An Important Insight Into the Economics of Utility Companies & Why Demand Charges Won't Go Away

Gary Morsches, Demand Charge Expert, Thought Leader, and CEO of DemandQ, sat down with Arne Hessenbruch, Lecturer at MIT on innovation, to discuss the economics of buying electricity, how to reduce peak demand charges, and the need to act for large electricity consumers for the sake of all commercial & industrial users.

Arne Hessenbruch: *Gary, thank you for sitting down with me today. You are being seen as a thought leader in reducing electricity demand charges. Can you tell us a little more about what a demand charge actually is, and why utility companies need to charge it in order to stay competitive?*

Gary Morsches: If you look at your budget for your commercial account or industrial account, you pay for G, which is your consumption. It's the little meter that turns, and you pay so much per kilowatt hour; the more you use, the more you pay. Everyone gets that. People have been working hard to become more energy efficient, to be greener, and to reduce the amount that meter spins. That's all about combating the consumption part of the bill. But that's not the whole bill.

In fact there's a newer charge that has come out in the last decade or so called **Demand Charges.** Demand charges are irrespective of the amount you consume; rather they capture the maximum amount you use in any given period. What happens is the utility has to have infrastructure and processes to meet your peak demand. Since Electric utilities are regulated monopolies within their defined service territory they have a fiduciary duty to supply their customers the amount of power they need at any given time. So consequently, they have to build their infrastructure to meet their territory's maximum need—not just your maximum need—but everyone's maximum need. If you think about it, that costs a lot of money. That costs a lot of infrastructure that's only used very little of the time.

In the old days, they didn't have to have a special charge for this. They captured all their revenue in fees and consumption—in their kilowatt hour charges. The utility model worked well for 100 years with increasing demand, and it allowed the electrification of the United States. There have been some bumps and bruises, but by and large the United States has been electrified. The problem for utilities today is that over the past decade electric demand has stagnated and even declined in some regions due to efficiency, sustainability, and DER's—Distributed Energy Resources (localized behind the meter Solar and wind) that have threatened the utility revenue model. So in light of these macro fundamental shifts in the market, utilities have implemented Demand Charges as a supplemental revenue source. And if you think about it, demand charges are a logical way to charge customers for being able to meet their maximum usage needs.

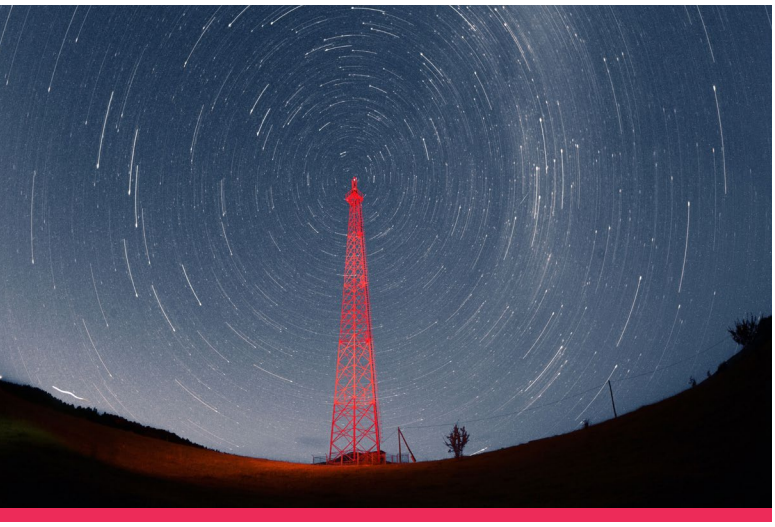
> **"People are consuming less electricity even though they are living better lives."**

Now electricity rates are relatively stable, and we have pretty good reliability in comparison to much of the world. However, that business model is under tremendous pressure right now. Why? If you think about it, the utilities' cost to serve you are basically fixed costs. They have fixed infrastructure, lines, wires, substations—those are largely fixed costs. And the variable side is the amount of electricity that goes through. So you separate those two, and they charge you for the electricity that goes through. But this fixed cost is a separate cost.

For the first hundred years, demand continually inclined.It followed GDP growth. As our country was prosperous and grew, so did demand. As a result, this fixed cost utility was collecting rates on a variable increasing volume, i.e. they kept capturing more volume, providing more revenue, and allowing them to grow and be profitable.

The last decade, we have seen three phenomena that occur that have taken demand and actually flattened or lowered it in many places. The first thing is our population is stagnating in some areas of the United States. It's not growing universally like it once did.

The second thing is that energy efficiency has come into play. People are consuming less electricity even though they are living better more prosperous lives. With things like LED lights and more efficient refrigerators, folks are still getting services they want with less electricity usage.



Finally, the biggest game changer here is DER, distributed energy resources, like solar panels and wind turbines. These DERs are supplying power to end users and to facilities that no longer require the utility to deliver electricity. It's basically being generated and consumed in house, on-site. All in all, the amount of volume that utilities are serving is going down. So they have a fixed cost component and declining volume. That doesn't work for businesses, and that's really squeezing utilities today.

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So what are they going to do? They can raise rates—i.e. they can raise the rate of the G (the generation, or energy charge)—but that doesn't make them competitive. It's a deregulated side of the marketplace, and that doesn't fly. So now they have a fixed cost component that captures a charge based on the maximum amount you use. Now your bill is made up of G, or consumption *plus* this demand side.

Now interestingly enough, if you think about what your electricity bill has done over the last 10 years, you're going to say, yeah it's gone up. And it has gone up. But if you take a look into the components of it, the largest part of your bill is consumption. Your consumption is basically the cost of generating electricity which in the old days meant converting fossil fuels into power—e.g. coal, gas—and now you have it interspersed with renewables and solar and nukes, etc. But by and large, what sets the price of electricity is that marginal use that generates that last megawatt hour needed to balance the system. Electricity is still hard and expensive to store. What utilities and grids do is they produce as much electricity as is consumed and that balanced across the grid.

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So the marginal fuel that generally sets the clearing price on a grid is natural gas, and if you have have any sense of anything about markets, you'll know that the shale revolution has drastically changed natural gas prices and even oil prices. In fact, in the last 10 years—particularly in the last 5 years—we've had very stable and low priced natural gas and oil. That's been good in many ways and has resulted in historically low electricity prices. So in the last 10 years our commodity prices—the commodity cost of electricity or the G as previously discussed—have dropped 23%, which is good, and it's stable, but the demand side, or the fixed price side has gone up 47%. That means your bill—despite the commodity price going down—has gone up 10% a year.

Arne Hessenbruch: *So, you're basically paying a sharp premium for demanding out of the ordinary consumption.*

Gary Morsches: Well, yes and no. What happened was, with the increase and sustained growth in overall volumes, they could subsidize all this infrastructure buildup through that higher volume. With that volume increase gone, it has to stand on its own—there's no subsidization anymore. Now that infrastructure buildout has to be funded on its own.

So consequently utilities are sitting there stuck, saying I've got to collect revenues, I'm not getting the volume I once had. I can't raise the price of my volume because now I'm won't be competitive with my neighbors—why would I pay 14 cents a KWh in Massachusetts to build a plant when I could go pay 8 down in Georgia? So regulators have to be very careful with the commodity price. It can't get too out of whack with other prices across the country.

The slack is made up on the demand side, which typically makes up 25 - 40% of your bill. It can be as low as 10% or as high as 60% depending on the utility and the rate structure. There are a zillion different ways utilities structure this stuff. If you look at your bill, it's very convoluted, lots of lines. But one way or another, they're adding charges to cover their fixed costs in order to secure enough infrastructure to meet your biggest needs.

Arne Hessenbruch: *So, any measure that reduces that premium is a good way to reduce your bill?*

Gary Morsches: I couldn't say it any better myself. You know, in the old days it wasn't as important as it is today. And demand charges are increasing by about 6% a year, per FERC's 2018 annual report. More and more utilities in the past 10 years are bringing in demand side charges onto their bills. They typically vary from 25% to 40%. I've even seen cases where it's over 50% of your bill. So that energy efficiency that's been baked into our heads since we were little kids—shut the door, close the refrigerator—that's all is well and good, and that helps, but it's not good enough. You've got to mind your maximum usage.

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Now the other thing that's interesting is that many utilities are in a world of hurt right now. **S&P Global Ratings Report (2019) stated that 27% of utilities are on negative or on credit watch because of this decrease in volume.** They're in a pinch right now. They're not too worried about it yet, but they're going to have to do some radical things. They've got to start increasing revenue in some ways. They can't get it through increased volume.

Arne Hessenbruch: *And the only intelligent way would be to change demand charges because otherwise if they increase price per kWh, they basically price themselves out of the competition. Is that correct?*

Gary Morsches: Yes—and the thing is that volume continues to decline. If you keep raising prices over a smaller volume, it doesn't help you that much. So it's all going to be on that demand side of the equation. You can't put your head in the sand.

Arne Hessenbruch: *It could be said that the basic economy of running the utility company suggests that demand rates will increase, so there's no way that we can avoid that in the future.*

Gary Morsches: Right, and now I'm really getting off on a tangent here, but if you were saying that today, in today's world, we're going to start a brand new utility for this thing called electricity, you would go right to the smartphone model with that. You would have huge fixed price. *You want electricity? 50 bucks a month. Then you want a plan? You'd still have to pay for minutes, but you would have a huge fixed price. Because it's a huge risk for me just to hook you up and serve you. I don't know how variable you're going to be, and I've got to build all this infrastructure to serve you. It costs a lot of money to do it. If you don't like it? Don't hook up.*

And just as a real aside, this sort of thinking has almost taken the utilities in Nevada down and almost literally bankrupted them. Because Nevada is extremely sunny. The state came out and said, *hey we want to be green, let's get people to put solar panels on their roofs. We'll make it really good for them, we'll give them rebates and tax credits.* So all these companies came in and flooded the market and everybody put solar panels on their roofs. Well, the poor utilities are saying, *now wait a minute here sports fans. My volume went way the hell down—way down—because everyone's self generating, and now I'm not collecting any money, yet I still have to keep all the wires up because if it's a cloudy day I have to serve these folks. You know, I'm all over the place—the grid is unstable, it's sunny, it's*

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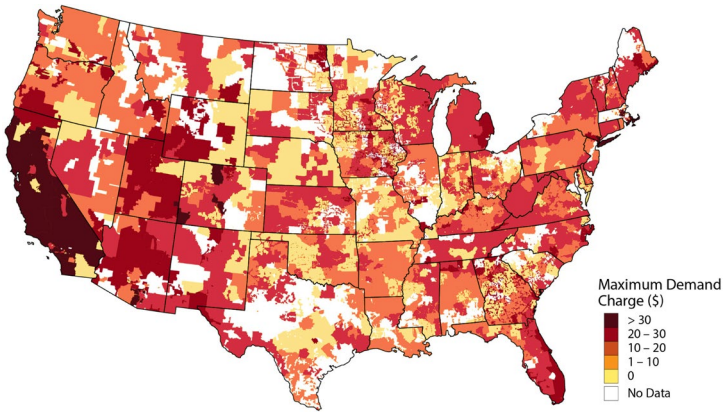
cloudy, it's killing me. And that's the type of problem that occurs right now. You want me to hook up to your house, it's not $5 a month, it's got to be $50 a month.

Arne Hessenbruch: *Can you talk a little bit more about what kinds of businesses are most affected by demand charges right now? For instance, a residential building is probably a bad example because individuals make independent decisions about their energy demand. But many corporations are massively affected by demand charges. What kind of businesses are you dealing with at DemandQ and how are you helping them?*

Gary Morsches: To serve a customer, whether they're big or small, steady loads are simple. It's kind of like driving a car. On cruise control, it's pretty efficient, you just drive. Whereas stop-and-go is very inefficient, and it's tougher on your car. So companies that are just on cruise control—i.e. data centers with constant loads—they still have to pay demand charges, but there's very little they can do about it.

Where companies get caught is when they have a variable load. For most folks, it comes with cooling—electric air conditioning units that turn on and off based on the thermostat and your set point. A lot of these businesses have 7, 10, 20 rooftop units that are independently operating loads and are random as to when they turn on and turn off.



Source: National Renewable Energy Laboratory

The variable load occurs in businesses like retail and restaurants. They have limited working hours, and they have peak demands as well as slow periods. It's the variability in load that nips these folks in the bud. Because they get these lulls, and then at a busy moment, all this equipment turns on at once. That sets that peak, and they have to pay for that peak.

Some utilities have these things called "ratchets." If your ratchet's 12 months, you're going to pay for no less than that peak for 12 months. Some ratchets are 6 months, some are 18 months.

These peaks are usually measured averaged over a 15 minute period. The utility will monitor everybody's usage on 15 minute periods forever, and that peak 15 minute period will wear with you either for a month—or even 12 or 18 months. Consequently, that 15 minute period—which comprised only about 4% of your use—can make up 40% of your bill, not only for the next month but for 12 months. So you need to avoid at all costs that peak setting 15 minute period. And you won't know when that period is.

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Arne Hessenbruch: *But the utility knows. They're looking over your shoulder.*

Gary Morsches: That's right. So when you can sit there and moderate when all these random units occur—i.e, space them out, don't let them all occur at once—you can really reduce that peak and save that money, not only for the next month, but for over a year. That's why peak management is such a critical thing.

It's good to manage your peak no matter what, but it's crucial to manage your peak when your utility has ratchets, because, again, one 15 minute bad period can cost you for a year.

Arne Hessenbruch: *I know a thing or two about data centers, so the analogy might fit. Data centers basically work with load balancers for distributing a lot of visitors on a website among many different machines. Could it be said that DemandQ is basically a demand balancer?*

Gary Morsches: That's exactly right. One other thing—where this patented technology came from was largely around the multiplexing capabilities that phone companies use. You know sometimes you're on the phone and get a little delay for a second? It's nothing wrong with your phone, it's just that the lines are full. The phone utility is sitting there saying, I can't take a million calls at one time, I can only take 800,000 of them. So I'm going to delay; I'm going to reroute calls over here and over there.

There's that little time delay because they're optimizing their system to allow the calls to get through. And it's not all instantaneous. Sometimes there are slow periods, and sometimes it's very very miniscule.

The same thing goes with DemandQ; we're going to sit here and queue all these random—mostly RTU—units to occur so they're not simultaneous. We may delay a unit 2 seconds or 30 seconds to avoid setting that peak. We look at ambient temperatures and ambient humidity. We build this into our algorithms to prevent your set points from being violated. So your customer experience—which is pretty critical in retail—and your operations are not going to be affected in any way.

And that's why DemandQ works; we're taking the signals off the building automation system—signals which are already out there. We send those signals through our algorithms, and then back to the building automation system with instructions on how to orchestrate the variable units. They're run to keep those set points in place while minimizing the peak usage as well as the throughput of that array of RTUs.

"We reduce peak usage by about 30% on those RTU units, and we save about 2-5% in throughput."

We reduce peak usage by about 30% on those RTU units, and we save about 2-5% in throughput. We're actually cycling equipment less as well. We're making sure that we run that equipment more efficiently, more effectively, and reducing wear and tear on that equipment, while maintaining your temperatures.

Arne Hessenbruch: *You used the example of a traditional phone line versus a cell phone line. Basically in the good old days, I picked up the phone, I had a dial tone that very moment. And whether or not I dialed somebody or waited 20 minutes to actually dial, I was blocking a line. That is exactly what's happening with electricity. Whatever plug load I plug in at any given moment, now I just get the energy. But I'm being punished for this if I don't do it wisely. And you do it more wisely, right?*

Gary Morsches: Our technology doesn't just let "dumb" cycling units stack randomly on top of each other. Instead we continuously monitor each unit and the building temperatures. And here's some of the thinking that's going on: Ok this unit's running pretty efficiently and its set point is in good shape, but the next one says kick on. We say, no, don't kick this second unit on, keep that one off, because we'll let the first unit run a little longer. And number one's coolness will dissipate over to number two's area, and meet that set point without turning this one on at all because of the dynamics of the building.

"*Demand mitigation* is a very big buzzword. Every energy management services company touts *demand mitigation*. So what is it?"

We call it tuning a building. We understand how buildings work, when a machine runs, how much cooling it gets in a section. We've got enough data in our databases to understand all this. We tune a building, we deploy DemandQ technology, and we start seeing the savings.

Arne Hessenbruch: *So if I understand all of this correctly, there are different ways to mitigate demand charges. For example, I can use a battery, but there are operational costs and maintenance costs involved. And you're saying your solution is a pure software solution; it basically does the same thing without the investment.*

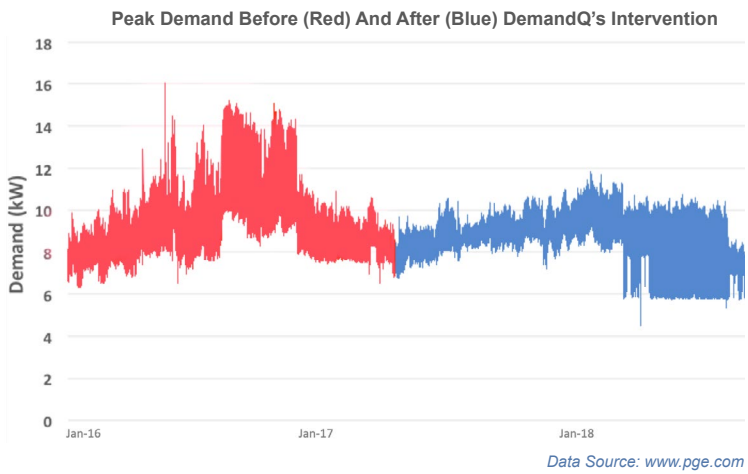
Gary Morsches: There are no equals as far as competitors. "Demand mitigation" is a very big buzzword. Every energy management services company touts "demand mitigation" So what is it?

There are mechanical ways of doing it. You can use a hard cap and put a timer in there, build a schedule, put limits on the BAS, and say you're done. It's simple, it's

cheap, but you're essentially forcing brownouts inside your building. What happens is, I don't care how hot it is in the sporting goods department, you can't turn the air conditioner on. That's bad for building operations and that's bad for the customer experience. It's like putting a governor on a car on a school bus. It can only go 55 no matter what and you want to pass somebody cause they're going 40 on the road, and you can't because you can't get the thing to go faster. That's what this does.

So there are hard caps, there are timers that people use, there are other mechanical things called variable frequency drives, motor controllers essentially that people will put on their compressors to slow them down or speed them up and there are fans in high demand periods.

The problem is now you've got capital costs, and you've got high maintenance and equipment costs on top of that. And it's really difficult to tune that building effectively. There are a lot of people trying to do it. It's very complicated, it doesn't work that well, and you've got maintenance costs.



Another approach is machine to machine communications. In other words, you'll signal, if these two RTUs are on, the third can't be on. It's basically algorithms that will vary machines. But those are expensive. They require equipment—they're invasive, and often conflict with the BAS system. So you're going to get a lot of extra cycling, and you're not going to get the throughput savings. You may even end up using more electricity. People do it. It can reduce demand, but it's not a very efficient solution.

Then there's battery storage. Ten or fifteen years from now, we'll be talking about battery storage as the panacea. It's come a long way, but the costs are still extraordinarily high, and it doesn't do anything for energy efficiency. Battery storage just shifts when you're going up to the grid to pull power, which smooths out demand. From the utility side, that's a good thing: you're lowering the peak demand without impact to your customer experience or operations. But it's very capital intensive. Even with subsidies, it's still very expensive. And you've got siting, safety, and construction burdens, with no efficiency gains whatsoever. I think someday it's going to be a great solution, but we're not there yet.

You've also got distributive energy resources, like solar panels. When it's hot out and the sun's shining, you don't have to go the grid as much. Solar panels supplement demand, and you get free energy out of it too. But it requires high capital investment, and realistically you can't count on shedding demand. If it's hot and humid but cloudy, your solar won't run, and you'll set your peak. In that case, you're going to be paying the same amount for demand charges whether you have solar panels or not. I'm not against distributive energy resources, but they're not a good reliable peak mitigation strategy.

Arne Hessenbruch: *What else is out there besides batteries and somewhat clunky solutions?*

Gary Morsches: I haven't talked about "demand response" which has been a buzzword for many many years. "Demand response" are utilities sponsored programs. Utilities will pay you to mitigate demand when they insist. For example, take a smelting factory. Smelters use a tremendous amount of electricity. They may use as much as a whole power plant's worth of electricity in any given time. So in very hot periods the utility will say, *look smelter, I will pay you a million dollars if I can give you 6 hours notice to shut down for a day*. It's cheaper for a utility to do that than to build another power plant to meet your demand. Payment in exchange for shedding demand is called demand response.

These programs got to be in vogue over the past ten years. They were also abused. People signed up for demand response and were paid. But when the time came to shed load, they didn't do it, and so the utility got themselves in a world of hurt.

If you are a part of a demand response program, you're paid for energy that you don't use during these demand response periods. This can occur zero times a year or fifty times a year—you just don't know. And there are administrative burdens to being in these programs. You've got to meet the utility's needs. They'll say, *now you've got to shed 50 kilowatts. That means: don't run*

your air conditioners for 4 hours. I don't care if your store is 85 degrees, it doesn't matter. If you don't shed this, we will penalize you, and you will be paying me back all the money. I've paid you and maybe even more. It's a sledgehammer, it's disruptive, and it's a lot of burden.

The talk was big on demand response. Utilities thought it was the panacea that was going to save the day, but businesses simply don't want to shut stuff down.

Arne Hessenbruch: *How is what you do at DemandQ different?*

Gary Morsches: What we do is known as Intelligent Demand Optimization, i.e. proven savings and peak reduction. It's a SaaS model which uses information that's already in your building automation system to optimize it with no upfront costs and minimal variable cost to do so. The downside is there can be some compatibility challenges with legacy systems. But once we're good with that, it's very scalable.

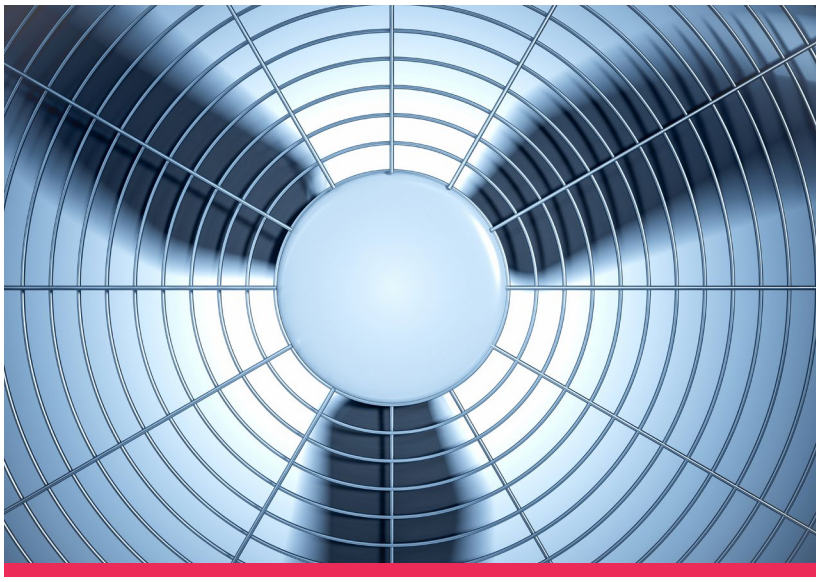
So there are various programs out there. It's a matter of balance: how much do you want to save, how much effort do you want to put into it, how much capital do you want to spend, how easy it for you to do it? That's what people have to weigh. If you do have compatibility with DemandQ, it makes the most sense: it's 24/7, requires no human intervention, and doesn't violate your set points or disrupt your operations.

Arne Hessenbruch: *Let's talk about how DemandQ stacks up against other solutions. Let's say I'm a big retailer with 50 box stores in a particular geographic area. How do I engage with you? Walk me through the process.*

Gary Morsches: We will say, let us prove that we work. We insist on running a pilot. We like to do it at three to five of your sites. Because we have a SaaS-based solution, there's no equipment that's installed. There's no capex involved. The pilot can be set up remotely.

> **"We will say, let us prove that we work."**

So we basically will end up talking. We'll ask you for your bills so we can understand your usage and your cost structure. We'll ask you for an inventory for the RTU systems that you have, what kind of equipment you have, what kind of BAS system you have, and we'll go from there. We'll analyze your information to ensure that we are truly compatible. We'll also want to talk to building maintenance, so that we can get access to everything. We'll want to talk to your security folks, so that we can use the company wifi.



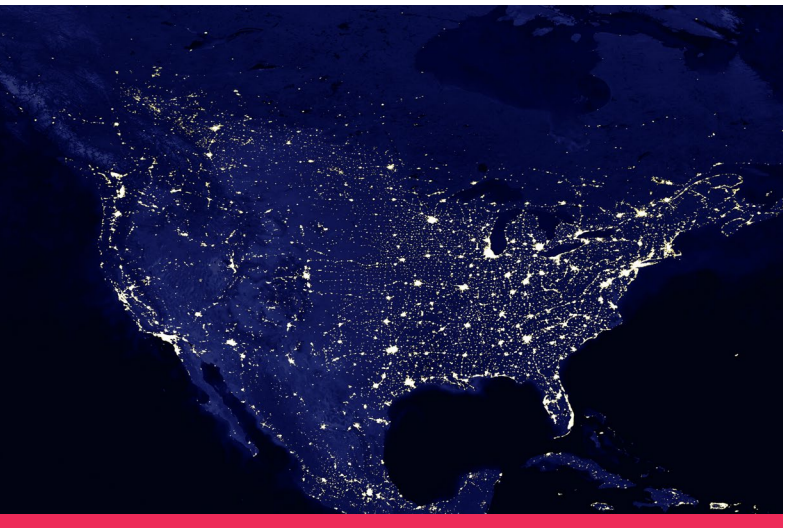
Now just as an aside, that is one of the push backs people have. We sometimes have security people saying, no one is coming onto my wifi no matter how no matter what. We have a SOC 2 certification so that we can be boxed away, and we've worked with banks and other companies with sensitive information without any problem. But if that is a problem, we can use our own dedicated modem outside your company's wifi. There's added cost to that, so it does etch away at some of the gain, but nonetheless if that's what you want, we have a solution for that.

So given that we can get through security ok, and the building automation system is compatible, we're going to run a pilot. During the pilot, we tie our software into your building automation system with, send the instructions from your BAS through our algorithms, and back to your BAS. In other words, we moderate your building automation system, which is going to control your building RTUs. Typically our pilots run about a week or so to get a feel for how your system works.

Arne Hessenbruch: *So you understand the whole dynamic range of my operation?*

Gary Morsches: Right, we "tune" your building. Through this process, we can understand how fast each unit runs, how much it cools, and how that cooling dissipates across the building. This allows us to model and understand how to best optimize. We tune it for about a week, and then we'll run an on-off test, typically for two weeks. That means we'll run it: on for one day and off one day, on one day, and off one day. We'll temperature-normalize

those results to show what advantages DemandQ brings. We'll quantify the kilowatt savings as well as the kilowatt hour savings and figure out the number of cycles that we run to maintain those temperatures. We love to use two buildings in the same city because we can alternate those so you really can eliminate any variables like weather. Then we'll quantify and say, yes, this works, and here are the savings we can get you.



After that, we'll sign a contract. Our contracts are pretty simple. Because we use a SaaS model, there's no fixed term. You can turn us off any time you want. It's all remote anyways. And we feel so confident that the savings are going to justify that you're not going to turn us off—none of our customers turn us off once they have us. Then we simply invoice you a fixed fee at the end of every month, and away we go.

> **"And we feel so confident that the savings are going to justify that you're not going to turn us off."**

Now let's talk a little bit about pricing. Drawing on our experience—**we have installations in 43 million SF in 47 states served by 265 different utilities.** So we have vast experience in this. We know how effective we're going to be given your geography, building type and the equipment systems you have. We typically price things based on square footage, type of buildings, and number of RTUs you have. Our payout generally ranges from 5:1 to 10:1. In other words you save at least 5 times what we charge.

If you don't think it does enough, if we can't prove it to you, we'll give you an M&V report—Measurement and Verification—and you can shut us off, no obligation. Our technology is a cloud-based Saas model and can be remotely deployed and shut down without any on-site visits or equipment adjustments.

Arne Hessenbruch: *So what you're saying is, in essence, there's very little operational risk, nothing is deeply integrated in my system. It's basically a connection between the building automation system and a cloud computer you run. The cloud basically responds with a better, more optimized program than the program that I was already running. If I don't want that more optimized program, I turn it off. There's no operational risk. But that never actually happens because you prove at every single site that, in fact, you create at least six times the savings.*

Gary Morsches: That's a good summary. I would just add that we have a fail safe in there. Should the wifi go down or we lose sync, we turn off and we give back controls to the BAS. So even if worse comes to worse—

Arne Hessenbruch: *Your operation still runs. You might get punished by having to pay the demand charge, but there's no operational risk. So I can sell this to my CIO very easily. I can say, if we fail, we'll just go back to what we had before DemandQ.*

Gary Morsches: Precisely right, yes.

Arne Hessenbruch: *We've talked about retail and cooling. You said pricing depends on the number of rooftop units. If I'm a steel manufacturer, my situation is very different. Can you speak about your experience with this?*

No, you're right—the sweet spot really is retail—big box retail. It's just a good dynamic, and we create a lot of savings for the facility.

I'm an old energy trader, and options theory is basically degrees of freedom. So consequently, the more degrees of freedom we have, the more we can optimize. I.e. the more RTUs we have, we can run those more efficiently than with fewer pieces of equipment. So a sweet spot for us is retail with 7 to 20 RTUs. We really can tune that and really pull out a lot of advantages. We can still be effective with buildings with as few as two RTUs. Businesses like smaller banks and restaurants are still realizing savings on the order of 10% off their electricity bills as well.

I will say one thing, just as an FYI, we do not create additional cooling tonnage. I.e., if your building is undersized to handle extreme temperatures, we can't help you. If you got two RTUs in a restaurant, a fast food

restaurant, and they're running full out in the summer, and your inside temperatures are still too high, that's just too bad. They needed to deal with that when the built the building, they can't be chintzy. We find that a lot, you'd be surprised. Fast food restaurants, that can't cool their inside temperature below 75, even 78 in the summer. Customers do not like that at all. You're running full out for 10 hours a day. In those cases, we've had to say no, we can't help you. There's nothing to optimize there. You know, you're driving your car, and you want to go 120 miles an hour, but you can't get over 100 with the pedal to the metal. We can't help you with that.

> **"If you think about it, when we're reducing the peak hour of the day, that's the dirtiest generation in the supply stack [...] So we reduce your carbon footprint as well."**

But we've had very good results in banks, because they have a lot of cycling load and they have office hours. Fast food, we're good at. We are in the telecommunications field. And another advantage we bring to that is at a lot of these remote sites, cooling is critical.

Arne Hessenbruch: *Because if you don't cool the equipment, it will fail.*

Gary Morsches: So we keep an eye on this equipment. From a maintenance standpoint, we understand when we start seeing when a unit isn't getting the ΔT or the temperature drop that you would expect. We can flag that unit and say, hey, *you better get someone out here, this thing's about to break.* Or, *this unit is not working*. Or *this unit is short cycling—its optimal cycling is a 20 minute through the three stages, yet, you run it and it kicks off after after eight, get somebody out there.*

You'd be surprised how much savings you find when we get into a building, Hey, do you know that you have six RTUs, and five of them are running, And yet your storage room's got the heater going. Or hey, you got these these ventilation fans going. This one is cold, it's cold in the store. And it's taking air back in.

We uncover all kinds of operational issues because we have access to that data. Another benefit is that we reduce cycling. We let the equipment run through its cycles instead of short cycling, on-off, on-off. We typically reduce cycling by 18%, which increases the life of that equipment and reduces maintenance costs. We don't quantify those advantages but there's a real benefit there.

Another benefit is that we improve your sustainability because you're consuming less electricity. If you think about it, when we're reducing the peak hour of the day, that's the dirtiest generation in the supply stack. At the peak, it's going out to the most expensive, dirtiest generating equipment it can get, and we're shaving that down. So we reduce your carbon footprint as well.

Arne Hessenbruch: *I saw that Fraunhofer's USA Center for Sustainable Energy Systems recently reviewed DemandQ and my understanding is it came back very favorable. Can you speak a little bit to what they've actually done, and why they think that DemandQ is actually truly helping with demand charges.*

Gary Morsches: We were part of a study that was actually commissioned by Eversource, the large New England utility. Not to get off track here, but we can bring a lot of benefits to utilities who are under a lot of pressure to reduce their peak demand. Because again, they have to have that infrastructure, the fixed cost to maintain, meet and supply this peak demand. And if they can shave that down, that reduces their cost to serve. Hence that can help lower the bills to their constituents.

So, Eversource, commissioned a study of our technology at a couple of big box stores in Massachusetts. They hired Fraunhofer to independently calculate the M&V, the savings, and ensure that the test was run properly. They showed that DemandQ did in fact work. DemandQ reduced peak demand and reduced energy consumption in those stores.

Arne Hessenbruch: *So not only were demand charges avoided, but on top of this there were net energy savings.*

Gary Morsches: Yes, that's right.

Arne Hessenbruch: *Because devices that were not needed were actually turned off.*

Gary Morsches: And the devices, when they were running, were run more efficiently. And all that was additive to reduce energy throughput, and energy costs. So yes, it was nice to see a third party verify the results.

Arne Hessenbruch: *Do you think there's anything more that we haven't covered yet, and you would like to share with the readers?*

Gary Morsches: Let me think about this. We talked about future things. And I think one, demand charge is going to go up. Secondly, this digital transformation will eliminate

analog systems and closed systems. We're getting out ahead of the technology as more and more things move that way. So this is going to be very supportive of any broader digital transformation effort that a company may be focused on. The Boston Consulting Group just did a study that stated there's about 11 billion IoT devices out right now in the world. They think that by 2030, there's going to be 132 billion. We're just the forefront of this digitalization.

Arne Hessenbruch: *But I would say, adding even more IoT devices would actually make the problems stronger, and hence the need for a solution like DemandQ stronger, because they're all not talking to each other. They basically shout for attention, which for a bigger operation is probably a negative. That tells me there's a higher need for a company like DemandQ in the future.*

Gary Morsches: That's what I'm trying to get at. Yeah, this is only the start of it, we're on the wave of it, you might as well get out ahead of it because it's only to get better. And if you think about it, you know, I'm an engineer, and my old boss said, If you can't measure it, you can't manage it. Okay? And I take it a step further, you know, demand—people don't understand it. So if you if you can't measure it, you can't manage it, and you certainly can't optimize it.

> **"if you can't measure it, you can't manage it, and you certainly can't optimize it."**

Arne Hessenbruch: *That's what Mr. Rogers said: if it's mentionable, it's manageable.*

Gary Morsches: There you go. So you know. That's my story. I'm sticking to it.

Arne Hessenbruch: *Thank you for your time Gary, and good luck with the business.*

About Gary Morsches

Gary Morsches has managed through the deregulation and technology changes in the oil, nat gas, and electricity markets. Asenior executive with expertise in energy, risk management, strategy, marketing, plant operations, asset optimization, new plant construction, business development, and investor relations. He is successful at identifying opportunities and implementing innovations that streamline operations, reduce costs, manage risk, and increase efficiency to generate profits. Gary is currently serving as Chief Executive Officer at DemandQ, Inc.

About Arne Hessenbruch

Arne Hessenbruch is a Lecturer in innovation at MIT and a co-founder of an advisory firm specializing in state-by-state differences in US energy markets. He has written on innovation in the context of long-term (decades) development of markets, and on innovation and hype. He received an MS degree in Physics from the University of Freiburg, and a PhD in History of Science from Cambridge University.

About DEMANDQ

DemandQ is a Watertown, MA venture founded in 2011. DemandQ has introduced a patented method for electricity distribution that reduces utility charges for commercial customers. DemandQ's Intelligent Demand Optimization service is available for immediate delivery, is secure and reliable and seamlessly integrates with building automation systems, electric equipment with networked controls, machine to machine networks, EV charging stations and other emerging technologies to holistically achieve integrated energy efficiency. **For more information, visit www.demandq.com.**

Links: **Fraunhofer Study** | **Gary Morsches on LinkedIn** | **www.demandq.com**