

# Webinar

## On-Site Solar Energy & Real Estate

Date: July 23, 2021

00:00:00 --> 00:00:03: Hello and thanks for joining us for on site,  
 00:00:03 --> 00:00:07: solar energy and real estate webinars sponsored by solar  
 cow.  
 00:00:07 --> 00:00:10: We are very happy that you are here.  
 00:00:10 --> 00:00:11: My name is Michelle Boyd.  
 00:00:11 --> 00:00:15: I am a program manager at the solar Energy Technologies  
 00:00:15 --> 00:00:18: Office at the US Department of Energy.  
 00:00:18 --> 00:00:21: I have been in this role for about 6 years  
 00:00:21 --> 00:00:24: and before I get started with my presentation,  
 00:00:24 --> 00:00:27: I've been asked to provide several housekeeping notes.  
 00:00:27 --> 00:00:30: As usual, participants will be on mute.  
 00:00:30 --> 00:00:35: For the entire webinar. Please enter your question for the  
 00:00:35 --> 00:00:37: panelists in the Q&A at anytime.  
 00:00:37 --> 00:00:41: You can also upvote your questions to help the web  
 00:00:41 --> 00:00:42: and our team,  
 00:00:42 --> 00:00:45: we added interest. Unfortunately, we might not be able to  
 00:00:45 --> 00:00:48: get to all of your questions during this webinar,  
 00:00:48 --> 00:00:51: so we will try to cover as many as possible.  
 00:00:51 --> 00:00:54: And I am very happy to answer questions later or  
 00:00:54 --> 00:00:57: via email or phone after the webinar and my contact  
 00:00:57 --> 00:01:00: information is at the end of my presentation.  
 00:01:00 --> 00:01:05: So next slide please. This is our speakers today.  
 00:01:07 --> 00:01:10: And each one will fix themselves after,  
 00:01:10 --> 00:01:15: say, next slide, please. Sex life is.  
 00:01:17 --> 00:01:20: Had to click a couple times three times,  
 00:01:20 --> 00:01:23: UM, so the mission of the solar office at the  
 00:01:23 --> 00:01:27: US Department of Energy is to accelerate the advancement  
 and  
 00:01:27 --> 00:01:32: deployment of solar technology to support equitable  
 transition to this

00:01:32 --> 00:01:34: carbonizing power sector by 2035.

00:01:34 --> 00:01:36: In order to do this,

00:01:36 --> 00:01:40: our projects and programs conducted research to reduce the cost

00:01:40 --> 00:01:44: of solar electricity to make it affordable accessible for all

00:01:44 --> 00:01:44: Americans.

00:01:44 --> 00:01:47: Enable solar to support the reliability,

00:01:47 --> 00:01:51: resilience and security of the grid and support solar job

00:01:51 --> 00:01:53: growth and manufacturing.

00:01:53 --> 00:01:57: Next slide. For background context,

00:01:57 --> 00:02:00: today there are two things you need to know and

00:02:00 --> 00:02:01: discharge lays them out.

00:02:01 --> 00:02:04: First, solar costs have fallen substantially in the last decade,

00:02:04 --> 00:02:07: and that's shown by the line on this graph and

00:02:07 --> 00:02:10: second came with his deployment of solar has grown grown

00:02:10 --> 00:02:14: dramatically from a couple gigawatts in 2010 to almost 100

00:02:14 --> 00:02:17: gigawatts today. And that's owned by the bars in the

00:02:17 --> 00:02:18: graph.

00:02:18 --> 00:02:21: They thought industry is on track with the boy 118

00:02:21 --> 00:02:23: gigawatts by the end of this year,

00:02:23 --> 00:02:26: making solar one of the fastest growing industries in the

00:02:26 --> 00:02:27: country.

00:02:27 --> 00:02:33: Next slide. Solar PD represents represented 40%

00:02:33 --> 00:02:37: of all new electricity capacity installed in the United States

00:02:37 --> 00:02:38: last year,

00:02:38 --> 00:02:41: and solar technologies now supply over 3%

00:02:41 --> 00:02:44: of the USL Electric. Next slide.

00:02:48 --> 00:02:50: Solar is often categorized as residential,

00:02:50 --> 00:02:54: commercial or utility scale to describe its use.

00:02:54 --> 00:02:58: Unfortunately, there's not a standard definition for these

00:02:58 --> 00:03:03: categories.

00:02:58 --> 00:03:03: But as the three commercial scale solar has the widest

00:03:03 --> 00:03:07: range of commercial use cases such as office buildings,

00:03:07 --> 00:03:10: retail shops, data centers and hotels,

00:03:10 --> 00:03:14: but also hospitals, schools, universities and government

00:03:14 --> 00:03:16: buildings.

00:03:14 --> 00:03:16: In terms of system size,

00:03:16 --> 00:03:20: commercial scale can be defined as anything that really

00:03:20 --> 00:03:23: doesn't.

00:03:20 --> 00:03:23: That doesn't fit into the definition of residential or utility

00:03:23 --> 00:03:24: scale,

00:03:24 --> 00:03:28: which usually is somewhere between 100 collapse and two

00:03:24 --> 00:03:28: megawatts.

00:03:28 --> 00:03:32: Commercial scale solar can be deployed either on a rooftop  
00:03:32 --> 00:03:33: or ground mounted.  
00:03:33 --> 00:03:37: The average commercial solar rooftop system is around 200  
cat,  
00:03:37 --> 00:03:42: 200 kilowatts, while the average ground mounted system is  
about  
00:03:42 --> 00:03:43: 2 1/2 times larger.  
00:03:43 --> 00:03:46: There are two types of commercial sale financing models.  
00:03:46 --> 00:03:48: Generally, there's lots of variations on them,  
00:03:48 --> 00:03:51: but generally first owning the owning the solar power  
generating  
00:03:51 --> 00:03:54: system is 1 model and another model is purchasing the  
00:03:54 --> 00:03:56: solar power from a third party,  
00:03:56 --> 00:03:58: either to our power purchase agreement or,  
00:03:58 --> 00:04:03: for example, a lease. Bye.  
00:04:03 --> 00:04:07: This slide shows the same increase in solar deployment  
overtime  
00:04:07 --> 00:04:09: which we saw a couple slides back,  
00:04:09 --> 00:04:13: but specifically for the commercial segment by the end of  
00:04:13 --> 00:04:14: last year,  
00:04:14 --> 00:04:17: a total of 17 gigawatts of commercial solar had been  
00:04:18 --> 00:04:18: deployed,  
00:04:18 --> 00:04:23: which is a 15 times in times increase over since  
00:04:23 --> 00:04:23: 2020.  
00:04:23 --> 00:04:30: Site. The lease at 2030 cost gold for residential,  
00:04:30 --> 00:04:35: commercial, and utility scale solar commercial scale solar  
costs \$0.39  
00:04:35 --> 00:04:36: per kWh in 2010,  
00:04:36 --> 00:04:41: which decreased to \$0.09 per kWh over the last decade.  
00:04:41 --> 00:04:47: Daily 20-30 Costco for commercial scale solar is \$0.04 per  
00:04:47 --> 00:04:47: kWh.  
00:04:47 --> 00:04:52: Next slide. The cost of solar energy is comprised of  
00:04:52 --> 00:04:55: the cost of the hardware,  
00:04:55 --> 00:04:59: which is such a submodule inverter and racking plus the  
00:04:59 --> 00:05:02: non hardware or what we call the soft costs of  
00:05:02 --> 00:05:04: solar such as permitting installation,  
00:05:04 --> 00:05:08: labor interconnection. Declines to pick costs so up the costs  
00:05:08 --> 00:05:12: as a proportion of the total system costs for each  
00:05:12 --> 00:05:14: of the three segments.  
00:05:14 --> 00:05:16: So residential is in blue commercial group,  
00:05:16 --> 00:05:20: up in red and utility scale in green.  
00:05:20 --> 00:05:25: Soft costs for commercial solar had become a larger  
percentage

00:05:25 --> 00:05:27: of total PV system costs.

00:05:27 --> 00:05:30: Overtime increasing from 33% in 2020.

00:05:30 --> 00:05:32: Excuse me 2010 to 55%

00:05:32 --> 00:05:37: in 2020. While stock has had decreased over the time,

00:05:37 --> 00:05:40: they just haven't decreased as fast as the hardware cost

00:05:40 --> 00:05:44: reductions and does have become a larger percentage of the

00:05:44 --> 00:05:45: total system cost.

00:05:45 --> 00:05:52: Next slide. There are multiple pathways towards achieving our 2030

00:05:52 --> 00:05:55: commercial solar cost goals.

00:05:55 --> 00:06:01: This waterfall chart shows one potential route which requires improvements

00:06:01 --> 00:06:06: both in hardware costs but also significant reductions in softcopy

00:06:06 --> 00:06:09: PD degradation rates and costs of capital.

00:06:09 --> 00:06:14: Next slide. The next three slides are specifically addressing corporate

00:06:14 --> 00:06:15: solar installations,

00:06:15 --> 00:06:18: a subsite subsegments of commercial scale solar.

00:06:18 --> 00:06:21: The data and graphs are from an annual report series

00:06:21 --> 00:06:26: called solar means business by the solar Energy Industries Association.

00:06:26 --> 00:06:30: In 2019, Walmart installed more solar than any other business,

00:06:30 --> 00:06:34: followed by Facebook, Google, Microsoft and Target.

00:06:34 --> 00:06:38: Apple and Amazon, however, have the most solar installed total.

00:06:38 --> 00:06:40: In the real estate industry,

00:06:40 --> 00:06:46: specifically Prologis, Brookfield, property, Retail and Brookfield Properties retail have

00:06:46 --> 00:06:50: the most cumulative installed solar capacity that's shown in the

00:06:50 --> 00:06:51: green bars here.

00:06:51 --> 00:06:54: And by State, California continues to lead in commercial solar

00:06:54 --> 00:06:55: with New Jersey,

00:06:55 --> 00:07:01: New York and Massachusetts. Also in the top ten states.

00:07:01 --> 00:07:10: That's right. Most corporate solar installations have been completed in

00:07:10 --> 00:07:12: the past five years,

00:07:12 --> 00:07:15: with about 2/3 of them deployed on site and the

00:07:15 --> 00:07:17: remaining third offsite.

00:07:17 --> 00:07:24: That's life. In terms of financing models,

00:07:24 --> 00:07:27: power purchase agreements with third parties are growing.

00:07:27 --> 00:07:31: Segment of commercial scale solar in large part because

00:07:31 --> 00:07:33: Ppa's  
00:07:33 --> 00:07:37: offer low upfront investments,  
00:07:37 --> 00:07:40: limited risk and predictable long term electricity rates.  
00:07:40 --> 00:07:44: However, many companies that choose to own their solar  
00:07:44 --> 00:07:47: system  
00:07:47 --> 00:07:49: in order to retain the solar renewable energy credits or  
00:07:52 --> 00:07:54: what's called S Rex and that allow them to meet  
00:07:54 --> 00:07:58: their company environmental goals. Next slide.  
00:07:58 --> 00:08:02: So the team that I need at the solar office  
00:08:02 --> 00:08:05: is called the strategic analysis and institutional support team  
00:08:05 --> 00:08:08: and  
00:08:08 --> 00:08:09: we focus on the development and demonstration of  
00:08:09 --> 00:08:11: innovative ideas  
00:08:11 --> 00:08:14: to reduce solar power, costs and other barriers to solar  
00:08:14 --> 00:08:18: deployment,  
00:08:18 --> 00:08:21: as well as on the replication of successful solutions across  
00:08:21 --> 00:08:25: the country.  
00:08:25 --> 00:08:26: We also have a Technical Support.  
00:08:26 --> 00:08:30: We also have a number of technical assistance programs to  
00:08:30 --> 00:08:31: help stakeholders to develop and replicate their solutions.  
00:08:31 --> 00:08:34: One program is the solar Energy Innovation Network,  
00:08:34 --> 00:08:39: or FBINSCIM was developed as a structure to enable  
00:08:39 --> 00:08:41: research  
00:08:41 --> 00:08:44: on a range of soft costs.  
00:08:44 --> 00:08:46: Depending on the needs identified by the local or regional  
00:08:46 --> 00:08:48: stakeholders.  
00:08:48 --> 00:08:50: Participating teams receive correct funding,  
00:08:50 --> 00:08:53: technical assistance and peer networking to facilitate that  
00:08:53 --> 00:08:54: particular learning  
00:08:54 --> 00:08:59: and social outcomes.  
00:08:59 --> 00:09:03: The current round three of the program has a topic  
00:09:03 --> 00:09:07: on advancing equity in commercial scope,  
00:09:07 --> 00:09:11: solar deployment in underserved communities.  
00:09:11 --> 00:09:14: While we are at the preliminary,  
00:09:14 --> 00:09:16: we are at the primary stage of selecting projects and  
00:09:16 --> 00:09:20: will be announcing the selections,  
00:09:20 --> 00:09:22: hopefully in the fall. Nexcite in the prior round of  
00:09:22 --> 00:09:24: FBI on one project tackled the relative lack of community  
00:09:24 --> 00:09:26: solar installed on commercial rooftops in NYC.  
00:09:26 --> 00:09:28: The team, led by the City of New York City,  
00:09:28 --> 00:09:30: University of New York, included the utility Con Ed and  
00:09:30 --> 00:09:32: the real Estate Board of New York,  
00:09:32 --> 00:09:34: and they developed a blueprint for overcoming barriers to the

00:09:20 --> 00:09:24: installation of community solar on commercial and industrial rooftops in

00:09:24 --> 00:09:27: New York City and modeled economics of community solar from

00:09:27 --> 00:09:30: the perspective of the host sites.

00:09:30 --> 00:09:32: So the final outputs of this for outputs of this

00:09:32 --> 00:09:34: project will be released soon,

00:09:34 --> 00:09:36: and I encourage you to keep an eye out for

00:09:36 --> 00:09:37: those next slide.

00:09:40 --> 00:09:43: Another technical assistance program led by the solar office is

00:09:43 --> 00:09:45: the national Community Solar Partnership,

00:09:45 --> 00:09:49: which is a coalition of stakeholders working to expand access

00:09:49 --> 00:09:52: to affordable community solar by 2025 while also advancing other

00:09:52 --> 00:09:56: community benefits such as increased resilience and workforce development.

00:09:56 --> 00:10:00: This partnership provides network infrastructure to engage with COA staff

00:10:00 --> 00:10:04: and other partners collaboratives that address barriers to solar adoption

00:10:04 --> 00:10:08: through peer learning and technical assistance over a period of

00:10:08 --> 00:10:10: two years, as well as.

00:10:10 --> 00:10:13: Individual technical assistance for support on unique local challenges.

00:10:13 --> 00:10:16: You can sign up to be a partner which is

00:10:16 --> 00:10:18: free at the four offices website.

00:10:18 --> 00:10:23: Next slide. And so here is my contact information.

00:10:23 --> 00:10:25: I urge you to reach out if you have any

00:10:25 --> 00:10:25: one,

00:10:25 --> 00:10:28: had any conversations or have further questions that we can't

00:10:29 --> 00:10:31: address today on the web and R and I would

00:10:31 --> 00:10:33: like to pass this off as their ability from each

00:10:33 --> 00:10:35: XY partners. Thank you so very much.

00:10:38 --> 00:10:42: Thanks, Michelle. Thank you to the Urban Land Institute for having me today.

00:10:42 --> 00:10:44:

00:10:44 --> 00:10:48: I'm Sarah Doherty. I'm a sustainability and ESG associate at

00:10:48 --> 00:10:52: HXT Partners and excited to talk today about how renewables

00:10:52 --> 00:10:56: and solar projects are helping portfolio managers in the real

00:10:56 --> 00:11:00: estate industry realized their broader ESG or environmental and social

00:11:00 --> 00:11:01: governance strategies.

00:11:01 --> 00:11:05: Next slide. Quick background on HC,

00:11:05 --> 00:11:08: wherein ESG advisory services firm.

00:11:08 --> 00:11:12: We help our clients develop and implement sustainability and ESG

00:11:12 --> 00:11:12: strategies.

00:11:12 --> 00:11:17: Next slide. And we're really focused on an investor driven

00:11:17 --> 00:11:19: approach to ESG.

00:11:19 --> 00:11:23: So starting with investor priorities and then helping our clients

00:11:23 --> 00:11:27: develop strategies and implement those things and also get credit

00:11:27 --> 00:11:28: for their efforts.

00:11:28 --> 00:11:32: So we're in the thick of reporting season right now.

00:11:32 --> 00:11:35: But the the ultimate goal is to help clients get

00:11:35 --> 00:11:39: get rewarded and recognized for their work next.

00:11:41 --> 00:11:43: So what is ESG? UM,

00:11:43 --> 00:11:46: you may have heard of it.

00:11:46 --> 00:11:50: It's really taken off in the last especially six months

00:11:50 --> 00:11:54: with merging regulations in the US and also in Europe.

00:11:54 --> 00:11:58: It's a holistic framework for evaluating and managing your risks

00:11:58 --> 00:11:59: to environmental,

00:11:59 --> 00:12:03: social and governance factors. And it's constantly changing fields.

00:12:03 --> 00:12:07: But really, what we're seeing investors focus on in terms

00:12:07 --> 00:12:12: of the environmental criteria is climate risk and especially.

00:12:12 --> 00:12:15: How you reduce your emissions and so a huge part

00:12:15 --> 00:12:19: of that strategy and what we're talking about today is

00:12:19 --> 00:12:21: by implementing solar renewable projects,

00:12:21 --> 00:12:25: and those have real rolled up benefits to your ESG

00:12:25 --> 00:12:27: strategy on the social side.

00:12:27 --> 00:12:30: Diversity and inclusion is a major priority,

00:12:30 --> 00:12:32: and on the governance side,

00:12:32 --> 00:12:35: we're increasingly seeing investors care about how boards and also

00:12:36 --> 00:12:39: management incorporate oversight or climate related risks.

00:12:39 --> 00:12:44: Next slide. So how did we get here?

00:12:44 --> 00:12:48: Corporate sustainability has been around for a long time,

00:12:48 --> 00:12:52: but recently there's been a major uptick and financial commitment

00:12:53 --> 00:12:56: due to Larry Fink at Black Black Rock talking about

00:12:56 --> 00:13:00: climate change is here to stay as an investor priority

00:13:00 --> 00:13:04: large institutional investors. Pension funds are really requiring that companies

00:13:04 --> 00:13:06: disclose their ESG priorities.

00:13:06 --> 00:13:09: the US also reentering the Paris climate agreements.

00:13:09 --> 00:13:12: The SEC is considered considering regulating ESG.

00:13:12 --> 00:13:15: Disclosure is the same way they do financial disclosures,

00:13:15 --> 00:13:18: so there's really a lot of movement in this field.

00:13:18 --> 00:13:22: Next slide. And all of this momentum has really led

00:13:23 --> 00:13:27: to what amounts to be sort of an overwhelming landscape

00:13:27 --> 00:13:32: for the different guidance and reading and ranking systems

00:13:32 --> 00:13:34: there

00:13:32 --> 00:13:34: are out there. So really,

00:13:34 --> 00:13:37: what we see investors caring most about is from a

00:13:37 --> 00:13:39: guidance perspective.

00:13:39 --> 00:13:43: Sasmi the sustainability, Accounting Standards Board and

00:13:39 --> 00:13:43: TCF the task

00:13:43 --> 00:13:45: force for climate related financial disclosures.

00:13:45 --> 00:13:48: And then the ratings and rankings.

00:13:48 --> 00:13:50: CDP which is focused on climate change.

00:13:50 --> 00:13:54: Impacts in Graz, which I'll talk about in a minute

00:13:54 --> 00:13:55: for the real estate industry.

00:13:55 --> 00:13:58: And then there are all the data aggregators which are

00:13:58 --> 00:14:02: taking data from these different ratings and rankings and

00:13:58 --> 00:14:02: generating

00:14:02 --> 00:14:05: ESG scores that investors use to make their decisions.

00:14:05 --> 00:14:10: Next slide. And so really for the for the real

00:14:10 --> 00:14:11: estate industry,

00:14:11 --> 00:14:15: investors used to be just focused on asset level certifications,

00:14:15 --> 00:14:18: so we'd Energy Star where the big priorities,

00:14:18 --> 00:14:21: but we're now seeing this focus shift to more of

00:14:21 --> 00:14:23: a portfolio consideration,

00:14:23 --> 00:14:26: and so grasp is really the the main benchmarking system.

00:14:26 --> 00:14:30: There's over 4.1 trillion and gross asset value invested in

00:14:30 --> 00:14:30: Graz.

00:14:30 --> 00:14:34: And that's really what we focus with our clients on

00:14:34 --> 00:14:35: next slide.

00:14:38 --> 00:14:41: And so how does solar fit into this whole picture

00:14:41 --> 00:14:44: in terms of the environmental criteria?

00:14:44 --> 00:14:47: A huge part of SG is reducing your emissions.

00:14:47 --> 00:14:51: And on a societal level this is a huge part

00:14:51 --> 00:14:55: of keeping us below the 1.5 degree warming threshold that

00:14:55 --> 00:14:59: we need to to achieve our net zero goals.

00:14:59 --> 00:15:02: And it used to be that investors really just cared

00:15:02 --> 00:15:06: about your scope one and scope two direct emissions.

00:15:06 --> 00:15:08: So the real estate industry.



00:15:08 --> 00:15:11: Your buildings and the emissions that are generated from the

00:15:11 --> 00:15:13: electricity that you use,

00:15:13 --> 00:15:17: but increasingly we're seeing investors care about emissions along the

00:15:17 --> 00:15:19: value chain or your scope three emissions.

00:15:19 --> 00:15:22: So the the indirect emissions that come from your tenants,

00:15:22 --> 00:15:25: which is a huge consideration for the.

00:15:25 --> 00:15:28: Net lease space where you may not have operational control

00:15:28 --> 00:15:29: over your building,

00:15:29 --> 00:15:33: but you're still expected to report on your scope three

00:15:33 --> 00:15:34: emissions next slide.

00:15:36 --> 00:15:39: And so there's a number of different financing models.

00:15:39 --> 00:15:43: Michelle talked about different tax incentives and programs at the

00:15:43 --> 00:15:44: federal level.

00:15:44 --> 00:15:47: Also at the local and state level.

00:15:47 --> 00:15:50: And I think that the main takeaway that I wanted

00:15:50 --> 00:15:54: to talk about today is sort of this onsite versus

00:15:54 --> 00:15:55: offsite strategy,

00:15:55 --> 00:15:59: so owners property managers can utilize both owner financed and

00:15:59 --> 00:16:02: operating leases to pay for solar installations up front,

00:16:02 --> 00:16:06: which obviously have benefits because you're increasing your property values.

00:16:06 --> 00:16:09: By owning your assets, you're able to use your own

00:16:09 --> 00:16:12: power and only pay for additional electricity.

00:16:12 --> 00:16:15: If you're using an excess of what you generate,

00:16:15 --> 00:16:18: but there's also trade offs you have to pay the

00:16:18 --> 00:16:19: maintenance costs.

00:16:19 --> 00:16:23: There can be large cap ex and bank financing costs

00:16:23 --> 00:16:23: up front,

00:16:23 --> 00:16:26: and So what we're really seeing is,

00:16:26 --> 00:16:31: as Michelle mentioned, is a move towards power purchase agreements

00:16:31 --> 00:16:34: which if you go to the next slide.

00:16:34 --> 00:16:38: You can see is is really what a lot of

00:16:38 --> 00:16:40: the best in class,

00:16:40 --> 00:16:43: especially in the REIT real estate investment trust.

00:16:43 --> 00:16:47: Based on these these companies are there purchasing energy off

00:16:47 --> 00:16:51: site so they're entering into these power purchase agreements and

00:16:51 --> 00:16:55: using that energy to power their properties and using the

00:16:55 --> 00:16:59: savings from that power purchase the lower rates that they're  
00:17:00 --> 00:17:03: getting through PS to be reinvested to build.  
00:17:03 --> 00:17:07: Solar infrastructure for their sites overtime so Kilroy best in  
00:17:07 --> 00:17:07: class.  
00:17:07 --> 00:17:11: Had a mission of being carbon neutral by 2020 and  
00:17:11 --> 00:17:16: they have installed solar on 15 of their properties which  
00:17:16 --> 00:17:19: is only generating currently a small 3%  
00:17:19 --> 00:17:21: of their total energy use.  
00:17:21 --> 00:17:25: But they have this offsite PPA that will be developed  
00:17:25 --> 00:17:28: by 2023 that when complete will provide for all of  
00:17:28 --> 00:17:31: their directly managed energy needs.  
00:17:31 --> 00:17:35: Its next slide. And Sarah will talk a little bit  
00:17:36 --> 00:17:39: more about Cornell strategy moving forward,  
00:17:39 --> 00:17:43: but we're also sort of seeing how this plays out  
00:17:43 --> 00:17:45: at a broader level,  
00:17:45 --> 00:17:48: so Cornell is really focused their solar strategy on where  
00:17:48 --> 00:17:52: they're purchasing their energy from and have a partnership.  
00:17:52 --> 00:17:56: A New York statewide consortium where they're partnering  
with other  
00:17:56 --> 00:17:59: academic institutions to enter into large scale PPS.  
00:17:59 --> 00:18:03: And in doing so are actually creating a green economy  
00:18:03 --> 00:18:04: around solar generation.  
00:18:04 --> 00:18:08: So they're really funding new plants to be opened and  
00:18:08 --> 00:18:12: also helping to reduce the rates and reduce barriers for  
00:18:12 --> 00:18:17: homeowners and other smaller skill purchasers to be able to  
00:18:17 --> 00:18:21: buy their own solar, and so that wraps up my  
00:18:21 --> 00:18:23: presentation.  
00:18:23 --> 00:18:25: And go to the next slide.  
00:18:25 --> 00:18:27: I feel free to get in touch with us.  
00:18:27 --> 00:18:30: Harriette Razzor founder wasn't able to make it here today,  
00:18:30 --> 00:18:33: but hope to talk with all of you about any  
00:18:33 --> 00:18:35: projects or things that you're interested in.  
00:18:35 --> 00:18:35: Thanks.  
00:18:41 --> 00:18:44: Hi, my name is Joel Halpern,  
00:18:44 --> 00:18:47: I'm the managing director of investments that help in real  
00:18:47 --> 00:18:51: estate ventures were a real estate investment and  
development platform.  
00:18:51 --> 00:18:54: We've done about a billion dollars of real estate and  
00:18:54 --> 00:18:58: development over the past decade and currently have about  
four  
00:18:58 --> 00:19:01: projects under development now in opportunity zones.  
00:19:01 --> 00:19:05: We we recently completed our first solar project about two  
00:19:05 --> 00:19:09: or three years ago and we're developing a new multi

00:19:09 --> 00:19:09: family.

00:19:09 --> 00:19:13: Project now and planning for rooftop solar and wanted to

00:19:13 --> 00:19:17: take this opportunity to talk through from the developer's point

00:19:17 --> 00:19:18: of view.

00:19:18 --> 00:19:20: You know why? Consider solar,

00:19:20 --> 00:19:24: what to consider and dumb and how to implement it

00:19:24 --> 00:19:26: during the development phase.

00:19:26 --> 00:19:29: There are a few considerations for you know why to

00:19:29 --> 00:19:32: go down the route of solar power for your project.

00:19:32 --> 00:19:35: Some you know, one could be sustainability goals at the

00:19:35 --> 00:19:37: at the company or portfolio level,

00:19:37 --> 00:19:42: or even just for the for the project level itself.

00:19:42 --> 00:19:45: You know the one of the most obvious is you

00:19:45 --> 00:19:47: know cash flow.

00:19:47 --> 00:19:50: If you're able to save on operating expenses and improve

00:19:50 --> 00:19:52: the bottom line from it,

00:19:52 --> 00:19:56: it helps to make the decision to go go down

00:19:56 --> 00:19:57: solar.

00:19:57 --> 00:20:00: Another another reason to consider solar,

00:20:00 --> 00:20:04: particularly for multifamily projects and more so now in an

00:20:04 --> 00:20:06: office is is is marketing.

00:20:06 --> 00:20:10: You know, tenants want to live and work in buildings

00:20:10 --> 00:20:12: that come from you know,

00:20:12 --> 00:20:17: our sustainability friendly and and provide you a better place

00:20:18 --> 00:20:19: to work and live.

00:20:19 --> 00:20:25: If. What to consider for making the decision that there

00:20:25 --> 00:20:30: are a few key items that I would touch on

00:20:30 --> 00:20:35: the most important that we see which you know.

00:20:35 --> 00:20:38: Would lead to whether you go down the route or

00:20:38 --> 00:20:42: not is the local utility rates most of our development

00:20:42 --> 00:20:46: is in the New York metro area where utility rates

00:20:46 --> 00:20:49: are are very high, so it's an easy decision to

00:20:49 --> 00:20:51: go down the solar out.

00:20:51 --> 00:20:55: We also do development in Colorado in Denver and the

00:20:55 --> 00:20:59: utility rates that are lower so the the benefits are

00:21:00 --> 00:21:01: not as strong.

00:21:01 --> 00:21:03: That, coupled with the utility rates,

00:21:03 --> 00:21:06: you also need to consider both the state and federal

00:21:06 --> 00:21:08: incentive programs from the state.

00:21:08 --> 00:21:11: Programs vary from state to state.

00:21:11 --> 00:21:15: You know, for example, New York provides a you know

00:21:15 --> 00:21:19: rebate in the first year for significant portion of the

00:21:19 --> 00:21:20: system costs.

00:21:20 --> 00:21:25: New York is where we did our first solid project.

00:21:25 --> 00:21:29: We're doing our second project in New Jersey and the

00:21:29 --> 00:21:33: state program in New Jersey does not provide an upfront

00:21:34 --> 00:21:34: rebate,

00:21:34 --> 00:21:39: but provides some revenue on a yearly basis.

00:21:39 --> 00:21:41: In addition to the state incentives,

00:21:41 --> 00:21:44: federal incentives to consider you know,

00:21:44 --> 00:21:45: or the federal tax credits,

00:21:45 --> 00:21:47: and the accelerated depreciation programs.

00:21:50 --> 00:21:52: In addition to the financial side,

00:21:52 --> 00:21:56: the incentives and the utility rates.

00:21:56 --> 00:21:59: Which route you go is also a big consideration.

00:21:59 --> 00:22:02: You can purchase a system out right now,

00:22:02 --> 00:22:04: which is a larger upfront capital expense,

00:22:04 --> 00:22:07: but you know better, better return over to overtime.

00:22:07 --> 00:22:11: You can lease the equipment and put it on your

00:22:11 --> 00:22:15: rooftop or you can lease your roof to A to

00:22:15 --> 00:22:19: a third party and purchase power back from them.

00:22:19 --> 00:22:23: So now I'm going to dive into two case studies.

00:22:23 --> 00:22:25: Our first project in the Merrimack,

00:22:25 --> 00:22:28: New York and our current project in Jersey City and

00:22:29 --> 00:22:33: talk about some difficulties and considerations of when to

00:22:33 --> 00:22:35: implement

00:22:35 --> 00:22:40: these solid the the solar design.

00:22:40 --> 00:22:42: Come next slide, please. Set up on the screen is

00:22:42 --> 00:22:45: our project in Mamaroneck,

00:22:45 --> 00:22:49: NY. We did 100 unit multifamily development.

00:22:49 --> 00:22:53: Uhm? And which we completed in 2018.

00:22:53 --> 00:22:55: So we we implemented solar here actually while we were

00:22:55 --> 00:22:59: under construction and there were.

00:22:59 --> 00:23:02: There were some challenges that we.

00:23:02 --> 00:23:03: That we came across largely to the time that we

00:23:03 --> 00:23:05: implemented it.

00:23:05 --> 00:23:09: These were wood frame buildings,

00:23:09 --> 00:23:12: so you know the biggest challenge we have with structural.

00:23:12 --> 00:23:15: We did not design for the live load of putting

00:23:15 --> 00:23:19: a ballasted system on this roof,

00:23:19 --> 00:23:19: and we were constrained with going with a mechanically

00:23:19 --> 00:23:19: attached

00:23:19 --> 00:23:19: system,

00:23:19 --> 00:23:23: which led to some additional costs and resulted in in

00:23:23 --> 00:23:27: less panels on the roof in addition to the structural considerations.

00:23:27 --> 00:23:28:

00:23:28 --> 00:23:32: The placement of our equipment on the roof and our roof vents and drains were not ideally located from for planning for solar.

00:23:32 --> 00:23:35:

00:23:35 --> 00:23:37:

00:23:39 --> 00:23:43: So after after we implemented during construction we were able

00:23:44 --> 00:23:48: to achieve 120 M kW mechanically attached system which is fully up and running.

00:23:48 --> 00:23:49:

00:23:49 --> 00:23:54: Now it was about a \$300,000 system cost.

00:23:54 --> 00:23:57: Which will which will have a seven year payback,

00:23:57 --> 00:24:02: actually about 50% of our upfront costs we've received back by year two through the New York State rebate program and the federal incentive programs.

00:24:02 --> 00:24:05:

00:24:05 --> 00:24:08:

00:24:08 --> 00:24:11: On an annual basis moving forward,

00:24:11 --> 00:24:15: we are achieving now about \$20,000 of annual utility savings, and we expect that to increase going forward as local utility rates also increase.

00:24:15 --> 00:24:20:

00:24:20 --> 00:24:23:

00:24:23 --> 00:24:26: On the bottom of the screen to shows in the the layout of the solar system for the project.

00:24:26 --> 00:24:29:

00:24:29 --> 00:24:33: Next slide, please. And we could talk about our Jersey City project.

00:24:33 --> 00:24:34:

00:24:34 --> 00:24:37: So taking some of the lesson lessons that we learned on a romantic development,

00:24:38 --> 00:24:39:

00:24:39 --> 00:24:44: we decided that we were going to do solar for our new project in Jersey City.

00:24:44 --> 00:24:47:

00:24:47 --> 00:24:50: While we were in the concept design phase,

00:24:50 --> 00:24:54: so as we progressed the design for this building,

00:24:54 --> 00:24:57: we went out and we engaged with with solar Cal who is our solar consultant and we worked with a UM with an engineer to design A solar system while we were in constant schematic design here.

00:25:01 --> 00:25:05:

00:25:05 --> 00:25:08:

00:25:08 --> 00:25:12: So so doing so allowed us to design the structure of the building to support a balanced system to provide more flexibility.

00:25:12 --> 00:25:16:

00:25:16 --> 00:25:17:

00:25:17 --> 00:25:22: Moving forward and dumb, it allowed us to strategically place our mechanical equipment to to not encumber the the layout of the of the solar system.

00:25:22 --> 00:25:27:

00:25:27 --> 00:25:29:

00:25:29 --> 00:25:33: So this project is going to be starting construction in in a couple of months from now and dumb we we anticipate to be able to achieve about a 250 kW system. So about double the size of our prior

00:25:33 --> 00:25:35:

00:25:35 --> 00:25:38:

00:25:38 --> 00:25:43:

00:25:43 --> 00:25:44: project.

00:25:44 --> 00:25:48: Our system costs here is 400 seventy \$5000 are projected

00:25:48 --> 00:25:51: to be and given the program that New Jersey has,

00:25:51 --> 00:25:53: which is actually, you know,

00:25:53 --> 00:25:57: better than what we see for UM.

00:25:57 --> 00:26:00: For New York as well as lock utility rates in

00:26:00 --> 00:26:01: New Jersey,

00:26:01 --> 00:26:05: we anticipate being able to achieve a four year payback

00:26:05 --> 00:26:09: here versus the seven year from our prior project.

00:26:09 --> 00:26:13: The the two components of of revenue going forward,

00:26:13 --> 00:26:19: we anticipate about \$35,000 of annual utility savings from the

00:26:19 --> 00:26:20: solar power itself.

00:26:20 --> 00:26:23: And as I mentioned earlier,

00:26:23 --> 00:26:27: New Jersey has an annual payout for their incentive

00:26:27 --> 00:26:30: program.

00:26:27 --> 00:26:30: UM, it's the programs. Actually,

00:26:30 --> 00:26:33: I believe it just changed.

00:26:33 --> 00:26:36: So it it used to be higher,

00:26:36 --> 00:26:40: but going forward from now we anticipate for chiva about

00:26:40 --> 00:26:45: 25,000 manual of annual savings through the through the

00:26:45 --> 00:26:45: incentive

00:26:45 --> 00:26:45: program.

00:26:45 --> 00:26:48: Uhm so so with that I'm going to pass it

00:26:48 --> 00:26:51: off to Sarah Zemanek from Cornell University.

00:26:56 --> 00:27:01: Great, thanks Joel. Thanks everybody.

00:27:01 --> 00:27:04: Thanks ULI for. Invited me to speak.

00:27:04 --> 00:27:08: I'm Sarah Carson. Dominic I'm the director of sustainability at

00:27:08 --> 00:27:09: Cornell.

00:27:09 --> 00:27:12: And I've been asked to talk to you today a

00:27:12 --> 00:27:16: little bit about how rooftop solar fits into our overall

00:27:16 --> 00:27:17: energy strategy,

00:27:17 --> 00:27:20: why we think it's a good idea and sound financial

00:27:20 --> 00:27:21: decision.

00:27:21 --> 00:27:25: And I'll give you some numbers about some of our

00:27:25 --> 00:27:26: projects generation.

00:27:26 --> 00:27:32: And economics. Show next please.

00:27:32 --> 00:27:35: It's kind of interesting, as are Cornell,

00:27:35 --> 00:27:37: our founder. As famously said,

00:27:37 --> 00:27:42: I would found it institution where any person can find

00:27:42 --> 00:27:44: instruction in any study.

00:27:44 --> 00:27:48: Next but as we have discovered with those great ambitions

00:27:48 --> 00:27:51: comes some pretty great emissions.

00:27:51 --> 00:27:54: This is a kind of a fun chart,

00:27:54 --> 00:27:56: an aerial of our campus.

00:27:56 --> 00:28:01: Those red bars represent the volume of greenhouse gas emissions

00:28:01 --> 00:28:05: associated with the energy used in each of our buildings

00:28:05 --> 00:28:06: and as a major research.

00:28:06 --> 00:28:10: One institution of interesting facts you know in our cold

00:28:10 --> 00:28:11: climate,

00:28:11 --> 00:28:15: we use about one one thousandth of the entire New

00:28:15 --> 00:28:16: York State.

00:28:16 --> 00:28:22: Electric demand, so our carbon neutrality goal set back in

00:28:22 --> 00:28:23: 2007 is.

00:28:23 --> 00:28:27: Are you challenging? Another fun fact.

00:28:27 --> 00:28:29: We have many fume hoods on campus,

00:28:29 --> 00:28:33: each fume hood, which I think we have upwards of

00:28:33 --> 00:28:37: 3000 each fume hood alone uses the equivalent of three

00:28:37 --> 00:28:39: homes worth of energy.

00:28:39 --> 00:28:44: Next slide, please. Alright, as I mentioned,

00:28:45 --> 00:28:47: we are committed to carbon neutrality.

00:28:47 --> 00:28:51: We have a greenhouse gas emissions inventory that we

00:28:51 --> 00:28:52: update

00:28:51 --> 00:28:52: annually.

00:28:52 --> 00:28:55: I'm starting it from a baseline in 2008,

00:28:55 --> 00:28:59: which includes what were shown in the previous slide,

00:28:59 --> 00:29:02: our scope one and scope two emissions as well as

00:29:02 --> 00:29:03: commuting daily,

00:29:03 --> 00:29:06: commuting by faculty, staff and students,

00:29:06 --> 00:29:08: and university funded air travel.

00:29:08 --> 00:29:10: So we're making pretty good progress.

00:29:10 --> 00:29:12: I'd say we're probably about 35%

00:29:12 --> 00:29:15: reduction versus our baseline last year.

00:29:15 --> 00:29:17: Course was impacted by COVID.

00:29:17 --> 00:29:22: Nobody was here, so we used a lot less energy.

00:29:22 --> 00:29:25: But there's a lot more information on our our goal

00:29:25 --> 00:29:28: and our greenhouse gas inventories on our website.

00:29:28 --> 00:29:30: If you're interested in that.

00:29:30 --> 00:29:35: Next slide, please. So our our overarching strategy to

00:29:35 --> 00:29:38: achieve

00:29:35 --> 00:29:38: our goal of reducing those emissions.

00:29:38 --> 00:29:41: We just looked at 20 by 2035 is.

00:29:41 --> 00:29:43: I think this is pretty standard.

00:29:43 --> 00:29:46: We first looked to avoid carbon intensive activities,

00:29:46 --> 00:29:50: then reduce the carbon intensity of what we're doing.

00:29:50 --> 00:29:53: So we have a really aggressive energy conservation

program.

00:29:53 --> 00:29:56: That's where we that's what we look first,

00:29:56 --> 00:30:00: so. We've spent about 30 or \$40 million on those

00:30:00 --> 00:30:04: efforts on our campus over the last five to 10

00:30:04 --> 00:30:05: years,

00:30:05 --> 00:30:08: but with the effect that we look at the way

00:30:08 --> 00:30:11: our campus has grown in the last.

00:30:11 --> 00:30:13: Few decades we have added about 15%

00:30:13 --> 00:30:17: in square footage, but our energy used today is actually

00:30:17 --> 00:30:19: lower than it was 20 years ago.

00:30:19 --> 00:30:23: So it's a really effective and important first strategy.

00:30:23 --> 00:30:25: And once we've done that,

00:30:25 --> 00:30:27: then we start to look at replacing fossil fuels with

00:30:28 --> 00:30:31: low carbon renewable energy that includes our on site,

00:30:31 --> 00:30:34: solar of course. And then we'll have to offset some,

00:30:34 --> 00:30:38: I'm sure, but we work really hard also to engage

00:30:38 --> 00:30:39: our campus.

00:30:39 --> 00:30:43: Residents to help us avoid and reduce those emissions in

00:30:43 --> 00:30:44: the first place.

00:30:44 --> 00:30:45: Next slide,

00:30:45 --> 00:30:49: please. Alright,

00:30:49 --> 00:30:53: kind of drilling into our energy picture so those would

00:30:53 --> 00:30:57: be those scope one and scope two emissions focusing on

00:30:57 --> 00:30:59: the energy used by our buildings.

00:30:59 --> 00:31:02: That's about 2/3 of our overall emission inventory.

00:31:02 --> 00:31:05: We're thinking about not only electricity about,

00:31:05 --> 00:31:09: also cooling and heating our campus so this slide just

00:31:09 --> 00:31:13: gives you a general vision that we already have a

00:31:13 --> 00:31:14: really cool project.

00:31:14 --> 00:31:19: Lake source cooling to address clearly needs on campus.

00:31:19 --> 00:31:22: You can see our little lead logo over the buildings

00:31:22 --> 00:31:26: on campus kind of indicating our approach towards energy

00:31:26 --> 00:31:29: efficiency

00:31:29 --> 00:31:33: and we have a really exciting deep direct use geothermal

00:31:33 --> 00:31:36: project that we're advancing with the help of our friends

00:31:36 --> 00:31:40: at the DOE for heating campus without learning something.

00:31:40 --> 00:31:42: And then of course, we're looking toward renewables for

00:31:42 --> 00:31:45: electricity.

00:31:45 --> 00:31:49: We have several existing solar projects.

00:31:49 --> 00:31:49: We have an on campus run of river hydro plant,

00:31:49 --> 00:31:49: and hopefully we'll be able to add someone to our

00:31:49 --> 00:31:54: portfolio.

00:31:49 --> 00:31:54: As well. Next slide, please.



00:31:54 --> 00:31:58: Uhm alright, so drilling a little closer to rooftop solar  
 00:31:58 --> 00:32:00: in terms of electricity needs,  
 00:32:00 --> 00:32:04: I said we have a hydro plant.  
 00:32:04 --> 00:32:11: We have at this point close to 30 megawatts of  
 00:32:11 --> 00:32:12: solar PV.  
 00:32:12 --> 00:32:16: Whether it's a little we have about 100 kW on  
 00:32:16 --> 00:32:20: site and most of that is either offsite on PPA,  
 00:32:20 --> 00:32:22: solar farms on Cordell own property,  
 00:32:22 --> 00:32:26: or we have supported a community solar farm also on  
 00:32:26 --> 00:32:30: Cornell owned property that is about 18 megawatts.  
 00:32:30 --> 00:32:35: But that leaves a pretty good chunk of remaining need.  
 00:32:35 --> 00:32:39: Our overall plan is to be kind of opportunistic and  
 00:32:39 --> 00:32:45: innovative as regulatory environment changes as different  
 incentives are available  
 00:32:45 --> 00:32:48: that grids change and technology is evolving,  
 00:32:48 --> 00:32:52: but we've actually maxed out what we can do with  
 00:32:52 --> 00:32:58: offsite distributed energy and also through Community solar  
 under New  
 00:32:58 --> 00:33:00: York State policy.  
 00:33:00 --> 00:33:03: And and tariffs, so we are in order to meet  
 00:33:03 --> 00:33:05: this remaining need pursuing all options.  
 00:33:05 --> 00:33:07: We're looking at large scale renewables.  
 00:33:07 --> 00:33:11: This one in this previous presenters mentioned as well as  
 00:33:11 --> 00:33:14: maximizing on site both rooftops and now we're looking at  
 00:33:14 --> 00:33:18: parking canopy's and those are limited scale relative to our  
 00:33:18 --> 00:33:21: overall needs. We think it's really important to pursue all  
 00:33:21 --> 00:33:25: solutions and that's also important to our community in terms  
 00:33:25 --> 00:33:28: of engagement and visibility that we're doing as much as  
 00:33:28 --> 00:33:32: we can on site. And I was also helping us  
 00:33:32 --> 00:33:36: comply with a new local stretch energy code.  
 00:33:36 --> 00:33:42: Next slide, please. Alright, as I mentioned,  
 00:33:42 --> 00:33:46: we do have about 100 kW of existing rooftop solar.  
 00:33:46 --> 00:33:49: You see some pictures of those systems here,  
 00:33:49 --> 00:33:52: including it's mostly ballasted ripped out.  
 00:33:52 --> 00:33:55: But we do have some fun.  
 00:33:55 --> 00:33:59: For building integrated PV and a couple of skylights on  
 00:33:59 --> 00:34:01: one of our newer buildings.  
 00:34:03 --> 00:34:07: And we think if we covered every viable rooftop on  
 00:34:07 --> 00:34:08: campus,  
 00:34:08 --> 00:34:10: you know, taking into account some,  
 00:34:10 --> 00:34:15: you know. Historic preservation needs some of the ages of  
 00:34:15 --> 00:34:16: our roofs,

00:34:16 --> 00:34:19: roofing materials, insulation, shade, all those things.

00:34:19 --> 00:34:22: We think that we could generate about 1%

00:34:22 --> 00:34:24: of our campus power needs.

00:34:24 --> 00:34:28: But remember, we're pretty energy intense with our part.

00:34:28 --> 00:34:31: Research operations and lab fume hoods,

00:34:31 --> 00:34:34: but that's just kind of the.

00:34:34 --> 00:34:37: The Cornell scale for rooftop next slide

00:34:37 --> 00:34:43: please. Alright, so

00:34:43 --> 00:34:48: come NCRE rooftop solar case study so that that acronym

00:34:48 --> 00:34:54: stands for our North Campus residential expansion project.

00:34:54 --> 00:34:57: It's kind of worked out for Cornell that what is

00:34:57 --> 00:35:01: most practical is for us to put solar on new

00:35:01 --> 00:35:01: roofs.

00:35:01 --> 00:35:04: We have some constraint just with ongoing operations in

00:35:04 --> 00:35:08: buildings,

00:35:08 --> 00:35:08: and you know, it's against some of the previous speakers

00:35:08 --> 00:35:08: mentioned.

00:35:08 --> 00:35:12: Sometimes roofs aren't laid out very well with like you

00:35:12 --> 00:35:12: know,

00:35:12 --> 00:35:17: other events and penetration and penthouses further

00:35:17 --> 00:35:20: equipment you know

00:35:17 --> 00:35:20: or the roofs are of an age that it doesn't

00:35:20 --> 00:35:23: make sense to put them on but but for now

00:35:23 --> 00:35:25: new buildings are. Where we're targeting,

00:35:25 --> 00:35:29: so we have this. Really exciting residential expansion project.

00:35:29 --> 00:35:33: 5 new residence halls. We worked with solar Cal also

00:35:33 --> 00:35:36: as our consultant to help us develop and manage the

00:35:36 --> 00:35:40: RFP process to meet our campus specific requirements and

00:35:40 --> 00:35:43: also

00:35:40 --> 00:35:43: to help us navigate. What is a really complex and

00:35:43 --> 00:35:45: rapidly changing local,

00:35:45 --> 00:35:47: state and federal policy and incentive environments.

00:35:47 --> 00:35:51: So they were just really helpful in keeping track of

00:35:52 --> 00:35:56: all those moving pieces and help us put together something

00:35:56 --> 00:35:59: that made sense for our campus.

00:35:59 --> 00:36:00: So our goal was to,

00:36:00 --> 00:36:02: you know, maximize this solar.

00:36:02 --> 00:36:04: Try to make as much progress,

00:36:04 --> 00:36:07: or that carbon neutrality goal as possible.

00:36:07 --> 00:36:10: Uh, by thinking about the sustainability triple bottom line,

00:36:10 --> 00:36:14: uh, we are also looking to at least break even

00:36:14 --> 00:36:15: financially.

00:36:15 --> 00:36:18: And at Cornell, what that means is that I,

00:36:18 --> 00:36:22: a Miss project manager, did not have any access to  
00:36:22 --> 00:36:23: capital.  
00:36:23 --> 00:36:26: No access to debt, not authorized to pay any premium  
00:36:26 --> 00:36:31: for renewable power and expectation to obtain their  
renewable energy  
00:36:31 --> 00:36:35: credits that we need to claim them on our greenhouse  
00:36:35 --> 00:36:37: gas inventory, and to the extent possible,  
00:36:37 --> 00:36:41: access to the the system physically and to its data  
00:36:42 --> 00:36:44: to support academic interest.  
00:36:44 --> 00:36:45: So we're pretty pathetic customer.  
00:36:45 --> 00:36:49: I would say your friends at solar cow would definitely  
00:36:49 --> 00:36:50: agree with that.  
00:36:50 --> 00:36:52: But we decided to go forward.  
00:36:52 --> 00:36:56: Then with the PPA structure of power purchase agreement  
that  
00:36:56 --> 00:36:57: was described earlier.  
00:36:57 --> 00:37:01: If that meets kind of our financial expectations.  
00:37:01 --> 00:37:05: And also it somewhat offsets UM our existing exposure to  
00:37:06 --> 00:37:08: variability in the energy market,  
00:37:08 --> 00:37:13: so that's that's an interesting aspect to explore in terms  
00:37:13 --> 00:37:19: of the benefits that the power purchase agreements provides.  
00:37:19 --> 00:37:24: So after putting all of our needs and requirements and  
00:37:24 --> 00:37:27: local laws and state policy and.  
00:37:27 --> 00:37:29: Interconnection agreements into a bag.  
00:37:29 --> 00:37:32: A week I came up with about a one MW  
00:37:32 --> 00:37:34: projects which supplies about 35%  
00:37:34 --> 00:37:39: of those residence halls electricity needs and so that they  
00:37:39 --> 00:37:41: include not only rooms but a dining hall,  
00:37:41 --> 00:37:45: and then also a teaching kitchen so it has a  
00:37:45 --> 00:37:47: little bit higher energy needs,  
00:37:47 --> 00:37:50: probably within a typical residence hall would,  
00:37:50 --> 00:37:53: but certainly less than our leveling.  
00:37:53 --> 00:37:56: And as I mentioned, we decided to go with a  
00:37:56 --> 00:37:58: pretty standard power purchase agreement.  
00:37:58 --> 00:38:03: We get the power and the renewable energy credits.  
00:38:03 --> 00:38:07: We were looking to meet our campus build energy rate.  
00:38:07 --> 00:38:10: We actually have a combined heat and power plan on  
00:38:10 --> 00:38:14: campus and generate most of our own electricity.  
00:38:14 --> 00:38:17: So we were working within sort of our our campus  
00:38:17 --> 00:38:22: grid framework in terms of interconnection as well as  
economics.  
00:38:22 --> 00:38:25: And one of the really nice things about that power  
00:38:26 --> 00:38:30: purchase agreement is that the developer then is responsible

for  
00:38:30 --> 00:38:33: operations and maintenance so that you know also made our  
00:38:33 --> 00:38:38: facilities folks happy. With select health help,  
00:38:38 --> 00:38:42: we received 5 proposals with some different options for us  
00:38:42 --> 00:38:46: to consider different term lengths whether we wanted a flat  
00:38:46 --> 00:38:48: or escalating price.  
00:38:48 --> 00:38:51: Interestingly, the escalating price turn out to be,  
00:38:51 --> 00:38:54: we thought, based on financial modeling,  
00:38:54 --> 00:38:59: the most economic. Sure, so that's what we went forward  
00:38:59 --> 00:39:00: with.  
00:39:04 --> 00:39:06: Uhm? OK, next slide please.  
00:39:09 --> 00:39:15: Some other factors that went into our analysis and selection.  
00:39:15 --> 00:39:17: Of course we're trying to maximize the overall benefit,  
00:39:17 --> 00:39:19: and so sometimes that means that.  
00:39:19 --> 00:39:22: The lowest price doesn't actually come.  
00:39:22 --> 00:39:24: The thing that we want,  
00:39:24 --> 00:39:27: right? We're interested in this bullet says,  
00:39:27 --> 00:39:29: are quadruple bottom line goals.  
00:39:29 --> 00:39:34: So that incorporates kind of the typical sustainability bottom  
line  
00:39:34 --> 00:39:34: of,  
00:39:34 --> 00:39:36: you know, planetary benefits people.  
00:39:36 --> 00:39:40: So the community benefits. And prosperity so that how does  
00:39:41 --> 00:39:45: it perform financially as well as our academic purpose?  
00:39:45 --> 00:39:48: We usually consider. So I think I mentioned that there  
00:39:48 --> 00:39:52: is an expectation that projects that we do will be  
00:39:52 --> 00:39:56: available to our faculty and students for research and  
academic  
00:39:56 --> 00:39:59: purposes. So we have created a fairly large matrix of  
00:39:59 --> 00:40:00: criteria,  
00:40:00 --> 00:40:04: you know. I'm kind of subdivided into those four headers  
00:40:04 --> 00:40:08: of the quadruple bottom line and a qualitative scoring and  
00:40:08 --> 00:40:11: weighting matrix that we use in addition to just the  
00:40:11 --> 00:40:15: straight up economics. And then of course we want to  
00:40:15 --> 00:40:16: minimize risk.  
00:40:16 --> 00:40:19: So we we thought about what is our economic threshold,  
00:40:19 --> 00:40:22: you know, for us we need to at least break  
00:40:22 --> 00:40:22: even.  
00:40:22 --> 00:40:26: And are there any dealbreakers or fatal flaws about the  
00:40:26 --> 00:40:30: project that would be something that wouldn't be a good  
00:40:30 --> 00:40:31: fit for Cornell?  
00:40:31 --> 00:40:34: Uhm, and we consider each project sort of as an  
00:40:34 --> 00:40:37: element of our overall energy portfolio.

00:40:37 --> 00:40:41: So as I mentioned, the ability to offset some exposure

00:40:41 --> 00:40:44: that we may have in energy market from our other

00:40:44 --> 00:40:48: assets or or purchase contracts is useful.

00:40:48 --> 00:40:52: EPA structure I think helps us minimize risk as well.

00:40:52 --> 00:40:56: Uhm, you know. And then we think about OK,

00:40:56 --> 00:40:59: what could possibly go wrong and in the worst case

00:40:59 --> 00:41:00: scenario,

00:41:00 --> 00:41:03: do we have some kind of financial reserves or commodity

00:41:03 --> 00:41:04: reserve?

00:41:04 --> 00:41:07: You know that we can use such that being with

00:41:07 --> 00:41:08: disruption,

00:41:08 --> 00:41:12: you know in our. You know market return from the

00:41:12 --> 00:41:16: PPA structure you know is is not going to upset

00:41:16 --> 00:41:18: the entire university budgets,

00:41:18 --> 00:41:21: so those are all things to think about in terms

00:41:22 --> 00:41:24: of how these projects fit in your overall.

00:41:26 --> 00:41:33: Set of needs. Alright, uhm.

00:41:33 --> 00:41:38: Next slide please, I just have left some some pictures

00:41:38 --> 00:41:40: about the project.

00:41:42 --> 00:41:45: Yeah, so we know. Here's the here's the design you

00:41:45 --> 00:41:46: know.

00:41:46 --> 00:41:50: We have to think about interconnection points for their ballots

00:41:50 --> 00:41:53: are the right way to go with a particular roofing

00:41:53 --> 00:41:55: system that we've chosen.

00:41:55 --> 00:41:58: We're actually thinking about some ways in which the

00:41:58 --> 00:42:02: ballasted

00:42:02 --> 00:42:07: systems kind of complicated roof maintenance and roof

00:42:07 --> 00:42:10: inspection.

00:42:10 --> 00:42:14: So you not only think about kind of these upfronts.

00:42:14 --> 00:42:16: Installation issues in costs, but your ability to operate and

00:42:18 --> 00:42:20: maintain your new year building and your roofing systems

00:42:20 --> 00:42:25: that

00:42:26 --> 00:42:26: are that are under the solar array.

00:42:26 --> 00:42:27: I'm yeah as well as,

00:42:27 --> 00:42:28: uh, you know the fire code and other risk penetration

00:42:28 --> 00:42:29: issues.

00:42:29 --> 00:42:31: See you next slide please.

00:42:31 --> 00:42:35: We're excited that the drawings are now becoming reality.

00:42:35 --> 00:42:38: You can see the solar panels starting to fill out

00:42:38 --> 00:42:39: on that.

00:42:39 --> 00:42:41: That building right in the middle.

00:42:41 --> 00:42:44: This is sort of our bucolic campus here in upstate

00:42:44 --> 00:42:46: New York with Kaiser Lake in the background.

00:42:46 --> 00:42:49: But the all the buildings.

00:42:49 --> 00:42:54: To the north of the building that with the white.

00:42:54 --> 00:42:57: Buildings to the north with the right routes will all

00:42:57 --> 00:42:58: be covered in solar.

00:42:58 --> 00:43:02: That's phase one of this residential expansion project and then

00:43:02 --> 00:43:03: there are some buildings.

00:43:03 --> 00:43:05: Phase two that aren't underway yet,

00:43:05 --> 00:43:08: and my next slide is the last.

00:43:08 --> 00:43:11: A close up of of what they look like with

00:43:11 --> 00:43:14: the you know the ballasted system.

00:43:16 --> 00:43:18: The other thing is my slides.

00:43:18 --> 00:43:22: I see in the chat there's a question.

00:43:25 --> 00:43:30: Something about a question about a depreciation.

00:43:30 --> 00:43:33: Either are. Michelle, that one that you want to take.

00:43:37 --> 00:43:37: You

00:43:37 --> 00:43:42: are so dumb. Starting my video here.

00:43:45 --> 00:43:48: There we go come so I am not that appreciation

00:43:48 --> 00:43:52: expert but I did put in a link to information

00:43:52 --> 00:43:53: from the solar energy,

00:43:53 --> 00:43:58: innovation, solar Energy Industries Association and in a quick search

00:43:58 --> 00:44:00: I saw that there is a lot.

00:44:00 --> 00:44:03: There are a lot of online tools to help you

00:44:03 --> 00:44:04: figure that out,

00:44:04 --> 00:44:07: so I'll let other folks who've actually done project developments

00:44:08 --> 00:44:10: recently addressed any other additional information.

00:44:15 --> 00:44:19: Anybody? Alright, so I'm happy to follow up with you

00:44:19 --> 00:44:20: separately.

00:44:20 --> 00:44:23: Uhm, it's it's. It is not an area that we

00:44:23 --> 00:44:25: install office work on a regular basis.

00:44:28 --> 00:44:30: Yeah, I guess

00:44:30 --> 00:44:34: uh, if depreciation, sorry if they mean like financial depreciation

00:44:34 --> 00:44:37: of the system you know and how that's you know,

00:44:37 --> 00:44:41: modeled economically or depreciation in generation we anticipate a about

00:44:41 --> 00:44:44: a half a percent degradation in generation year over year,

00:44:44 --> 00:44:47: and then the kind of the specifics about you know

00:44:47 --> 00:44:50: how the developer you know depreciates things.

00:44:50 --> 00:44:55: You know, for their tax purposes or monetizing those tax

00:44:55 --> 00:44:56: credits.

00:44:56 --> 00:44:58: Do solar Cal or if they're on the phone,  
00:44:58 --> 00:45:01: someone could could take that one right.  
00:45:01 --> 00:45:02: Follow up as you said,  
00:45:02 --> 00:45:02: Michelle.  
00:45:04 --> 00:45:07: Yeah, happy to follow up from it.  
00:45:07 --> 00:45:09: I was assuming it meant makers financial depreciation,  
00:45:09 --> 00:45:13: but that was the system so.  
00:45:13 --> 00:45:15: Alright, one of the questions we have here,  
00:45:15 --> 00:45:19: UM. Sarah, you have a question about you mentioned  
maxxing  
00:45:19 --> 00:45:23: out of off-site generating capacity based on New York State  
00:45:24 --> 00:45:24: Reg.  
00:45:24 --> 00:45:27: Could you describe these in a little more detail?  
00:45:28 --> 00:45:30: Yeah, uhm, sure, so uh,  
00:45:30 --> 00:45:35: I guess maybe I'll think about it and kind of  
00:45:35 --> 00:45:36: three big buckets,  
00:45:36 --> 00:45:39: one being distributed energy resources.  
00:45:39 --> 00:45:43: RDR II being community distributed generation or CDG.  
00:45:43 --> 00:45:48: And then the third being a really large scale renewable  
00:45:48 --> 00:45:49: energy.  
00:45:49 --> 00:45:52: So it's a New York State has a state goal.  
00:45:52 --> 00:45:56: Our let's see. We just recently passed the CL CPA,  
00:45:56 --> 00:45:58: the climate, leadership and Community Protection Act,  
00:45:58 --> 00:46:02: which set some pretty aggressive goals at the state level  
00:46:02 --> 00:46:03: for achieving 100%  
00:46:03 --> 00:46:06: clean energy by 2040. So,  
00:46:06 --> 00:46:11: uh, there are. You know policies from our Public Service  
00:46:11 --> 00:46:13: Commission to support that.  
00:46:13 --> 00:46:16: But they they also they they support,  
00:46:16 --> 00:46:18: and they also limit an individual entity.  
00:46:18 --> 00:46:21: So distributed energy projects are limited in size.  
00:46:21 --> 00:46:25: It could be at this point no bigger than five  
00:46:25 --> 00:46:26: megawatts.  
00:46:26 --> 00:46:33: On the different interconnection tariffs also stipulates how  
many projects.  
00:46:33 --> 00:46:39: From an offsite distributed, any resource can be attributed  
back  
00:46:39 --> 00:46:40: to a single.  
00:46:40 --> 00:46:43: Are and there are that is also limited at 5  
00:46:43 --> 00:46:45: megawatts at this point.  
00:46:45 --> 00:46:48: So my campus has a 35 MW meter,  
00:46:48 --> 00:46:50: so I see that you can see how A5 MW  
00:46:50 --> 00:46:53: cap on distributed energy,

00:46:53 --> 00:46:56: a little bit of a limit on what we can  
00:46:56 --> 00:46:57: do in that category.  
00:46:57 --> 00:47:01: So we have built out.  
00:47:01 --> 00:47:04: You know all the all the projects that we can  
00:47:04 --> 00:47:07: kind of soaked up are what we call satellite capacity  
00:47:08 --> 00:47:10: and just under distributed energy.  
00:47:10 --> 00:47:13: There's a similar kind of cap on a single entity  
00:47:13 --> 00:47:18: or a single meter participating in community distributed  
generation in  
00:47:19 --> 00:47:20: New York State.  
00:47:20 --> 00:47:23: Kind of complex without going into too many details,  
00:47:23 --> 00:47:28: and you know, a single community project can only any.  
00:47:28 --> 00:47:31: Single entity can only offtake up to 40%  
00:47:31 --> 00:47:35: of. Pacific Community Distributed Energy project.  
00:47:35 --> 00:47:39: And single entity is limited to participating with only one  
00:47:39 --> 00:47:40: community solar project.  
00:47:40 --> 00:47:42: So again I can have,  
00:47:42 --> 00:47:46: you know 40% of a 5 MW project and only  
00:47:46 --> 00:47:47: one of those.  
00:47:47 --> 00:47:51: So there's a sort of a capacity limit on what  
00:47:51 --> 00:47:53: anyone entity can do there.  
00:47:53 --> 00:47:57: So we're now looking to large scale renewable energy  
projects  
00:47:57 --> 00:47:58: you know,  
00:47:58 --> 00:48:02: and trying to navigate kind of a changing policy environment  
00:48:02 --> 00:48:05: in New York State around that as well,  
00:48:05 --> 00:48:07: so that's. Little more color into.  
00:48:09 --> 00:48:10: Where our limits are.  
00:48:12 --> 00:48:15: There is also a question as I'm some someone is  
00:48:15 --> 00:48:16: Cornell,  
00:48:16 --> 00:48:18: patient pays taxes and it's it's that came into the  
00:48:18 --> 00:48:19: model.  
00:48:21 --> 00:48:25: Uhm? Yes and no. So even though Cornell is a  
00:48:25 --> 00:48:31: not for profit educational entity and therefore technically tax  
exempt.  
00:48:31 --> 00:48:34: We're actually the I think the largest taxpayer in our  
00:48:35 --> 00:48:35: county,  
00:48:35 --> 00:48:38: so anyways, but so yes or no,  
00:48:38 --> 00:48:41: again, is answer to that with our our solar projects  
00:48:41 --> 00:48:43: and it depends how they're structured.  
00:48:43 --> 00:48:47: So the the Community solar project that we supported,  
00:48:47 --> 00:48:49: the way that one is structured.  
00:48:49 --> 00:48:52: They negotiated a pilot agreement with our local taxation



authorities.

00:48:52 --> 00:48:55: New York State is a home real state.

00:48:55 --> 00:48:59: I don't, so things probably a little bit different in

00:48:59 --> 00:49:00: other states.

00:49:00 --> 00:49:05: And we're currently kind of working through some issues around

00:49:05 --> 00:49:08: whether PPA solar farms you know,

00:49:08 --> 00:49:13: and Cornell and property that just serve Cornell's academic interests

00:49:13 --> 00:49:15: are taxable or not.

00:49:17 --> 00:49:20: So we do not pay taxes on the rooftop.

00:49:20 --> 00:49:23: Solar, which is actually the subject of this of this

00:49:23 --> 00:49:23: webinar,

00:49:23 --> 00:49:26: so maybe that's the simplest answer if the if the

00:49:26 --> 00:49:28: building underneath it is stacked exempt.

00:49:28 --> 00:49:31: So far the solar system on the top of it

00:49:31 --> 00:49:33: has also been tax exempt.

00:49:36 --> 00:49:38: Thank you come. There's one person has a hand in

00:49:38 --> 00:49:39: hand raised.

00:49:39 --> 00:49:41: Can we unmute them to ask a question?

00:49:45 --> 00:49:47: Hi there, this is Serena.

00:49:47 --> 00:49:50: Begin with solar count. Just wanted to answer the question

00:49:50 --> 00:49:51: about depreciation.

00:49:51 --> 00:49:55: So if you are the owner of the solar system,

00:49:55 --> 00:49:59: you can actually depreciate the entire system cost in the

00:49:59 --> 00:49:59: first year,

00:49:59 --> 00:50:00: if that's helpful.

00:50:03 --> 00:50:16: Thank you. Alright. Uhm? We have a question about uhm.

00:50:18 --> 00:50:22: Question about the Safeway. To dispose or reuse used batteries,

00:50:22 --> 00:50:25: and this is an area that DELE is putting significant

00:50:25 --> 00:50:28: research funding into to try to further the reuse and

00:50:28 --> 00:50:30: recycle of used batteries.

00:50:30 --> 00:50:34: So I sent a couple links around in the Q&A,

00:50:34 --> 00:50:36: but I'm happy to follow up.

00:50:36 --> 00:50:39: This is not an area again that I am focused

00:50:39 --> 00:50:39: on,

00:50:39 --> 00:50:43: but there are plenty of people at daily that are

00:50:43 --> 00:50:46: and so I'm happy to put you in touch with

00:50:46 --> 00:50:48: those people who's like more information.

00:50:51 --> 00:50:56: And we got a question about how come.

00:50:56 --> 00:51:00: About how the federal incentive programs work.

00:51:00 --> 00:51:02: For real estate developers, for root,

00:51:02 --> 00:51:06: for a roof, leasing for.

00:51:06 --> 00:51:09: For solar and I put in a fact sheet from

00:51:09 --> 00:51:11: the Department of Anti.

00:51:11 --> 00:51:15: Come in on the investment tax credit into the into

00:51:15 --> 00:51:16: the Q&A.

00:51:16 --> 00:51:19: I I would note that the ITC goes to the

00:51:19 --> 00:51:23: system owner if they and so just wanna make that

00:51:23 --> 00:51:24: clear.

00:51:24 --> 00:51:29: It doesn't go to the to the roof research.

00:51:29 --> 00:51:32: And For more information about state incentives,

00:51:32 --> 00:51:34: I also put a link in for the desire database

00:51:34 --> 00:51:38: with constructive these kinds of incentives at the state level,

00:51:38 --> 00:51:41: which are not the same as the federal.

00:51:41 --> 00:51:44: So I don't have anybody else on the panel.

00:51:44 --> 00:51:46: Has anything else to add please?

00:51:53 --> 00:51:54: Right, uh,

00:51:54 --> 00:51:56: like I guess I would just say,

00:51:56 --> 00:51:59: UM for US. UM, that the PPA model was critical

00:52:00 --> 00:52:03: to be able to monetize the federal tax benefits because

00:52:03 --> 00:52:05: as a not for profit,

00:52:05 --> 00:52:08: of course we don't have much of a tax liability.

00:52:08 --> 00:52:12: So working with a third party partner who could monetize

00:52:12 --> 00:52:15: those was what made the projects economically viable for us.

00:52:18 --> 00:52:20: Yes, and I thank you for that clarification,

00:52:20 --> 00:52:22: 'cause it's not that the ITC can't be monetized,

00:52:22 --> 00:52:25: it just needs to be done differently.

00:52:25 --> 00:52:26: Thank you for clarifying that.

00:52:28 --> 00:52:32: Come any other questions here that we want to ask?

00:52:32 --> 00:52:36: There's a question about. Net Zero is a goal.

00:52:36 --> 00:52:40: How much onsite battery storage is necessary to

accommodate a

00:52:40 --> 00:52:43: net zero building using some of the projects in this

00:52:43 --> 00:52:45: presentation as a comparative?

00:52:45 --> 00:52:50: Did any did any of you look at battery storage?

00:52:50 --> 00:52:53: And if you look at data

00:52:53 --> 00:52:57: storage in your project and we've looked at battery storage,

00:52:57 --> 00:53:01: UM integrated with solar and then stand alone has not

00:53:01 --> 00:53:03: made great economic sense yet,

00:53:04 --> 00:53:07: we're where we sit in upstate New York.

00:53:07 --> 00:53:11: We have kind of what I think is unfortunately,

00:53:11 --> 00:53:13: low grid electric prices. We have,

00:53:13 --> 00:53:17: you know, kind of. Said by a glut of fracked

00:53:17 --> 00:53:21: gas from our neighboring states to the South,  
00:53:21 --> 00:53:23: so battery storage is tough economically.  
00:53:23 --> 00:53:26: You know to meet our kind of quadruple bottom line  
00:53:26 --> 00:53:27: criteria,  
00:53:27 --> 00:53:30: but I sort of typing an answer depending how you  
00:53:30 --> 00:53:34: think about net zero and how you define that.  
00:53:34 --> 00:53:36: If you're talking about net zero energy,  
00:53:36 --> 00:53:40: then my understanding and interpretation is that as long as  
00:53:40 --> 00:53:41: you are on site,  
00:53:41 --> 00:53:45: systems are generating as much electricity as you're using  
on  
00:53:45 --> 00:53:46: an annual basis.  
00:53:46 --> 00:53:50: But that meets the criteria of net zero.  
00:53:50 --> 00:53:54: There are kind of different ways to think about.  
00:53:54 --> 00:53:58: Net 0 but in terms of net zero electricity.  
00:53:58 --> 00:54:03: Technically, onsite storage wouldn't be required from our  
perspective.  
00:54:06 --> 00:54:09: Set out onto the goal setting piece for.  
00:54:09 --> 00:54:13: Net zero. We're seeing the science based targets initiative is  
00:54:13 --> 00:54:17: really becoming the standard for how developers set their  
emissions  
00:54:17 --> 00:54:18: reductions,  
00:54:18 --> 00:54:21: so having it actually certified by a third party.  
00:54:21 --> 00:54:26: The science based targets initiative is really where the ball  
00:54:26 --> 00:54:26: is going,  
00:54:26 --> 00:54:29: not just having your own your own target.  
00:54:35 --> 00:54:37: At the Department of Energy,  
00:54:37 --> 00:54:40: there's a lot of work from in our Buildings office,  
00:54:40 --> 00:54:42: on Net zero, and they have great information on their  
00:54:42 --> 00:54:43: website as well.  
00:54:46 --> 00:54:49: On the next question, what software to tools do you  
00:54:49 --> 00:54:53: use to both model the designing systems and what tools  
00:54:53 --> 00:54:55: for the financial modeling?  
00:54:55 --> 00:54:57: Any takers on that one?  
00:55:02 --> 00:55:05: For EST did it not,  
00:55:05 --> 00:55:08: not quite for the financial modeling piece,  
00:55:08 --> 00:55:11: but some financial incentives. I guess.  
00:55:11 --> 00:55:15: Measurable as a software provider that we work with that  
00:55:15 --> 00:55:17: actually ties directly into grips,  
00:55:17 --> 00:55:21: so it actually takes all of your energy data or  
00:55:22 --> 00:55:27: utility data across wastewater energy and and you can report  
00:55:27 --> 00:55:30: out on different metrics using that.  
00:55:30 --> 00:55:34: But there's lots of different ESG softwares that are popping

00:55:34 --> 00:55:36: up for the real estate sector.

00:55:41 --> 00:55:44: I would also put a plug in for the system

00:55:44 --> 00:55:45: advisor model,

00:55:45 --> 00:55:48: which is a model that the that the National Renewable

00:55:48 --> 00:55:50: Energy Lab developed in.

00:55:50 --> 00:55:53: It is available online that you can use as a

00:55:54 --> 00:55:54: first cut,

00:55:54 --> 00:55:58: designing the system and figuring out the financial benefits of

00:55:58 --> 00:55:59: different designs and systems.

00:55:59 --> 00:56:04: So definitely recommend taking a look at that on Dixie

00:56:04 --> 00:56:05: Yum.

00:56:05 --> 00:56:07: The link in the chat box.

00:56:11 --> 00:56:14: And another question here, how much,

00:56:14 --> 00:56:18: maybe for Sarah authority, how much are the annual

00:56:18 --> 00:56:21: expenses

00:56:18 --> 00:56:21: to repair and or maintain the solar buildings?

00:56:21 --> 00:56:23: Solar panels on an industrial building?

00:56:23 --> 00:56:24: Any insights on that?

00:56:27 --> 00:56:28: Might be more for Sarah.

00:56:28 --> 00:56:33: Sarah Z. Not not sure about that one.

00:56:37 --> 00:56:39: For us with a PPA there nothing.

00:56:43 --> 00:56:45: I did put some information.

00:56:45 --> 00:56:49: Sandia National Lab is collecting data on O&M costs.

00:56:49 --> 00:56:53: It's mostly utility scale, but there are some reports and

00:56:53 --> 00:56:56: data is going back and forth with somebody in the

00:56:56 --> 00:57:00: audience talking about that data having restricted access.

00:57:00 --> 00:57:04: But there are reports and certainly can follow up with

00:57:04 --> 00:57:08: you if the you know you're interested in the data,

00:57:08 --> 00:57:14: so so. Alright. Uhm? So to answer the last question

00:57:15 --> 00:57:17: here was this report.

00:57:17 --> 00:57:21: Was this webinar recorded? Yes it was and I believe

00:57:21 --> 00:57:24: you'll be able to access on the websites of the

00:57:24 --> 00:57:27: host group CLI and I think I just messed up

00:57:27 --> 00:57:30: that FM. I always mess up background and so just

00:57:30 --> 00:57:34: want to thank everyone for joining us today and really

00:57:34 --> 00:57:36: learned a lot from my Co panelists.

00:57:36 --> 00:57:38: So thank you so much.

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