility driven demand response programs simply, easily, repeatedly, and measurably. Demand Response is akin to a specialized form of Predictive Energy Optimization™ (PEO), but instead of an energy cost driven optimization paradigm, Demand Response achieves event goals through a more aggressive time-based curtailment strategy that still seeks to optimize comfort. Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone- leveraging learning models for the building's thermal behavior, BMS capabilities, and tenant comfort." (**Ex. G**, at 3.)
a communications interface configured to receive information from a smart energy grid;	The BuildingIQ components receive energy pricing data from the utility provider. "Key inputs: Existing Building Data. Historical, real-time and forecasted external data (utility pricing, weather)." (New Approaches in Automating and Optimizing Demand Response to Solve Peak Load Management Problems at 4, attached hereto as **Exhibit P**.) "BuildingIQ . . . factors in weather forecasts, occupant comfort,

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	energy prices, and demand response events to minimize both peak and ongoing consumption for building owners . . . .” (Building & Energy Intelligence Brief at 3, attached hereto as **Exhibit Q**.) “Power meter information can be collected through the BMS, independent metering or by web services connections to other sources such as the utility.” (**Ex. P**, at 6.) “Connectivity Requirements: . . . Utility meter interval data." (**Ex. H**, at 3.)
a processing circuit;	BuildingIQ is a software product that necessarily runs on processing circuits.
non-transient computer-readable media in communication with the processing circuit;	BuildingIQ is a software product comprising non-transient computer-readable media.
an integrated control layer configured to receive inputs from and to provide outputs to a plurality of building subsystems, the integrated control layer including a plurality of control algorithm modules configured to process the inputs and to determine the outputs;	BuildingIQ’s Predictive Energy Optimization product controls a building’s HVAC systems to reduce energy consumption and cost. “Predictive Energy Optimization™ (PEO) is BuildingIQ's premier service. PEO leverages a responsive and well maintained HVAC system - so is often the service provided after Smart Tune re-commissioning has been completed. PEO improves the energy efficiency of commercial, public, or academic buildings regardless of BMS. Running as a software-as-service (SaaS), PEO optimizes around system efficiency, occupancy comfort, and lowest cost. The service utilizes the full capabilities of the 5i platform, learning from and adapting to the building and BMS over time as it automatically fine-tunes temperature and pressure set points at the air handler or zone. PEO automatically and continuously obtains data on the local weather forecast, the occupancy for the building, energy prices, and tariffs. Based on those inputs, it runs thousands of simulations to arrive at the most efficient HVAC operating strategy for the next 12 hours. BuildingIQ's network operations center maintains oversight of the data for 24/7 anomaly detection, data analysis, and diagnosis to assist on-site facility teams.” (**Ex. G**, at 6.) “The BuildingIQ advanced, cloud-based software is the first energy management solution to intelligently predict and manage energy demand in commercial buildings. It directly adjusts heating, ventilation and air conditioning (HVAC) system parameters, continuously optimizing energy use using advanced algorithms without the need for manual intervention. BuildingIQ communicates

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	with your building management system (BMS) and automatically reduces energy consumption and lowers energy costs while maintaining or improving tenant comfort." (**Ex. Q**, at 3.) "The BuildingIQ software continually optimizes energy consumption by pre-planning HVAC operations and adjusting points throughout the day . . . ." (**Ex. Q**, at 4.) "[T]he system optimizes the settings of the building management system (BMS) to reduce energy and/or cost while maintaining comfort." (**Ex. P**, at 4.)
a fault detection and diagnostics layer configured to use the inputs received from the integrated control layer to detect and diagnose faults;	BuildingIQ's outcome-based fault detection (OFD) product is a software component that receives faults from the building systems and processes them for resolution. "OFD is the service on top of BuildingIQ's 5i Intelligent Energy Platform that sits between the huge transition in the building operations journey from energy visualization to predictive energy optimization. The steps of OFD are: 1. Baseline – understanding the building's energy profile and how it acts in varying weather. 2. Data consumption & trending – ingesting and storing any data provided by the building system or IoT-type devices (unlike a typical building management system (BMS), BuildingIQ stores up to 10 years of data for analytics). 3. Rules-based detection – detecting logic-based, value-based and trend-based alarms. 4. AI-based detection – uncovering the underlying system dynamics and relationships driving faults while learning to identify deviations from expected operation. 5. Triage/Prioritization – collaborating in close contact with client teams, BuildingIQ Network Operations and building experts take AI-based diagnoses and apply practical, system and building specific insights. 6. Ticketing – ticketing assignment and tracking using either BuildingIQ's own Facility Worksite service, or that of a client, is included.

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	7. Planning/Actioning with the BuildingIQ Mobile App – identifying opportunities for catalyzing work in collaboration with experienced building engineers and facility managers at BuildingIQ, whether it is a monthly service visit from a controls contractor or a yearly budgeting process. 8. Validation/Accountability – validating all completed work by comparing data from the time period post-fix to the original data that generated the issue." (https://buildingiq.com/press-media/press-releases/buildingiq-launches-outcome-based-fault-detection/, attached hereto as **Exhibit R**.) "Fault detection systems of yesterday inundate facilities teams with data and guesswork. That's why they're mostly ignored. But they're not entirely useless. BuildingIQ's OFD service springboards off basic fault detection and diagnostic (FDD) solutions by layering on intelligence —in the cloud— based on cutting edge data science. And because it's science, the tools we use are always evolving and improving. Our operators use a tunable map to identify which pieces of equipment have the most impact on your building's energy consumption. To dive into root causes we can account for changing weather patterns and focus on how each point is influenced by operational and occupant changes. Influence changes over time and we capture that too. Not just for today or the last week like a typical BMS, but for any date range comparison from days to weeks to periods from different years. Most existing FDD solutions can only deliver a rough guess of the associated costs of ignoring a fault, but can't begin to know why you should care. Influence mapping uncovers the data points and assets that impact the energy consumption of a building. This lets us move beyond a reactive alarm to symptoms of the problem, and instead begin to identify the deeper root cause driving complex system responses and prioritize acting on them based on their impact." (https://buildingiq.com/products/building-operations/outcome-based-fault-detection/, attached hereto as **Exhibit S**.)
a demand response layer configured to process the information received	BuildingIQ's Demand Response product is designed to automatically adjust the building's power profile in response to demand response events (i.e., during demand limiting periods) and uses energy cost

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from the smart energy grid to determine adjustments to the plurality of control algorithms of the integrated control layer;	data for these periods to drive that response. "BuildingIQ's automated demand response service enables owner/operators to participate, and take full benefit from, utility driven demand response programs simply, easily, repeatedly, and measurably. Demand Response is akin to a specialized form of Predictive Energy Optimization™ (PEO), but instead of an energy cost driven optimization paradigm, Demand Response achieves event goals through a more aggressive time-based curtailment strategy that still seeks to optimize comfort. Unlike other DR solutions, BuildingIQ's Demand Response automatically controls the BMS down to the zone- leveraging learning models for the building's thermal behavior, BMS capabilities, and tenant comfort." (**Ex. G**, at 3.) "BuildingIQ's Demand Response service gives owner/operators . . . a way of responding to demand response (DR) events. . . . The resulting behavior of the BMS system . . . during . . . the demand event achieves the desired energy consumption target . . . ." (**Ex. H**, at 2.) "Power meter information can be collected through the BMS, independent metering or by web services connections to other sources such as the utility." (**Ex. P**, at 6.) "Connectivity Requirements: . . . Utility meter interval data." (**Ex. H**, at 3.) "Power Datafeed" and "Actual Usage." (**Ex. J**, at 11.) "Baseline Energy Use (metered)" and "Metered" energy use. (**Ex. J**, at 14.) "[A]llowing the building temperature to drift upward gradually -- when power costs are high -- to the maximum comfort level allows power consumption to be moderated and held below the max demand. The use of cooling energy is thus minimized at times when max demand charges and cost of cooling are at their highest." (**Ex. K**, at 3.)
wherein the integrated control layer, the fault detection and diagnostics layer, and the demand response layer are each computer	The various components of the BuildingIQ system identified herein are all software modules which are non-transient computer-readable media run on processing circuits in the BuildingIQ cloud.

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code modules stored in the non-transient computer-readable media, wherein the computer code modules configure the processing circuit, all modules are executed by the processing circuit, to provide the actions of the integrated control layer, the fault detection and diagnostics layer, and the demand response layer;	
wherein the fault detection and diagnostics layer is configured to prioritize faults by estimating a financial impact of a plurality of faults using pricing information from the smart energy grid.	BuildingIQ's outcome-based fault detection (OFD) product is a software component that receives faults from the building systems and prioritizes them based on their impact on energy consumption, cost, comfort, and other factors. "OFD is offered as a managed service and delivered in cooperation with your onsite facilities team, incorporating prioritization of faults and issues, ticketing work for prioritized faults with full client override capabilities, and data-based validation of the effectiveness of work performed into one comprehensive service." (**Ex. S**.) "Most existing FDD solutions can only deliver a rough guess of the associated costs of ignoring a fault, but can't begin to know why you should care. Influence mapping uncovers the data points and assets that impact the energy consumption of a building. This lets us move beyond a reactive alarm to symptoms of the problem, and instead begin to identify the deeper root cause driving complex system responses and prioritize acting on them based on their impact." (**Ex. S**.) "Correlation mapping uncovers how data and assets really interact — revealing the full impact of a fault to help prioritize corrective action. Using our correlation map our engineers can visualize the relationships between every point and system. This allows them to deep dive into the root cause, and stop chasing symptoms." (**Ex. S**.) "Flexible prioritization informed by both quantitative and qualitative impacts, tailored to the site's needs…Quantify energy, comfort, and equipment impact" (**Ex. S**.)

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	"Triage/Prioritization – collaborating in close contact with client teams, BuildingIQ Network Operations and building experts take AI-based diagnoses and apply practical, system and building specific insights." (**Ex. R**.) "To achieve this, OFD will: 1. Make facility teams more efficient. Prioritization and filtering of issues based on multiple variables (energy, comfort, client reputation, risk, **cost**) declutters the day and provides data to the facility team to internally prioritize and justify investment." (https://buildingiq.com/blog/moving-beyond-data-with-fault-detection-data-and-shiny-technology-is-not-enough/, attached hereto as **Exhibit T**.)

85. Johnson Controls reserves the right to modify its infringement theories as discovery progresses in this case; it shall not be estopped for infringement contention or claim construction purposes by the information contained herein. This chart is intended to satisfy the notice requirements of Rule 8(a)(2) of the Federal Rules of Civil Procedure; it does not represent Johnson Controls' preliminary or final infringement contentions or preliminary or final claim construction positions.

86. BuildingIQ's continued infringement of the '556 patent subsequent to the filing of the Complaint (ECF No. 1) is willful and deliberate.

87. BuildingIQ's conduct has caused and will continue to cause Johnson Controls substantial damage, including irreparable harm, for which Johnson Controls has no adequate remedy at law, unless and until BuildingIQ is enjoined from infringing the '556 patent.

REQUEST FOR RELIEF

Wherefore, Johnson Controls prays for judgment as follows:

A. For a judgment that BuildingIQ has infringed the '238 patent;

B. For a judgment that BuildingIQ has infringed the '566 patent;

C. For a judgment that BuildingIQ has infringed the ’721 patent;

D. For a judgment that BuildingIQ has infringed the ’681 patent;

E. For a judgment that BuildingIQ has infringed the ’097 patent;

F. For a judgment that BuildingIQ has infringed the ’556 patent;

G. For an order preliminarily and permanently enjoining BuildingIQ and its officers, directors, agents, employees, successors, and all persons in privity or active concert or participation with BuildingIQ, directly or indirectly, from infringing the Patents-in-Suit;

H. For a judgment and award that BuildingIQ account for and pay to Johnson Controls damages adequate to compensate for BuildingIQ’s infringement of the Patents-in-Suit, including lost profits but in no event less than a reasonable royalty;

I. For a judgment and award of any supplemental damages sustained by Johnson Controls for any continuing post-verdict infringement of the unexpired Patents-in-Suit until entry of final judgment with an accounting as needed;

J. For a finding that BuildingIQ’s post-Complaint infringement is willful and an award of increased damages for willful infringement pursuant to 35 U.S.C. § 284;

K. For an order finding that this case is exceptional under 35 U.S.C. § 285 and awarding Johnson Controls its costs, expenses, and disbursements incurred in this action, including reasonable attorneys’ fees as available by law to be paid by BuildingIQ;

L. For an award of pre-judgment interest, post-judgment interest, and costs in this action; and

M. For an award of such other relief as this Court deems just and proper.

JURY DEMAND

Johnson Controls demands a jury trial on all issues so triable.

ASHBY & GEDDES

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