

Western Massachusetts Solar Forum: Session 1 Transcript - September 12, 2023

Participant: UMass CEE [UC] English (US)

00:32:26 [UC] Recording in progress.

00:34:04 [UC] Well, good afternoon, everybody on behalf of the clean energy extension, at University of Massachusetts, Amherst. I'd like to welcome you to this second session of the Western Massachusetts. Solar solar Forum.

00:34:18 [UC] My name is Scott Jackson and I will be your moderator for this afternoon.

00:34:21 [UC] an extension professor at the University of Massachusetts, Amherst in the Department of Environmental Conservation. I want to just make one quick disclaimer at the beginning.

00:34:32 [UC] Beginning before we get in, to the basic Logistics here, at the University of Massachusetts, they planned and a test of the emergency broadcast system, some time for this afternoon. So hopefully that'll happen while I muted, and some other speaker is talking,

00:34:48 [UC] But if suddenly you hear blasting Sirens, I will mute myself and we will wait it out and proceeded afterwards. I apologize if there's any interruption

00:35:04 [UC] So, just to get you oriented to the technology first.

00:35:09 [UC] we're dealing with zoom, but we're also using cvent platform that will allow you to ask questions and do other things.

00:35:18 [UC] So, the zoom meeting itself, is we've disabled the chat and we are also going to, you're going to be muted for the duration of this presentation. The cameras are off by default, but you're welcome to

00:35:33 [UC] Turn them on if you like.

00:35:34 [UC] and I believe that we're going to have ASL available but if I'm wrong, somebody will interrupt me and correct me on that the event platform for attendee. The attendee Hub

00:35:49 [UC] Is a place where you can go to access speakers bios the detailed agenda, you can open it up and look at it. You can ask questions and and that's where the transcription and Spanish translation will be at the end of

00:36:04 [UC] Workshop this afternoon, you will be given access to a post-session survey and we would ask you to fill that out so that we can improve any way that we can for the following sessions.

00:36:21 [UC] So in the attendee Hub, you will see certain features here.

00:36:26 [UC] So you can see the list of speakers and their get, you can get access to their bios by clicking on their pictures.

00:36:33 [UC] can also use the icons in the upper right hand corner to for the Q&A to access the survey at the end of the workshop, and for the translations.

00:36:49 [UC] The post survey will open about 15 minutes before the end of the session and it'll be available for 48 hours afterwards in the attendee hub.

00:36:59 [UC] If you somehow get booted out of this, Zoom meeting or you leave and need to come back in, just come right back in, you can go through if necessary from the clean energy extensions website.

00:37:14 [UC] and then for the Q&A, you can submit your questions at any point throughout the afternoon, people will be modern monitoring the questions and choosing just a handful that we'll have time to answer during the panels at the

00:37:29 [UC] And of each of the sections of today's session. So there will be two

sections and each one will be followed by a panel discussion of the of the speaker's. All the questions will be read by people from clean

00:37:44 [UC] The extension and it's going to be incorporated into a white paper based on the Forum afterwards.

00:37:53 [UC] We'd like to thank our Congressional Delegation for sponsors being co-sponsors of this program.

00:38:00 [UC] It's nice to have support of our elected officials in trying to educate and also clarify some of the issues related to solar in Western Massachusetts, we particularly appreciate state Senator, Joe Comerford and

00:38:16 [UC] Representative Mindy, Domb for being sponsors of this and for helping to make it happen.

00:38:24 [UC] I also want to acknowledge all of the numerous State and Municipal officials who have joined us today and at other sessions as well.

00:38:34 [UC] These sessions wouldn't be possible if it weren't for a planning committee that met multiple times to try to establish the scope and the detail related to these different sessions.

00:38:44 [UC] Thank you to all of you.

00:38:48 [UC] You can download a copy of the agenda for this afternoon from the attendee hub.

00:38:53 [UC] But basically, as I said, there will be two parts. The first part you can see Illustrated here and then the second part will take us right up till 4:00 this afternoon when the workshop will end.

00:39:09 [UC] And so with that, I am going to introduce the first speaker.

00:39:19 [UC] So our first Speaker, I'm not going to do detailed biography so that we can save time for the speakers to use it for their presentations.

00:39:27 [UC] their bios are on the attendee Hub.

00:39:30 [UC] So let me introduce our first Speaker can comia from the Pioneer Valley Planning Commission who's going to discuss state laws and regulations, as well as local bylaws and ordinances.

00:39:43 [UC] Thank you Scott.

00:39:44 [UC] Let me just get my screen setup here.

00:39:52 [UC] Eight.

00:39:53 [UC] yes.

00:39:55 [UC] So I thank you Scott and thank you to the clean energy extension for having me talk about probably one of the most exciting things that I love to do in my work is land, use and zoning and I think as

00:40:10 [UC] Many, there may be many people on this call that are either planning board members or those that have to review solar projects.

00:40:22 [UC] I think that hopefully this is either a primer or just a confirmation of the things that you may be interacting with in your work I think since this is a novel land use issue with regards to

00:40:37 [UC] How solar is established or establish as a significant land use type in western Mass.

00:40:47 [UC] I think that there are a lot of considerations that are planning boards may have to address when they're either. Looking at how to review side said developments and or prepare solar zoning bylaw

00:41:02 [UC] Amendments as they navigate some of these issues.

00:41:05 [UC] So some questions to think about, I think in this conversation and as you interact with the other speakers this afternoon, because I think we're all somewhat related to the concept of hand.

00:41:18 [UC] How do state laws and regulations, including the smart solar incentive program, interact with Solar Development and land use, how has this changed over time, how do state regulations and recent Court decisions, 00:41:31 [UC] As interact with your local bylaws and what are the different types of concerns and considerations for developing your local regulations. 00:41:40 [UC] and I'm using bylaws obviously its bylaws and ordinances depending if you are visiting us from a city that has ordinances 00:41:51 [UC] So, currently our 00:41:54 [UC] Guidance for solar land. 00:41:55 [UC] Use regulation I think stem from from at least in the Pioneer Valley and this probably is could be a resource for those in Berkshire. In Franklin County, we have section 3, which is the Dover Amendment. 00:42:12 [UC] I've the chapter 40 a which basically says you cannot prohibit solar, or you have to provide, you know, due diligence and planning for allowing that type of use in your community. 00:42:25 [UC] We are probably all familiar with the model Zoning for the regulation of solar energy systems, which was in 2014. And if it's not a resource that is easily accessible, 00:42:40 [UC] At the end of the conversation, I could point you into the direction of where the PV PC provided and and had completed a solar best practices guide which is reflective of 11 communities, that work 00:42:55 [UC] Gather in 2019 to establish a model by law and some considerations for review development review. 00:43:05 [UC] Why our communities either adopting or amending zoning bylaws or ordinances at the moment? 00:43:13 [UC] I think at the time municipalities are we're dealing with significant large-scale Solar Development challenges because of multiple factors I think in some of the 00:43:25 [UC] unity's in the Pioneer Valley, it's understanding that there are some natural resources that may be tampered with when you're talking about solar and the types of solar coverage that an array would, you know, 00:43:40 [UC] Impact, in addition to, you know, where else you may be locating. I think also the intent of the smart regulations, the new smart regulations, inadvertently incentivize large scoler 00:43:55 [UC] Development by left municipalities without enough guidance. 00:43:58 [UC] I think there's this conversation that planning boards, you know, maybe caught flat-footed and trying to address, maybe some of the Nuance of the smart regulation. And what we're trying to 00:44:13 [UC] and as some of the hardships of regulating solar in town and then what is the new topic is battery energy storage systems, which I think in a lot of communities there are currently dealing or 00:44:29 [UC] At least the conversations and the town halls have been how to address this weather as a component of your solar by law or a standalone use. 00:44:41 [UC] The effects of smart program in Massachusetts. 00:44:43 [UC] It was obviously created by the Commonwealth to manage encourage and incentivize Solar Development. And I think to an extent, it has been successful in that the positive intent was to Spur development of non greenhouse, gas amazing energy sources, smart program, 00:44:59 [UC] Version 1. 00:45:00 [UC] Inadvertently challenge.

00:45:01 [UC] the local infrastructure because of number and size of projects proposed. Which again I think led to this discussion about amending bylaws and and amending bylaws more recently, and more recent, the state completed updates to

00:45:16 [UC] Program, which I think seek to rectify some of those particular issues.

00:45:23 [UC] And looking at addressing some of the considerations that towns have been identifying as standards of criteria for review of development.

00:45:36 [UC] We often rely on communities that have adopted solar amendments, or solar. Solar zoning amendments that have been passed by the Attorney General's office.

00:45:52 [UC] And so with that said, I think a lot of the conversation with regards to how the Attorney General's office may be reviewing some of these bylaws. As towns are putting forward amendments

00:46:07 [UC] Is that they are finding that it's reasonable for site plan reviews to talk about certain things like preserving natural features minimizing tree.

00:46:21 [UC] Tree and soil removal abating noise and odors parking light against access.

00:46:26 [UC] So your typical considerations in site plan, additional requirements for agricultural use or open space, use minimizing soil removal and field disturbances creating a bond mechanism

00:46:41 [UC] decommissioning and removal solar installation, requiring that towns are in compliance with mg/l chapter 44, section, 53, G and a half limits on wholesale Trio, cutting

00:46:56 [UC] On what is necessary for the solar array.

00:46:58 [UC] I know some communities have adopted, so our bylaws that create some of those ideas and and, and create opportunities for applicants to address what?

00:47:11 [UC] may be occurring through environmental review on those particular solar applications and the requirements for pollinator friendly plantings. What I'll say is, in the best practice guide that PV PC.

00:47:25 [UC] Imitating the conversations in 2019.

00:47:27 [UC] A lot of the conversation was requiring pollinator-friendly plantings and seeing the Attorney General's office approving. The language as used for some of the communities, I think

00:47:43 [UC] Leads to the fact that we got.

00:47:45 [UC] This is a very environmentally, the considerations for the types of plantings.

00:47:52 [UC] You may have around solar or something, that should be considered in a solar application, some of the things and I know that in the Pioneer Valley just hearing about maybe some some,

00:48:08 [UC] some disagreements by planning board members, and/or Town staff, with regards to when an attorney general draws attention to when the the Attorney General's office draws attention to certain regulations

00:48:24 [UC] Bishan on use of pesticides, herbicides, and filters, fertilizers for soil for solar Farms. This is preempted by exclusive jurisdiction of MDR, restrictions on sizes.

00:48:37 [UC] Sometimes I think that has been identified within the context of the updates. You get from the agios after you submit them restriction of large-scale, ground mounted solar, two Parcels

00:48:53 [UC] Land that have been ready.

00:48:54 [UC] cleared of trees for at least five years.

00:48:56 [UC] So this timeframe and considering applications when you have a, you're relying on a time frame of when you had done some clear-cutting. And then relying

00:49:11 [UC] On this, this particular language, anything not reasonably grounded in protection of public health, safety and Welfare.

00:49:18 [UC] So that is your typical language from chapter 48 Section 3, with regards to, why the Commonwealth had created that particular, you know,

00:49:34 [UC] Disallowing of certain types of use or some other land. Use concerns that I think have come up in their review of solar applications, our stormwater, runoff battery, battery, energy

00:49:49 [UC] Storage systems. And this dual use solar and this is a concept with regards to having agricultural lands. And I know that some of the speakers in the future will in this afternoon session will be discussing about

00:50:04 [UC] Farmland.

00:50:04 [UC] and some of the natural resources and and the impacts of solar.

00:50:08 [UC] But understanding that there is a mechanism that the smart program that allows for this.

00:50:14 [UC] And I think that there could be some conversation around your solar zoning solar by law, that addresses that. So, you know, in the context of your development review and

00:50:29 [UC] And how you may be looking at. Amending your zoning bylaw trying to figure out how to address these particular issues.

00:50:42 [UC] So as I mentioned, considerations for zoning, when you're looking at amending, a by lower, creating one, for some communities, that don't have one understanding that they have to be reasonably connected to public health, safety and Welfare.

00:50:57 [UC] Our and typically documented by study or analysis and and listed as a statement of purpose in your bile, our ornaments. So you you you you would use the

00:51:12 [UC] purpose section of your zoning bylaw, our ordinance to describe why. In fact, you may be pursuing these types of amendments ensuring that no discrimination in the standards applied to solar regulations.

00:51:26 [UC] So if you have certain types of dimensional requirements or aesthetic requirements on in certain zoning districts, just ensuring that the application of those standards are

00:51:43 [UC] Done for a reason.

00:51:44 [UC] Again, typically related to the new and existing standards are typically related to the public health, safety and Welfare and and drawing that connection. And then always as as I work with many

00:51:59 [UC] Ensuring that they utilize an opportunity to engage with technical consultants to assist in. Looking at the standards in the context of that development addressing the zoning bylaw and

00:52:14 [UC] Typically solar can sorry stormwater considerations in those developments.

00:52:21 [UC] And yeah, that is the end of my presentation with regards to thinking, generally about how how you may want to look at your zoning bylaw and the various considerations knowing that there

00:52:36 [UC] The chapter 48 Section 3, as kind of your guidance, if you don't have a solar by law.

00:52:48 [UC] Thank you.

00:52:49 [UC] Thank you, Ken.

00:52:52 [UC] If I could just ask you a question you in your presentation, you would refer to chapter 44, section 53, G 1/2. Could you explain what that section is?

00:53:02 [UC] So that is the, what we call the outside Consultants. I don't know the actual there's a term, but typically, it's allowing for municipalities to engage with outside.

00:53:18 [UC] Consultants, for review of site plans or special permits. As I mentioned in the last slide, as far as considerations to zoning, is to ensure the opportunity. If the planning board or the zba whoever's reviewing the

00:53:34 [UC] Application, the solar application to engage with your civil engineers, or anyone related to trying to address the impacts of the solar solar

00:53:47 [UC] Island the Solar Development rather great.

00:53:52 [UC] Thank you.

00:53:52 [UC] I just want to remind people that you can submit questions at any time. If we end up with a little extra time, we can ask some questions then also, you can check the attendee hub for bios and

00:54:07 [UC] And then download the detailed agenda for today's Forum.

00:54:13 [UC] All right.

00:54:14 [UC] Ken well thank you very much.

00:54:15 [UC] thank you. It's see there is one question we can get at since we're a little ahead of time says large ground mounted solar and Senate program began in 2010.

00:54:26 [UC] 2010. Could you please clarify what is more challenging about smart from a planning perspective? That's a, that's a good question. And I think

00:54:35 [UC] one of the things that I've come across in my work is,

00:54:41 [UC] The the balance of working with planning boards and towns that are supportive of many of the concepts of Solar Development and allowing for them in the in their

00:54:56 [UC] Days.

00:54:57 [UC] But also, knowing that there are best practices such as developing solar on already, impervious, surfaces, or on rooftops, allowing for the technology to you know, continue

00:55:13 [UC] In a forward way but also understanding that some of the environmental concerns typically when it involves a lot of clear-cutting. And I think that has been the general trend of

00:55:29 [UC] A lot of the development since then and and looking five years past the initial for some applications that I've been familiar with five years past the initial it getting online.

00:55:44 [UC] There have been some some tremendous impacts particularly storm water. So I think it's both navigating the want for ensuring that solar is something that a community really

00:55:59 [UC] Ports, specially for, you know, the the and understanding of being Forward Thinking when it comes to Green energy and and those Concepts but also knowing that some sites are just hard

00:56:14 [UC] develop on, but most of the time, the applicants are bringing forward applications that are, you know, the challenging, I guess those those best thoughts about whether or not this particular

00:56:29 [UC] The killer parcel is apt for development, whether it's just hard geography or it's within a resource area and and you're trying to navigate your other various permitting, like the Conservation Commission whether it's near

Wetlands, whatnot.

00:56:44 [UC] so understanding that concept but also, you know, trying to be as, as a planning board trying to be as thoughtful regarding for allowing development,

00:56:59 [UC] But also being mindful of what kind of impact it's having to your account.

00:57:07 [UC] Well, thank you, Karen. That's very helpful.

00:57:10 [UC] You're welcome.

00:57:11 [UC] All right. Let's move on to our next speaker.

00:57:13 [UC] Our next speaker this afternoon is John Rogan from Clark University and he's going to talk about where solar has been developed with respect to land.

Use take it away. John, thank you very much and thank you for the invitation

00:57:29 [UC] Just speak.

00:57:34 [UC] Okay, does it look okay?

00:57:41 [UC] Thanks everyone.

00:57:42 [UC] I'm going to speak briefly today about the work. We've done a car if University and we're from The Graduate School of geography and part of the research we do is based around land, change and mapping land change

00:57:57 [UC] Satellite imagery and the title of this brief presentation is where has solar been developed with respect to land use in Massachusetts. And I'm speaking on behalf of a large group of graduate students who've contributed greatly

00:58:12 [UC] This work.

00:58:14 [UC] So, just to let you know how we do this land change analysis, we work with satellite imagery from the European Space Agency, sensor as called Sentinel to. And these are three data collected very, very

00:58:29 [UC] Currently only focus on the summer months to map solar installations ground mounted solar installations and the pixel size of the imagery is ten by ten meters.

00:58:42 [UC] So the, the footprint on the ground collectors 10 by 10 meters, which is not as good.

00:58:48 [UC] I would say as the Google Earth imagery that is anywhere from 0.5 to 2 meters in resolution. But the advantage is that these data.

00:58:59 [UC] Are collected regularly and it allows us to look at at changes over time.

00:59:04 [UC] And so, what I'm going to present today is an example of the mapping of solar that we've done in relation to land use and, and some different aspects there in this presentation

00:59:19 [UC] Is also contains some supplementary slides that I wouldn't have time to go through today and given the totality.

00:59:27 [UC] So the time span of this analysis is 2001 to 2022 and we're looking at the summer months, it allows for the best contrast between what's not solar and what is solar and in the bottom.

00:59:43 [UC] I have left of the screen, you see?

00:59:45 [UC] Just an example of a satellite image and then with a computer algorithm that we use, that algorithm allows us to detect where solar is occurring as we take that information and were able to compare it to land use.

01:00:00 [UC] And track it over time, as you're going to see both the timeframe of solar and also the Solar Development and also the relationship to land use.

01:00:13 [UC] One thing that we at the behest of others. One thing we focused on is the idea of mapping the area of solar panel, the photovoltaic panels themselves, but also the area cleared as

01:00:28 [UC] A sellout that we estimate is due to the Solar Development itself.

01:00:33 [UC] So you'll see some of those as we move forward.

01:00:37 [UC] Okay, so as of August of 2022, we're now in the process of finalizing 2023 s data.

01:00:48 [UC] But what you see here are just some summary maps and graphs.

01:00:53 [UC] First of all with the data we've collected we estimate that. There are a thousand solar installations as of August last year and we initially did this work up until 2019 and so

01:01:07 [UC] What we found that between 2019 and August of last year.

01:01:14 [UC] There were 250, new solar installations added to the state. So, the map, you see in the dark or dots, those were the solar fields that were mapped up to 2019. And then the red dots are those that were added

01:01:29 [UC] After that, I'm one off the cuff. Remark, mm. A perhaps. Is that the, the solar developed after 2019 was predominantly along major roads such as root 2 and

01:01:45 [UC] For the most part of avoided Forest land, unlike previous years, the graph that you see in the right hand side, is a bar graph, showing the number of solar installations.

01:01:58 [UC] and and by area on the horizontal axis and so there are seven to date up until our maps of 2022.

01:02:07 [UC] about seven thousand acres of land in solar that is in total. Both the photovoltaic panels

01:02:14 [UC] and the area cleared and roughly the mean area for the for a single solar installation is about 5 Acres.

01:02:24 [UC] So this is the type of summary information that we gather together using this, the change analysis and the solar panels that we map.

01:02:33 [UC] map. So this is a graph showing in the vertical axis Acres, that's amount of land associated with ground solar and on the horizontal axis is the year.

01:02:44 [UC] Or that we estimate that the solar panels were installed.

01:02:48 [UC] And so what you see really this trend shows that in 2013, there was a significant increase in the amount of acreage in solar and so all told since 2019, that's about

01:03:03 [UC] Well, it's the majority of solar that's that's present today.

01:03:07 [UC] What we've also show. What we're also showing here is that the area of land cleared associated with solar but not in a under a panel for say has been

01:03:23 [UC] Pretty significant in some cases half of the area cleared and in most the most recent time period for 2022.

01:03:32 [UC] It's almost 50% of the land, cleared as a result of solar installations.

01:03:39 [UC] In terms of land, use what we found over the entire time, span of the study is that solar installations have cleared Forest to about 50% or 3500 acres

01:03:54 [UC] Of land.

01:03:55 [UC] So that's the majority of solar has gone into one. Land-cover land use type. That is Forest, followed by cropland, which is a broad category, but we're using some basic categories in this.

01:04:10 [UC] Particular study and that's 24% for cropland and 11% has gone in in terms of what's called Barren land soul, and that is, they are soil and other types.

01:04:26 [UC] Again, using the types of data we were able to render maps by Tone, this is just basic GIS analysis.

01:04:35 [UC] The map, you see here is the count of solar field by a particular tone and so the tones of Charlton, Spencer and Oxbridge.

01:04:43 [UC] For example and one, two three that you see in the map, there they are being highlighted as areas that have seen a lot of solar ground solar installations but on the graph and the right hand side, you can see a current

01:04:55 [UC] Edge by Tone and the different colors, represent developed land and red and green and sorry, yellow and cropland and grass and green. And what you're seeing across those tones.

01:05:07 [UC] Those are the top 10 of tones in acreage of grown solar in Massachusetts.

01:05:13 [UC] you see that there's a tremendous variability in the land, use that has been affected, you know, that is now impacted by solar so to speak. It really does vary.

01:05:25 [UC] Greatly depending on the tone, but you do notice in every town there, there's a substantial dark green bar or category, which is the forests category.

01:05:37 [UC] So with that, we've focused also on aspects of forest land which the previous speaker, rightly spoke about this is again, am a map of Massachusetts towns where the grade of green

01:05:52 [UC] Kate's, the Acres of forest loss.

01:05:54 [UC] So the darker, the shade, the greater the amount of forest loss and a particular tone.

01:05:59 [UC] So central Massachusetts areas just to the west of Worcester where I am and areas down along the south of the state at the South East towards Cape Cod

01:06:15 [UC] Also seen a lot of acreage also and because we have the time series were able to show in the bar graph on the right acreage of solar in that is clear-cut Forest relative to other land cover categories.

01:06:28 [UC] And we see in that time series that while Forest has been increasingly impacted by solar for clear-cutting, that is that trend is declining in the in the most recent time

01:06:44 [UC] Time frame.

01:06:45 [UC] And this work is is all put in the context and is important for us. In terms of the losing ground 6th edition report, which came out a couple years back which at the time reported 6,000 acres

01:07:00 [UC] Land cleared for solar. And if that Trend were to continue as much as 150,000 Acres estimated to be under solar in that way, or cleared land for solar and other speakers today, no doubt

01:07:15 [UC] I will speak to that - Audubon study.

01:07:20 [UC] One final thing to note is the this type of data can be related to various land, cover layers or Municipal layers.

01:07:30 [UC] And this is just an example of what we can do with that.

01:07:33 [UC] So in the map you see areas of wetlands lakes, rivers, Etc. And these data come from the national Wetlands inventory, and the the red dots are again, the solar fields

01:07:46 [UC] and what we see here in the summary is that the minority small large minority, let's say of solar site 73 overlap that is that they are in the presence of these Wetland features

01:08:02 [UC] From a mapping perspective and the average distance to Wetland for all solar is approximately 180 feet, 183 ft.

01:08:12 [UC] But I'll draw a distinction here between the legal definitions in Massachusetts for wetland and the types of datasets were using that, you know, full

and you know, full clarity here with. Go to say that

01:08:27 [UC] Types of national land cover data sets are easily brought into conversation with the types of solar mapping that we're doing.

01:08:35 [UC] But it doesn't imply that these are within the legal boundaries of what the state would declare as a wetland. And I would leave that to others with more expertise in that context.

01:08:49 [UC] So, just to sum to summarize. As of August 20, 22, we've mapped, a thousand, solar installations covering 7,000 acres in the state.

01:09:01 [UC] That's been a gain of two hundred and fifty cents.

01:09:03 [UC] our prior mapping of to and 2019. And we're in the process of finishing. Hopefully, by October the 2023 map, as well and the cleared area surrounding solar fields, is that the areas that are not

01:09:18 [UC] In photovoltaic land use. So to speak. But the land.

01:09:22 [UC] cleared that's taken up 40% of the total area of installation. Since since 2013, when Solar Development really showed up in our maps and in a significant way, the last point I'll add is that

01:09:37 [UC] The conversion of forest has declined significantly. In the last two years, we are noticing that the shift in Solar Development in areas that were not in forest in

01:09:52 [UC] Last 20 years.

01:09:53 [UC] So in other words the land use maps that we use indicate that though they are in cropland and develop land predominantly.

01:10:04 [UC] So thank you very much.

01:10:08 [UC] Well, thank you Josh. I was an excellent summary.

01:10:11 [UC] We have a couple of questions that came in and we have time, so I'd like to post these questions to you.

01:10:18 [UC] One of them is like, what's the minimum size of a solar installation that you are able to detect and document and is included in your data set?

01:10:28 [UC] That's a great question.

01:10:29 [UC] We've feel checked the data set fairly as rigorously I think as we could possibly for any type of mapping and therefore that we that we work on

01:10:45 [UC] and so given that there's a pixel area of ten by ten meters, you know, my take on it, is that for, you know, the solar panels that are

01:11:00 [UC] You know, half an acre to an acre or the that's the minimum size with with checking we have found groans groan mounted solar that was that we

01:11:15 [UC] Just given that it was at your parties or perhaps solar panels that are in a backyard that are relatively small in size.

01:11:24 [UC] So I would describe our s our estimates as just that, they're, you know, the regular see checked but they have some Omission errors in the case or were missing some,

01:11:39 [UC] So very small panels.

01:11:42 [UC] Thank you.

01:11:43 [UC] You are you have a developed land? Use category that's in your charts.

01:11:47 [UC] Can you give us a sense of what you've included as developed land?

01:11:51 [UC] That was converted to solar?

01:11:53 [UC] It's another great question.

01:11:54 [UC] Um, yes, so develop land at this.

01:11:57 [UC] These are areas that are designated in a Latin, a typical land use map, whether it's Massachusetts or the United States as areas with houses, and

building commercial property.

01:12:13 [UC] Oh, basically areas associated with some population density.

01:12:20 [UC] So it's a catch-all term for places with commercial buildings residences, Municipal areas, Etc.

01:12:32 [UC] Thank you.

01:12:33 [UC] Thank you.

01:12:33 [UC] Thank you. Had a couple of questions about, you know, when you look at the acreage that's been converted to solar, do you have any sense of how that compares with how much conversion there has been for other forms of development in

01:12:48 [UC] Assets.

01:12:49 [UC] So for example, is just a small percentage compared to other development or is this a significant contributor?

01:12:57 [UC] It's a really good that these are fantastic questions so our estimate is that Solar Development.

01:13:05 [UC] So conversion of forest or grind mounted. Solar is 10 to 15% of all conversion.

01:13:13 [UC] The majority of the conversion of forest is for new developments, whatever.

01:13:19 [UC] They might be throughout the state, so it's small.

01:13:24 [UC] small. I don't know if that means it's insignificant.

01:13:27 [UC] All right. Clearly we're all together because because we're interested in this topic but commercial development business as usual development, call it that is a much larger contributor to Forest Laos.

01:13:44 [UC] Thank you.

01:13:44 [UC] Another question that came in is, do you get the sense that the average size of these more industrial scale? Solar installations, there's a car getting larger over time.

01:13:58 [UC] And I don't know that but I can definitely find out and report back to the panel in the process of these P sessions. That's that's noted and and we'll address that thank you.

01:14:12 [UC] And then, finally, one more is that that more recent drop in the percentage of conversion of forest land. How would you have any sense of why that drop happened or where did it go instead?

01:14:30 [UC] I know that it is predominantly known areas that our cropland in land use or developed. Why that happened? My just you know my

01:14:45 [UC] feeling about it, is that

01:14:49 [UC] Decisions made by the state have led to the move of Solar Development away from forest areas.

01:14:58 [UC] But there are many many people here, including yourself, who probably would know more about that, but that that's just my taker. Well, thank you, John.

01:15:11 [UC] This has been very helpful and thank you to those of you who contributed questions. I know it makes me look brilliant when I get to

01:15:19 [UC] ask the questions but actually they came from others.

01:15:22 [UC] so credit where credit is due.

01:15:24 [UC] So we're going to move on to the next speaker and our next speaker is and eat imagine and he's going to he's from see Bane and Sundberg solar and is going to talk about the overview of cost in complexities of solar across project types

01:15:39 [UC] Market sectors.

01:15:40 [UC] Go ahead. Andy, I think Scott. Hi everybody.

01:15:43 [UC] My name is Andy.
01:15:45 [UC] I'm here.
01:15:45 [UC] Representing see, Bane to solar energy Business Association of New England and I'm also a business development manager at some bug solar.
01:15:53 [UC] I've worked in solar for about a decade, so I'm here sort of representing the, you know, the industry side.
01:15:59 [UC] But also here is a, you know, as a citizen in Massachusetts and someone interested in sustainability and policy. So I'm just going to be presenting on sort of the different scales. I'm going to throw up a share.
01:16:09 [UC] Screen.
01:16:10 [UC] Except you're going to see that.
01:16:12 [UC] Okay? Yeah.
01:16:13 [UC] All right.
01:16:13 [UC] great. So, yeah, my goal here is to sort of give an overview of the different ways that were building solar today as there to talk about the pros and cons of the different approaches.
01:16:24 [UC] You know what gets complex? What works?
01:16:26 [UC] What doesn't? And, you know how we sort of blend those together to meet our goals at least ideally and
01:16:36 [UC] well, do is start with just kind of giving a overview. So I like to think of this as the, Richard Scarry diagram like what is the simplest form of solar?
01:16:46 [UC] What is the essential parts of a solar project? Today, I'm focusing on grid, tied solar specifically which is you know, 99% of what's getting built.
01:16:56 [UC] Hey, if I'm back in the woods and do I need batteries?
01:16:59 [UC] That is a whole separate thing.
01:17:00 [UC] This is this is grid-tied. Solar, as several people mentioned, energy storage is becoming a factor in Grid, tied solar design to, that's not really within the scope of what I'm looking at a time or just looking to how do we build basic systems and really the critical Parts
01:17:15 [UC] Grid. Tied solar project is going to have our in this little residential diagram.
01:17:19 [UC] You're going to have solar panels. You know, an array of group solar panels here.
01:17:25 [UC] They're shown on a roof.
01:17:25 [UC] You can see one, two, three, four, five, six, seven, eight, nine panels.
01:17:28 [UC] So small project you know, you're not seeing it but beneath that there's some mounting or racking structure holding that to the roof. But it's pretty minimal.
01:17:37 [UC] You have wires those wires, bring that power down to an inverter, which is turning the DC power, the panel's, make into the air.
01:17:44 [UC] AC power used in our homes in the grid.
01:17:46 [UC] You need a connection to an electrical service or grid.
01:17:50 [UC] So with residential solar that might be a breaker with utility-scale solar. That might be a dedicated electrical service, but somewhere in there, you're basically building an electrical interface, it's going to connect you to the grid, and you're going to build in metering, rightmost, grid-tied,
01:18:05 [UC] Whatever it is, you want to measure your Outlets, you want sustainability credits, you want monetary credits, you want to just track what's

being produced and was being used.

01:18:14 [UC] So just to give that overview of like, that's that's your simplest approach to solar deployment deployment.

01:18:19 [UC] Simplest way to build it.

01:18:20 [UC] the simple strategies on the roof.

01:18:24 [UC] I like to say the roof is a solar mounting structure.

01:18:26 [UC] You already own. If you own a home it's going to building. This is going to be your lowest cost way to build solar.

01:18:31 [UC] And the reason is, you're just using the things in that picture, I already showed you.

01:18:35 [UC] You're not adding anything else the equation and you're using a mounting structure, which is the building that you already own, you're using land.

01:18:43 [UC] You already own using electrical service most likely that you already own to build Stoller so you can see here you know examples of both residential and commercial solar on roofs.

01:18:55 [UC] I'm sure everyone is seeing, you know, residential solar this is typically anywhere between five and you know, 40 panels on our roof, tied into house, electrical service behind the meter.

01:19:06 [UC] Commercial solar can use similar racking or can use valassir acting on flat roof, which is shown in the top right picture.

01:19:13 [UC] It's a non-penetrating rack and tilt the panel's up in all cases. You know, a lot of this solar, not all of it but a lot of it is going to be behind the meter meaning in serving the loads on the site and it's going to be over all the easiest

01:19:28 [UC] And lowest cost for us to build but just to get into the pros and cons of that, right?

01:19:35 [UC] This is your lowest cost to deploy and you're using otherwise. Unused space, its property.

01:19:41 [UC] You own, you have a service local service that's in place. But here are your challenges.

01:19:47 [UC] This works best with not only owner occupied buildings but long-term owner Archive Building. So, if you are a renter, if you're in in a condo, if you're a commercial landlord who has

01:19:57 [UC] Changing tenants. The changing needs solar on your roof can graze and issues. You have to sort of figure out what's your arrangement to capture, the value of the energy, generated, who's going to be using it? There are building issues that come

01:20:13 [UC] Rooftop solar.

01:20:13 [UC] You don't want to put that on a roof. That needs to be replaced.

01:20:16 [UC] You want a fairly new roof?

01:20:18 [UC] It's in good condition.

01:20:18 [UC] The residential side, slate, roofs present challenges, some other metal shingles and unusual Roofing types was that challenges your housing. Stock matters, right?

01:20:30 [UC] A big barn, Dormer, big barn roof is great. But when you have Dormers or hips or vents or skylights breaking up the roof, you know, even if you get plenty of Sun, it's a lot harder to fit solar within all of those obstacles.

01:20:42 [UC] It's and similarly on the commercial scale. You can see right in this picture you know this is a flat roof solar installed but I would say maybe you know 30% of the roof from a square foot of standpoint is covered with solar and that's

because you're sharing space

01:20:57 [UC] It's with a roof deck.

01:20:58 [UC] You're sharing space with the Elevator Shaft or sharing space with the HVAC equipment and other mechanical things.

01:21:04 [UC] And also with existing building stock you have structural loading issues, solar is not heavy, but it does add some way to the roof.

01:21:14 [UC] And if you have a building that was built, you know, possibly, two older building codes for snow loads were increased.

01:21:21 [UC] You may find your site doesn't work.

01:21:23 [UC] You may also adjust have shade issues on a site or other

01:21:27 [UC] Things that make it hard to do.

01:21:29 [UC] So, you know this is I think always the first place to look is rooftop. Solar is going to be the fastest, easiest most affordable best approach.

01:21:37 [UC] It gets a panels up off the ground into the Sun, but it does not work everywhere and we need other options, right?

01:21:45 [UC] So the next thing we're going to look at is ground mounted solar and ground mounted, solar can be, you know, very large scale. It can be something you do in your backyard. There really is a range of

01:21:57 [UC] That the nice thing about ground minutes older is you can do it where you don't have a roof. You can do it where you don't have a building, but do you know, it does change a few things, right?

01:22:11 [UC] It's going to be more expensive fundamentally because you are buying racking your building rapping on the Steele. You're digging a trench for power.

01:22:19 [UC] Excavating equipment on site to bring that power back to an electoral service.

01:22:23 [UC] There's a lot of kind of just adding costs in that this is, you know, easily going to be in a twenty to twenty to fifty percent more and Groupon and solar kind of, depending on the site in the scale. So the pros.

01:22:38 [UC] Yeah, you're avoiding the issues with rooftops, you're avoiding space limits.

01:22:41 [UC] You can go to very large scales. If you have the land that said it doesn't work everywhere, right?

01:22:49 [UC] You know, as you know John Doe same you get situations where you know, nobody in solar wants to cut down, the tree is we want big open flat, you know, unvegetated land that give us a field of gravel close to three phase power line.

01:23:04 [UC] Like to put the solar there.

01:23:05 [UC] Oh, you start looking for challenging sites and trying to make it work and sometimes there's a great site but you're really far from the three-phase utility grid, which you need for large-scale, ground mounts, you know, sometimes there's a site that seems good in terms of close to power but the

01:23:20 [UC] Will stability isn't there? Or there's ledge, or there's changes in Gray.

01:23:27 [UC] You know, generally and tree clearing obviously is an exception of this in the sense that you know, that's it's not permanent very long lasting but if you take cleared land or even Farmland, you can deploy solar there and decommission it with no lasting damage to the land.

01:23:42 [UC] You're essentially just, you know, setting a metal structure and animals. They're all of those things can be pulled away and you can do this. You know, ideally is great to use a site that isn't great farmland or Forest land, you

can use, landfills, you can use Brown field sites that will

01:23:57 [UC] You know, get into some more complicated permitting.

01:23:59 [UC] It will increase your implementation costs and you know as a no you know, my work isn't really in that Arena but the people I've talked to you a sort of suggested most of the viable landfill and Brownfield sites in Massachusetts have been explored and developed like it's a, not a

01:24:14 [UC] Fully saturated Market. It's not a spot where we have a ton of undeveloped, you know, bad sites for smaller at this point.

01:24:23 [UC] So yeah, this is, this is a brooch that lets you do a bigger project, right?

01:24:26 [UC] That really helps and economy scale do apply when you're doing a bigger one, but at the same scale as a rooftop project, you're going to have a higher cost based on buying all that racking doing the excavation bring the equipment.

01:24:39 [UC] A longer Rottweiler run to get the electrical service and then often

01:24:44 [UC] In, you know, you're having to put up fencing or having to make plans for site management.

01:24:48 [UC] Trimming vegetation over time and Cetera. This is probably the you know, the least popular approach to Solar Development at the special a large scale, nobody likes the in giant fields of solar.

01:25:01 [UC] There's a kind of negative public perception for reasons that I don't, I understand and not every site works and you know, this block can be removed. It ties up that space for a single use, for a good chunk of time.

01:25:14 [UC] Time.

01:25:16 [UC] So you know, the next part of this is we're talking about other alternatives to sort of how do you do solar and better ways, right? So one thing that is very popular is pardoned, canopy?

01:25:26 [UC] You know, it everybody knows the feeling of going in August get into your cars been sitting in the sun for hours and you look at these cars in the shade and that's very exciting option.

01:25:40 [UC] You know, things we'd love to see more of and there are some policies that support them, in terms of incentive adders in the smart program for parking canopies.

01:25:49 [UC] But there are, you know, there are some real challenges. This is significantly more expensive than a field ground Mount.

01:25:55 [UC] If you look at the structure and the just the engineering of something, it's going to lift this structure, you know, 14.

01:26:01 [UC] feet up in the air above these cars, you know, be safe to having a place where the general Public's coming and driving through and vehicles or

01:26:09 [UC] Sr coming through, you're going to have, you know, just literally the amount of metal used a significantly larger, the engineering and permitting is much more complex that said. This is, this is an awesome strategy, right?

01:26:22 [UC] You're taking land that the environmental impacts are almost nothing.

01:26:25 [UC] It helps the people are parking.

01:26:28 [UC] You know, just to get into the pros and cons, right?

01:26:31 [UC] right? Everybody likes shaded parking for the property owner. This actually is going to reduce the wear and tear on that lot. It's going to reduce their asphalt maintenance cost.

01:26:39 [UC] Just for the people parking there, there's actually studies showing reduced emissions from the Cars because when you start that car that's been sitting

in the sun for a couple hours, you're going to have, you know, that air conditioning kicking on the engine. Working at high heat, you're going to use more gas

01:26:54 [UC] Have a greater emission issue.

01:26:56 [UC] Then if you're parking in the shade because we're dealing with parking lots, right?

01:27:01 [UC] You're not you know any issues about Wetlands about habitat about tree cutting, this is a parking lot. You're not really coming up a locks against, you know, those sort of flags and you know, you're seeing a photo here of a site where there was

01:27:16 [UC] Those that didn't work for solar the parking lot did, but this can also be a way to take a roof and expand buildings are only so big.

01:27:25 [UC] If you need more energy, doing a rooftop solar system and parking canopy system.

01:27:30 [UC] can easily double the project size, increase the generation.

01:27:35 [UC] as we've said, right, this is more costly than roof mount and more costly than a standard ground, Mount one of the real world. Things is that if you own a business and you think this is a great

01:27:46 [UC] An idea.

01:27:47 [UC] Okay but instruction is going to disrupt the parking for your business while it's happening, the mounting of these things, The Columns and just kind of getting them Ingrid. You can actually find that you're losing some parking spaces when you're putting one of these n. And, you know,

01:28:02 [UC] Sometimes there's code required amounts of parking or just you know, issues where people always think it's tight here already.

01:28:07 [UC] So that said, this is one of the last Point here scale required for viability. This is something where, you know, the, the smaller.

01:28:17 [UC] Like if you just look at the top small one here, you want to build these bigger for financial viability, just because the permitting and engineering and cyclists, get high enough that if you're building a space for 20 cars, it's not going to pencil out as well for you as if you're building a space for two.

01:28:32 [UC] 100 and then you know site issues are also real for businesses that have a lot of large trucks coming in semi trucks for delivery. You need to think about their pathway.

01:28:43 [UC] They're generally not going to do well, driving under or around these things. You need to leave clear space for that sort of stuff snow shed and run off. You know, in New England, you're going to get rain on these earrings snow on them and you can get a little Avalanche of snow and you come up where that's going to land.

01:28:58 [UC] So, if you have existing parking lot, soften your kind of reconfiguring those lots thinking about water catchment, runoff, things that you might not be thinking before.

01:29:07 [UC] And it's not as simple as I sort of just throwing them up and say, PDF sort of rethink the whole picture about a lot is working.

01:29:12 [UC] So, just to give a sense of that. Here's another example, right? Both of these are what we call dual use a global tanks and, you know, to be clear, both of these families are all things.

01:29:25 [UC] We love to see them. These are two,

01:29:28 [UC] Egg roll takes is some terrible.

01:29:29 [UC] Takes is basically a ground Mount.

01:29:31 [UC] That is compatible with some kind of farming use and that is a pretty broad definition.

01:29:36 [UC] The first system that you see on the left here is on poles that are I think about 14 feet tall. It actually has a Tracker system that follows the Sun from east to west and a range of different crops can be grown beneath

01:29:52 [UC] Currently, it's just being used for hey for livestock.

01:29:56 [UC] But what this does is it means that you can get essentially two yields out of that havea. So you're both getting the the hey that you're growing. And you're getting energy, that allows a dual Revenue stream for the farmer, which is great.

01:30:11 [UC] You get to diversify your income and you get to get dual use of the land.

01:30:17 [UC] The one on the right is essentially a ground mount with, with just some slightly increased spacing, but it's using sheep grazing sheep there. So it's raising sheep. And using those sheep as the main vegetation management strategy, there are other things,

01:30:32 [UC] This is done, you know, studies on this top about looking at different crops, you know, and how they grow with solar, you know, integrated sometimes there's ways to even use that for trellising other things. But, you know, just to give an example, they're out, there are a lot of ways to do

01:30:47 [UC] This one of the main kind of complicating factors, is it nine times out of ten?

01:30:54 [UC] You're reducing your power density.

01:30:56 [UC] So if you say, hey, I've got an acre of land, and you're just doing a standard ground Mount, you know, clear everything put down that solar, you know, this is going to space your panels out further to allow crops to grow to allow animals to graze on a power per,

01:31:11 [UC] You know, Greg or per square foot or however you want to look at it.

01:31:14 [UC] you're getting less power from the space. You know, depending on the racking write this, this picture with the Sheep is essentially a standard ground Mount. So the costs other than again, the reduced density are not significantly changed but with

01:31:29 [UC] Agreeable texting with the track or this lifted up, right? Just like a parking canopy.

01:31:34 [UC] It's going to be a little more complex and a little more costly to build. And some sort of the really specific challenges are just that, you know, Farm use is a very Broad and unique things. So, figure out how to be compatible with what a farmer is already doing what they

01:31:50 [UC] Get out of the site requires a lot of kind of custom relationship building and getting to understand the processes and systems in place.

01:31:58 [UC] Right down to saying, you know, what are the turning radius is and tight clearances from the farm equipment, being used. And you know that partly why what you're seeing in both of these is really grasslands rather than crops but it is still an area of research

01:32:14 [UC] That I think, you know, merits a lot further investigation and, you know, the other con list is not, every site works. Just like any real amount. If you're far enough from grid power, that can be an issue.

01:32:26 [UC] If you're, you know, very close to Wetlands.

01:32:29 [UC] You're running in permitting issues but it is it is a win to combine solar farm land. You know as as noted it's really great for Farmers to sort of

diversify the revenue streams especially in an era where we're seeing prop losses or any say most still got the umbrella of the

01:32:43 [UC] And that really helps and public perception. Cheaper fuel people, people love seeing this stuff.

01:32:50 [UC] It's a you know, it's a very positive thing to sort of see two things happening at once on site and to see Farmers benefiting from Solar without clearing the farm. So, just to give a summary, you know, I think rooftop solar is always the easiest and

01:33:06 [UC] So mr.

01:33:07 [UC] Roach, but it can't do everything we need.

01:33:09 [UC] Not every roof works, and there just isn't enough space on roofs, every approach is going to have challenges, so there's pros and cons to everything.

01:33:17 [UC] and there's also ways to make almost all of them work, but I think a big thing that I'd like to see is, you know, more ways to support rooftop solar viability.

01:33:29 [UC] So that means that the existing building stock looking at ways to address building issues, you know there's currently

01:33:35 [UC] The legislation being proposed that would establish a zero carbon renovation Fund, in Massachusetts, allow homeowners with aging buildings and limited income to do. Structural grades roof Replacements, things like that. That would let them both implement solar and

01:33:50 [UC] Do you know conversions to heat pumps? And other all-electric approaches, basically go to a zero carbon building approach.

01:33:59 [UC] Some municipalities have looked at policies is essentially encourage or require solar as part of new construction at different scales. And I think those are a good idea in terms of just sort of making sure that when people to build, they build something that works well for solar.

01:34:14 [UC] But kind of, you know, one of the big takeaways I wanted to really touch on is I think the most popular options for solar off. The roof are also the most complicated of the most expensive, doing the agreeable, to X, doing the parking canopies.

01:34:26 [UC] They're harder, they're more costly.

01:34:28 [UC] And if you're looking at a strictly Revenue driven approach to solar, you need to sort of, you know, factor in the fact that that's going to be more complicated and going to be more costly, I think, you know, to be fair the incentive programs to address this in some ways. But

01:34:43 [UC] Finding more ways to internalize the added value of the Dual use solar adds to its communities.

01:34:48 [UC] Would be good and big pictures. You know. We need more solar of really probably all kinds to meet our climate goals so sorting out good policies.

01:34:57 [UC] Good zoning regulations, good ways to manage sort of limitation is going to be critical as we proceed and that's all for me.

01:35:07 [UC] Happy to take questions if their time and certainly talk later.

01:35:10 [UC] Well, thank you Andy. That was very

01:35:13 [UC] Helpful and please stick around for the panel at the end of this section. Because there are a couple of questions for you, that will take at that time, but we're going to move on now to our next speaker. Who's going to cover some similar?

01:35:27 [UC] It's got a complimentary discussion. Josh hillston from PV squared is going to talk about the challenges of Solar Development in the built environment.

It's all yours Josh.

01:35:41 [UC] Thanks so much.

01:35:43 [UC] Go ahead and pull up my presentation here.

01:35:54 [UC] Great.

01:35:54 [UC] So my name is Josh Hilton and I've been are designing sales Consulting with PV squared for the past decade and it's been an honor to support. Hundreds of clients across Western masses. They go solar and take steps towards transitioning to clean energy.

01:36:07 [UC] This is particularly been fun to follow Andy, a friend and former colleague and also John Rogan who had the privilege of taking a class with at Clark University. So it's been really great to see some of their work leading into my presentation.

01:36:22 [UC] I've been asked to speak about the challenges of Solar Development and built environment, which generally refers to residential and Commercial roof. Top solar small-scale groundmass and solar parking canopies as and I just did a great job of reviewing those project types, this

01:36:37 [UC] Area of solar particularly residential rooftop solar to the Show, an example of here.

01:36:43 [UC] It's definitely the most visible and common in the communities as is commercial roof, top solar. And then we have of course, smaller scale, ground mounts, typically located in like a backyard or side field, or pole mounts

01:36:59 [UC] And then of course parking canopies which mostly you see these at a larger scale.

01:37:05 [UC] I think one of the trends that would be interesting is getting the economics of these to the point where you can do them, you know, more of these kind of smaller scale, kind of infill development, you don't always have an opportunity to start, you know, fresh with a brand new parking lot in a

01:37:20 [UC] grocery store like this picture, which is, of course, the River Valley Co-op in Easthampton that many slopes will be familiar with

01:37:30 [UC] these projects are usually installed on buildings and typically interconnected behind the meter of an existing electrical service and generally they serve on site electricity needs which those contrasts with utility-scale Solar Development which generally first a megawatt scale

01:37:45 [UC] Bounce that export all their power to the grid and where there are, of course, more issues and trade else around land use.

01:37:52 [UC] So, to prepare for this presentation, I surveyed, my colleagues at P Squared on the design and sales team as well as our project managers permitting specialist and of course the installation team. And here are our top five challenges of developing solar in the built environment.

01:38:07 [UC] Image. Number one, weather and wear and tear on the body.

01:38:11 [UC] Number two, municipal permitting and inspections number three, fire code, roof access setback. Requirements number for utility service and Transformer, upgrades number five, electrical licensure, and one-to-one ratio

01:38:26 [UC] Kermit's, I'm going to go ahead and get into some of these cells.

01:38:30 [UC] So, rooftop solar installation is physically challenging and difficult work.

01:38:34 [UC] That's performed Outdoors primarily and you're exposed to the elements.

01:38:38 [UC] So the weather can be cold and snowy or hot and sunny humid and rainy or Stormy with gusting winds and the risk of lightning strikes and all of these

weather conditions are intensified when you

01:38:53 [UC] Working on a roof working at height. Typically on a pitched roof is installers bodies. So back pain knee and ankle pain. And shoulder problems are

01:39:08 [UC] Really typical complaints of rooftop solar installers and the wear and tear on installers. Bodies is real and can result in folks shortening their installation careers or requiring alternative ground based roles or light duty work

01:39:24 [UC] Number two in Municipal permitting inspections.

01:39:26 [UC] So before you can install a solar project, you need municipal building and electrical permits. There are significant variations in permitting processes across municipalities and little in the way of standardization especially at the level of individual inspectors or authorities having jurisdiction.

01:39:41 [UC] Fiction or HD is as we say in the industry, PV squared service territory includes more than 50 different towns.

01:39:49 [UC] So aside from the significant amount of time and energy to prepare a permit package and get them approved.

01:39:54 [UC] The biggest issues that we have to do with scheduling inspections and satisfying. The many varying requirements of individual inspectors who in some cases, inspectors can seem to have an outright hostile attitude towards solar installation.

01:40:10 [UC] So for example, a typical rooftop solar project will require a rust building inspection after the mounting attachments. And racking systems are installed but before the panels are installed because of the rough inspection occurs. Midway through the installation process.

01:40:25 [UC] Access. There's a very high risk that the installation will be interrupted if an inspector cannot be reliably and quickly scheduled and get to the site.

01:40:33 [UC] So, installation crews are routinely forced to lead job sites early, or remobilize to a new job site. If they can't get a rough inspection in time, this reduces operational efficiency and effectively raises the price of Solar for everyone,

01:40:48 [UC] Final building and Electro.

01:40:51 [UC] inspections are easier because they can be scheduled once.

01:40:54 [UC] The installation is complete, but it's still two additional inspections that need to be coordinated.

01:40:58 [UC] And often inspectors will require a licensed electrician. Be present for the inspection and may have requirements that differ substantially from inspectors. The next town, over installation. Methodologies that are routinely accepted in one jurisdiction will

01:41:13 [UC] Be allowed in another and there's minimal latitude for a negotiation with inspectors who do have final Authority, and little oversight.

01:41:21 [UC] There are some towns in which PV squared has found its so ownerís and difficult to work with inspectors that we either have or have seriously considered simply not providing solar in those communities anymore.

01:41:36 [UC] In or three roof access Pathways and setbacks for fire code. So in until 2023 this year, mass building code Exempted solar installations from including Ruth access Pathways and setbacks give me fire code then something changed and we started to hear Rumbings that the forthcoming edition of the

01:41:51 [UC] He's building code would remove that exemption and that rooftop solar rays would be required to comply with national fire code.

01:41:59 [UC] Setbacks before this new version of the mass building code was

released sometimes started to enforce fire code, setbacks and access Pathways even for solar projects that had already received their building permits, which sent our operations in chaos and required

01:42:14 [UC] Dozens of already contracted solar projects to go through laborious and painful redesign processes. And the number of cases, those resulted in projects getting downsize to the point where they no longer made sense and those projects were cancelled. So typical

01:42:29 [UC] An actual roof, setbacks are 18 inches to 36 inches from the Ridge and then a 36 inch wide access pathway should the ridge for each route plane. And those 36 inch Ridge. Setbacks they kick in a solar covers more than

01:42:43 [UC] Thirty percent of the overall roof area and that's a nice T threshold to hit.

01:42:47 [UC] So if you just see this picture here, you know, a number of these arrays would no longer be compliant with the current fire setbacks that are being enforced and so you would lose an entire row of panels. In many of these cases,

01:43:02 [UC] so here's another example of a layout of a solar array on a roof with no roof setbacks, here's what it looks like with the most with a 36-inch fridge, step back, and a 36-inch Pathway to

01:43:17 [UC] Edge on the side. And then here's, you know, sort of, like a compromise, kind of a layout where, you know, the code official could allow for a slight engagement on like a ridge, setback, for example and you know, you know, lose as much from the full layout.

01:43:33 [UC] so, as we were experiencing this, we found that on average typical residential, rooftop solar array will lose about 25% of its size due to fire setbacks but some smaller projects or those with many smaller sub arrays and I'm going to use

01:43:49 [UC] I picture that and E1. Remember here. You, you could lose certainly more than 50% of the number of panels on a roof and, you know, a project like this, you know, probably would just knock it. Built under the current setback requirements.

01:44:04 [UC] So here's a quick thought experiment. For folks, if Massachusetts had not previously, Exempted residential rooftop solar rays from leading fire code, setbacks there would be 25% less rooftop solar today.

01:44:17 [UC] So at this point, both towns in western Mass are enforcing, fire code setbacks but there's still a huge amount of variation across municipalities and between individual fire officials.

01:44:28 [UC] So some fire officials seemed eager to enforce the most conservative interpretation of the fire code.

01:44:34 [UC] And to leave little room for common sense, accommodations or exceptions and other fire officials don't see any need for rooftop setbacks and are not enforcing them at all. So the rollout of these fire codes and mass was messy and lacked any kind of centralized coordination.

01:44:49 [UC] Chain or telegraphing of the timeline for onset of the setback requirements.

01:44:54 [UC] And all of that could have been easily avoidable with the appropriate leadership at the state level looking forward. If fire codes are going to continue to be enforced, what are some implications of that on solar array layouts on roof?

01:45:07 [UC] Other than simple size reductions. So one, is that arrays. That had previously been Justified up to the ridge are now being located further down the roof often Justified to the bottom Edge which means they'll

01:45:19 [UC] They'll have more shading because they're lower down the roof and then it's also much harder to set up a ladder under the array to install or service. The array are arrays. That would have previously been centered on a roof, leaving a small, but useful access pathway at either edge of the roof are

01:45:34 [UC] Being justified hard to one side to make room for a full three foot access path way on the other side and this makes it much more difficult and less safe for installers and will also make servicing the array harder and less safe than the future.

01:45:48 [UC] So, there are legitimate competing interest here and it's reasonable to ask for some amount of roof access to be preserved for firefighting activities.

01:45:57 [UC] But my question is, was this a problem that actually needed to be solved and do these codes do more harm than good?

01:46:04 [UC] It was there a consideration of the greater good. When these fire setbacks The Entity group enforced.

01:46:12 [UC] Moving on to utility service and Transformer upgrades, so, most, rooftop solar installation does not require a larger electrical service. So what it might be typical to upgrade from say, 100 amp to a 200 amp service to pursue other home electrification

01:46:27 [UC] Like adding heat pumps are EV Chargers.

01:46:29 [UC] It's not typically necessary for solar.

01:46:31 [UC] However, interconnecting solar is considered by the utility to be a service upgrade, which triggers compliance with the current utility service design guidelines.

01:46:41 [UC] So, existing electrical services that work just fine, but have fallen out of compliance with current utility guidelines, are required to be upgraded to meet current codes as part of a solar installation and this can be costly.

01:46:55 [UC] costly. And in some cases May prevent

01:46:56 [UC] the solar installation for moving forward and at a minimum adds significant timeline, delays and cost. So some examples of these kinds of service upgrades were beware a meter was located on the back side of a building.

01:47:10 [UC] Now they're required to be on the front or a Gable end or as example is shown here in this picture where there's an addition that encroached on that utility meter and it no longer meets the setback or clearance requirements.

01:47:23 [UC] So for this client to do a solar project, they have to substantially.

01:47:26 [UC] Work their electrical service because it no longer meets code.

01:47:30 [UC] The other issue is that we can sometimes have to upgrade Transformers and that is typically happening when the solar project is larger than the Transformer capacity, which makes sense the Transformers not rated to handle that much power.

01:47:44 [UC] You got to upgrade it but it also happens in the case of shared Transformers and just here, I'm going to use an example that's close to home for me.

01:47:54 [UC] Street. There are five solar projects on my street and a shared Transformer, all those solar projects connect to a single Transformer and I would strongly suspect here that the next person on the street, who wants to go, solar will be required to upgrade to that Transformer

01:48:09 [UC] And we're seeing this is becoming really common, especially in dense neighborhoods with high levels of solar adoption.

01:48:15 [UC] The problem is, it's hard to predict when these Transformer upgrades are going to be triggered, especially with share Transformers, because you don't

always know how much solar is interconnected. And the cost of the Transformer, upgrade is born entirely by the interconnecting customer, so

01:48:30 [UC] Pass or not distributed across all interconnecting customers or all utility customers or all taxpayers.

01:48:36 [UC] So there's no socialization and these costs and finally timelines for getting a new Transformer can be really long and varied.

01:48:44 [UC] This is a project we're currently building in Amherst. Where we've received an estimate of more than one year, for a Transformer, to be available from the utility and you do have to work with utilities to get the Transformers even though the interconnecting customer pays full Freight on the

01:48:59 [UC] cost.

01:49:01 [UC] So yeah, timeline delays and costs and then not great.

01:49:06 [UC] Socialization of those cost burdens are all issues there Josh. If you could wrap up in the next minute or two, please yep.

01:49:14 [UC] Yeah, I'll try your. So finally, the electrical licensure and one-to-one ratio Mass requires solar installations to include licensed electricians, working in a one-to-one ratio with unlicensed installers, sometimes called apprentices and effectively.

01:49:25 [UC] That means the crews are dispatched a a licensed and unlicensed workers we usually run.

01:49:29 [UC] Four person crew.

01:49:31 [UC] So, two pairs as you see here, but this greatly limit Staffing in options and makes operations much harder.

01:49:37 [UC] What happens if an electrician calls out sick or needs to go for an appointment early.

01:49:42 [UC] So, we're constantly juggling electricians and money inspectors consider. All aspects of solar installation to be electrical work subject to ratio requirements.

01:49:50 [UC] Few roles for entry level or helper positions, and high demand for licensed electrical, labor limits, the supply of electricians and driven wages. For electricians way up in a highly competitive, labor market and electricians are learning, you know,

01:50:05 [UC] What their unlicensed colleagues on these jobs are working.

01:50:09 [UC] So it's great for electricians but who are electricians? Well, they're overwhelmingly male and an aging demographic. So many older electricians are no longer willing to work on the roof or they were strongly prefer not to because as we discussed above working on the roof is the body, but that presents

01:50:24 [UC] Logistical challenges because many inspectors require unlicensed.

01:50:27 [UC] Installers to work under the close supervision of an electrician, which on a rooftop means, you need electrician on the roof. So, in conclusion, one to one ratio, requirement and limits opportunities for entry-level installers, to enter the workforce, but just training operations.

01:50:43 [UC] And you hand. It makes look the cost of solar much more expensive for everyone.

01:50:48 [UC] So I know that was a lot.

01:50:50 [UC] Thank you all for allowing me to present

01:50:54 [UC] Well, thank you Josh. That was very interesting and very informative and I can expect that there will be some questions when we get to the panel discussion in just a few minutes.

01:51:05 [UC] Moving on our next speaker is claim, clay from UMass extension. He's

the director of the agricultural program and is going to talk about food production and farmland protection.

01:51:24 [UC] Sorry, we're going to unmute good afternoon, everybody.

01:51:27 [UC] Thanks for inviting me here.

01:51:29 [UC] I'm going to introduce myself and get right into it.

01:51:32 [UC] I know we're running a little bit late.

01:51:34 [UC] I am the Clem. You may want to change your display settings so that we can see the actual full screen.

01:51:44 [UC] Okay, I thought I did that up at the top the middle of the three.

01:51:54 [UC] Up higher.

01:51:58 [UC] Sorry what says display settings at the top of the bar above your screen to the right.

01:52:08 [UC] Little farther.

01:52:09 [UC] I don't, sorry folks.

01:52:15 [UC] There you go.

01:52:17 [UC] And then hit switch screens.

01:52:29 [UC] That's right.

01:52:30 [UC] you could just proceed if you want will turn look at this. I'm not here's the things you're saying or not.

01:52:35 [UC] What are actually showing up on my screen, not sure why. So my apologies so I direct the extension agriculture program at UMass extension, to say a few things about me. I oversee a group of extension

01:52:50 [UC] To work with farmers and and professionals and Commercial.

Horticulture also serve on the agricultural lands preservation committee, which oversees the APR approval process for Farmland, protection and was involved with the Farmland action plan.

01:53:05 [UC] And I'm involved with on-farm research, funded, by d0 e. That's led by Clean Energy extension looking at dual-use and with review of dual-use predetermination applications.

01:53:17 [UC] So the two things I was asked to speak about and I apologize. I don't have as many pretty pictures as others are local state and Regional goals for food production and farmland protection, and the effects of solar deployment on agriculture farm, land and farming economics.

01:53:34 [UC] Talk mostly about Massachusetts, not other states. In terms of goals for Farmland protection, I'll talk a little bit more, regionally about food, protect production and and how that relates to Farmland goals for Farmland

01:53:49 [UC] Farming.

01:53:50 [UC] And then I'll just briefly touch on the effects of solar deployment based on some sort of preliminary observations from the work that we're doing the the on-farm research that we're doing and and related work.

01:54:05 [UC] But it's a little soon for me to say anything conclusive on on that front just knowing that this is more of a solar crowd than a Farmland crowd. You know, keep it pretty basic here and also that we're short on time, the Massachusetts State wide

01:54:19 [UC] goals for Farmland, protection, emerged from a few State.

01:54:25 [UC] And I'm just going to focus on two publicly embraced goals, not so much those coming from private sector organizations.

01:54:32 [UC] So come from a few State planning exercises to clean energy, and climate plan that many of you are probably more familiar with than I am the healthy soils, action plan, which was released earlier this year, but developed a couple of

years prior to that and the Farmland action plan which also was
01:54:48 [UC] Developed in Prior years but is under review for release later this year. Just to focus in on the key goals that are consistent across. Those one is no net loss of forest and farmland
01:55:03 [UC] And the other is protecting 30%, in case of the healthy, soils, action plan and specified as of undeveloped Prime soils, and soils of Statewide importance, protection is sort of a subset of that goal of no net, no net loss, those
01:55:17 [UC] permanent protection through tools, like the a PR program and other easement programs and then no net loss can be achieved through a variety of other means, besides permanent protection, tax advantages and
01:55:33 [UC] Zoning variety of other tools that we won't get into. But just in terms of goals, the idea is to is to protect 30% and to have no net loss.
01:55:46 [UC] Just quickly to show folks where where the the Farmland is and what it is, and apologies. Again, if you can't see my screen, especially if it's smaller than it should be and the colors don't necessarily lend themselves to distinguishing, but two-thirds of the Farmland in Massachusetts
01:56:02 [UC] Is is in this part of the doughnut here which is Pastor. Hey and other perennial crops and then a little less than a third is cultivated land, including cranberries. And so that that's largely the breakdown and
01:56:17 [UC] This is where you see it geographically and then the table here on the right, just shows you what the protection status is. And it's a lot of numbers there.
01:56:26 [UC] I don't want to call attention to too many of them other than to say that if the goal is 30 percent protection, we're currently at 10 percent on average Statewide and not the county that has the most has 17 percent.
01:56:39 [UC] So there is a long way to go to achieve that goal. Great progress being made, we have a groundbreaking program that in the API.
01:56:46 [UC] Our program and it's does phenomenal work. But it's a long slog to protect that much land and so some of the goals that are out there are very ambitious if we're trying to achieve them from the Farmland protection standpoint
01:57:01 [UC] By 2030, in terms of food production, there really are not a lot of state agency goals on food production that are made very explicit, just generally, the more local food production. The batter is
01:57:16 [UC] Is sort of the overall messaging but I am going to refer and do a few slides borrowing from the New England, feeding New England report which was not produced by a public agency. It's the New England food system planners taking the lead
01:57:31 [UC] on this but it has been you know I won't say endorsed, certainly not in its entirety but the MDR and other New England Department of Agriculture has said that it may think it's a valuable tool and that there's significant alignment between
01:57:47 [UC] Queen departmental goals and, and the reports aims and it really because it's the only effort in the region that that starts with food production and then cooked in goals and then in sort of a self sufficiency approach
01:58:02 [UC] Often used to justify Farmland protection and and other initiatives in the agricultural sector starts with those.
01:58:11 [UC] And says, how much land do we need to achieve those.
01:58:14 [UC] And so, I thought it would be interesting to at least present a little bit of that in here, in the context of solar conversation. I'm not going to

walk through this model with the point simply is that they had a fairly detailed conceptual

01:58:29 [UC] I will backed up by a lot of analysis to figure out how much land you would need to achieve certain goals related, to food production.

01:58:40 [UC] There's also a whole set of dietary assumptions that are won't get into here.

01:58:43 [UC] So we'll just sort of move forward from there.

01:58:46 [UC] The end result of that modeling work and with a lot of GIS work and so on is that to achieve 30% based on the assumptions about diet and other things that they made.

01:58:59 [UC] Of regional self-sufficiency. You need to both Revitalize. Some existing crop land, and add five hundred ninety Thousand Acres of new crop land across New England.

01:59:09 [UC] So just to put that in context, here's at this chart sort of shows you what what the acres are in New England, and the New England states and a relative to the other parts of the country. So to add 590,000, new crop land Acres would

01:59:24 [UC] 15% increase across New England.

01:59:26 [UC] So if that were shared proportionately among the six New England states, we'd be looking at about 75,000 new Acres of Farmland in Massachusetts.

01:59:35 [UC] So, the point there is simply sorry, I'll go back to that one, but the point there is is not that anybody has to agree or disagree with, with these goals in particular, but simply that for folks who are focused on Farmland protection food security

01:59:51 [UC] And not thinking about solar at all, which I think is very few people who aren't thinking about solar at all. But, you know, there's a long way to go to protect the amount of farm land. That has been put forward as a goal and there's a need potentially to increase.

02:00:06 [UC] Farming and the acreage under farming significantly over time in order to cheats food self-sufficiency goals and so I think it's valuable just for for folks who are working in the Solar world to be aware that there is a

02:00:21 [UC] Two goals out there.

02:00:22 [UC] And of course, there is some potential conflicts and some potential areas to reduce those conflicts.

02:00:28 [UC] And I know that there will be others talking about that.

02:00:31 [UC] I'm just going to briefly make a couple of comments based on my own experience here in terms of the deployment of solar on agriculture farm land and park firm economics, and really kind of broad broad points to

02:00:46 [UC] Consider in furthering the conversation one is it Farms just vary a lot in in their soils their crops and the ownership tender and management structures and many other attributes.

02:00:59 [UC] Perhaps also vary a lot in their adaptability to solar cell and that's designed for Tool you'll use which others have mentioned here. Some crops May succeed in that setting, but farmers will typically lose flexibility ones,

02:01:14 [UC] Are installed in terms of what kinds of crops they may be able to be successful with under under those panels. The trade-off between agricultural production and energy production is going to vary with those, both the farm related factors and the solar factors.

02:01:30 [UC] And this just makes policy and incentive design.

02:01:32 [UC] Very difficult. As I think, we all know.

02:01:34 [UC] And another thing that I think is often forgotten is just that the benefits of solar Revenue may or may not slow to those who are responsible for agricultural production on the farm.

02:01:44 [UC] So we throw around the word farmer but it can mean many different things and I think just in the interest of more clarity and open and honest debated, it can be important for people to be a more explicit about which farmers

02:01:59 [UC] are talking about or whether they're talking about the person who owns the land, the person who manages the farm, the person who made an agreement with a solar developer in the past and so on, because when you're trying to trying to track who is ultimately benefiting from

02:02:14 [UC] From incentives.

02:02:15 [UC] It's usually not a simple picture.

02:02:18 [UC] So with that I will stop and take questions when we get to the panel. Thank you.

02:02:25 [UC] Thank you very much clam, you're right on time.

02:02:28 [UC] So thanks so much for doing that.

02:02:30 [UC] And yes, we'll look forward to taking some questions for you during the panel.

02:02:34 [UC] It's coming up, we're going to move on now to our next speaker.

02:02:38 [UC] Andy Fenton from the nature conservancy and and he's going to talk about wildlife, habitat conservation, and recreational land. Take it away ND

02:02:52 [UC] Thank you, Scott.

02:02:56 [UC] Just let me know how you still seeing full screen or not.

02:03:02 [UC] Yep, fullscreen. Your look good.

02:03:04 [UC] Okay, great. Thank you.

02:03:07 [UC] Well thank you Scott and thanks to the clean energy extension for inviting me today. Thanks for everyone who's joined and thanks to the other speakers. I'm actually learning a ton today and I'm a forest ecologist with the nature conservancy in Massachusetts that been with

02:03:22 [UC] 25 years and most of that time I focused on Forest conservation in Massachusetts with focus on Western Massachusetts and I've also worked on solar and renewable energy sighting over the years with many of the folks on the panel today

02:03:38 [UC] And what I want to talk about is wildlife plants and animals and their habitats and begin begin to cover how we can use information to rapidly.

02:03:50 [UC] Expand our renewable energy while being sensitive to vulnerable and important habitats.

02:03:57 [UC] And other speakers speakers will will expand on this topic.

02:04:02 [UC] So for context and I think this will provide context for some of what we've already heard. And also, what will here going forward?

02:04:10 [UC] Massachusetts has almost three million Acres of forest.

02:04:12 [UC] That's about 60% of the state. We have over 8000 River Mi 500,000 Acres of wetlands and about 1.5 1500 Acres of Coastline. So all of that, diversity of

02:04:26 [UC] that supports a rich diversity of plants and animals. Over 2000, native, plant, species, 200, breeding bird species, mammals salamanders reptiles insects fungi and more and we have over 400.

02:04:42 [UC] Native plant and animal species listed as rare under the Massachusetts. Endangered Species Act and it takes large intact, well-connected habitats to support this Rich diversity over time.

02:04:55 [UC] And we also need Wildlife that as that is resilient to climate

change. As the as we're seeing the impacts of changing climate on ourselves and on, and on our native plants and animals.

02:05:10 [UC] These same places are critical to our own health and well-being are our communities, our economies our quality of life and for certain the pandemic has taught us that access to open. Space was a critical aspect of

02:05:26 [UC] From of personal and Community healing as state parks and Forest Municipal lands Land, Trust lands. And others were receiving record. Visitation these same natural systems clean our air and water.

02:05:40 [UC] Are they pull carbon pollution from the atmosphere and they give us protection during droughts and floods.

02:05:48 [UC] This map shows natural lands mostly forests in the Berkshire, plateau of Massachusetts covering most of Western Massachusetts. I made this map over 10 years ago and I've used it frequently to kind of identify and exemplify the opportunity to

02:06:04 [UC] Conserve outstanding intact, connected Landscapes, across, Western Massachusetts. But more recently, I realized that this only tells part of the story and I made a companion map. That looks like this, which is that same

02:06:19 [UC] Forrest, natural cover with our develop plans in red and our roads in black on the same map and this habitat loss and fragmentation which comes from these developed plants and Rhodes has a direct impact

02:06:34 [UC] On the viability and resilience of our native plant and animal species are wildlife.

02:06:41 [UC] So the same concept I've borrowed the data from Harvard forest and modified their graph of every New England State to show, just Massachusetts and on the, on the y axis here, we see the percent of State Forest cover

02:06:56 [UC] our time about 500 years ago at the left side of the graph, we see that Massachusetts was about 90% forested and through the 17th 18th and 19th centuries that Forest cover dropped

02:07:11 [UC] About 30% of the, for the state being covered in forests at that, at its peak, deforestation of Forest, Clearing in the middle of the 19th century.

02:07:24 [UC] Now, our Force have recovered over the past hundred years, to about 70%, Forest cover by the 1960s. But what we're seeing now is a very right side of the graph is a loss of forest. Once again, we've lost about

02:07:39 [UC] 10% of our forest cover from 70 percent down to about 60 percent over the last 50 or 60 years and to borrow the phrase from Harvard Forest, previous director. David Foster.

02:07:53 [UC] What we're seeing now is a hard deforestation.

02:07:55 [UC] We're not seeing Forest cleared for pasture, which can recover to forestry, seeing Forest cleared for development which will not recover to Forest over time.

02:08:07 [UC] So, all of this has led to habitat loss and fragmentation combined confounded by things, like invasive, plants non native, insects and diseases of our tree species climate change and this is the impact of the the habitats

02:08:22 [UC] Our native species and ecosystems. Show me which are showing dramatic, the clients in both diversity and abundance.

02:08:29 [UC] And that's, of course, both globally and locally and the same degradation to our natural systems that affects plants and animals. Affects our own ability to receive the benefits that these systems provide one number that is sticks out to me. On the left is the loss of

02:08:44 [UC] Nearly 30% of the birds in North America, over the past five years or

50 years.

02:08:50 [UC] Sorry.

02:08:51 [UC] That's that's that's a loss of 3 billion, Birds a key to halting and reversing these Trends is to consider conserve resilient plant and animal habitats.

02:09:05 [UC] But the good news is that despite the high rate of loss of forest, and I don't know if I mentioned this but we're losing Forest at about a rate of five, six thousand acres a year, that's ebbed and flowed over the last 50 years

02:09:20 [UC] Five to seven thousand acres.

02:09:22 [UC] Are the general numbers despite losing Forest, at that rate.

02:09:26 [UC] We are also protecting forested Landscapes at a high rate, so this is probably my busiest slide.

02:09:32 [UC] What we see on the acre on the left is Acres of protected, lands along the y, axis and along the bottom, are the year. So starting more than 100 years ago, in the mid 19th century, we protected about half a million Acres over.

02:09:47 [UC] 100 years and thanks to the states and the mass Audobon losing ground reports for all these data where I pulled them from.

02:09:55 [UC] And again, this is a coarse scale back of the envelope.

02:09:57 [UC] I mean, sure to stick that on on the slide to remind myself but we we protected about half a million Acres, over 100 years, that rapidly accelerated starting in the mid-1980s and we protected almost another 800,000

02:10:12 [UC] Verse 2 for a total of 1.3 million acres by 2020.

02:10:17 [UC] That's a huge success in a primary reason why we have such amazing wildlife, habitat natural areas based on the work of state agencies, municipalities Land, Trust in others, and this course should be greatly celebrated

02:10:31 [UC] The clean energy and climate plan goals for the state which is also mentioned. Total have a goal of about protecting a little over 2 million Acres of 40% of the state by 2050.

02:10:43 [UC] that's that's another approximately 700,000 Acres. This is ambitious but also achievable and this would mean an acceleration of pace of land protection over

02:10:58 [UC] Coming years, but again, it's in keeping with our recent Trends. Ambitious, but achievable

02:11:07 [UC] To inform these efforts.

02:11:08 [UC] The Nature Conservancy collaborated with Mass wildlife to develop the most recently, but the news bio map, which we developed last year to maximize identify places. That will maximize the benefits of land protection, restoration

02:11:23 [UC] Management. And we synthesized, an integrated, a decade's worth of data to create bio Maps where species habitats freshwater Forest landscape and other components and we pull data from the Mass wildlife databases 40-year

02:11:38 [UC] Heritage and endangered species program database tncs resilient landscape data. And the UMass ecological Integrity data among others.

02:11:50 [UC] This information is designed to inform decisions at multiple scales. By many entities including municipalities public agencies Land, Trust in others.

02:12:00 [UC] The map here showing core habitat and critical natural landscape across. The state is designed to be used as a pro active and proactive planning and action tool.

02:12:10 [UC] It's different from the priority habitat used for the regulatory message. Massachusetts, Endangered Species Act and the

02:12:19 [UC] The tool is designed to help us conserve all aspects of biodiversity, not only today but in perpetuity going forward, now acknowledging that there are

many other considerations going to solar citing. These data can help us proactively address some of

02:12:34 [UC] Challenges were facing with citing ground-mounted facilities and pointing pointing us away from the most vulnerable and important, habitats.

02:12:45 [UC] I literally spent two or three minutes on Google Maps and found an example that I think is is a good one.

02:12:53 [UC] In this example, the area chosen for the solar array was not prioritized for Bio map in green meaning that it had no rare species habitat. No large intact ecosystems and you can see that it's it's the habitat is

02:13:08 [UC] Operated from the solar array by a road and a lot of Isom by some housing and develop plans.

02:13:14 [UC] So this is an example of a place that did not have a lot of habitat, high quality habitat as defined by Biomat and makes sense, from a solar citing perspective for ground mounted solar. This is as far as I'm going to go on this topic because upcoming speakers

02:13:29 [UC] first are going to go deeper on the topic of using the spatial data to inform how and where to site solar facilities and how we can reach our ambitious, clean energy, and renewable energy climate goals for the state,

02:13:46 [UC] I want to wrap up by saying that we can we can achieve that goal.

02:13:51 [UC] We have the information, we have the data to find win-win solutions, for energy, for climate, for nature, and for people, and I'm look forward to the discussion further on in the session and answering your questions.

02:14:05 [UC] Thanks.

02:14:07 [UC] Thank you, Andy.

02:14:08 [UC] That was excellent.

02:14:08 [UC] And we move on now from talking about the value of force land for habitat and we're going to talk now about the importance of forest land for carbon sequestration.

02:14:20 [UC] And so, our next speaker, Jonathan Thompson is going to cover that go ahead. Jonathan.

02:14:26 [UC] thanks Scott, let's see if we can get the technology working.

02:14:32 [UC] How is that is that you see in the full screen?

02:14:38 [UC] Not yet. No, you getting presents turn yet.

02:14:45 [UC] Okay, one second.

02:14:49 [UC] Let's try that again.

02:14:50 [UC] Share screen.

02:14:53 [UC] PowerPoint.

02:14:56 [UC] Okay. Something's coming sludge how we doing now?

02:15:01 [UC] Got it.

02:15:02 [UC] Okay.

02:15:03 [UC] And it's in presenter view.

02:15:05 [UC] Yep, you're all set. So thanks Scott. Thanks to the clean. Energy extension, thanks for everyone, listening like Andy. I'm just learning a ton today.

02:15:17 [UC] So this is just a great event.

02:15:19 [UC] My talk is entitled answering in, unnecessary question. What are the carbon trade offs between forests and solar? And before I get into it, I need

02:15:31 [UC] To explain that. All of the technical details, I will show you today and the calculator which I'm going to give you a link to it. At the end of my presentation is really the work of my colleague, Lucy Lee who

02:15:46 [UC] Pink is out there listening.

02:15:49 [UC] So and I'm just doing the presenting and so I'll take the blame for everything that's wrong and she deserves all the credit for anything.

02:15:56 [UC] That's right. I also just wanted to introduce you to my dog rooster there.

02:16:00 [UC] As he said, spy a ground Mount solar project and Amherst.

02:16:05 [UC] So why do I say I'm answering an unnecessary question because it's a false choice is why we can have

02:16:16 [UC] For us and solar, we can meet the clean energy targets for the state and later today. Michelle mannion will offer a presentation that is completely unrelated

02:16:31 [UC] It to what I'm going to talk about today.

02:16:32 [UC] I told her I would say that because it is her opinion and frankly kind of my opinion to that focusing on the trade-offs takes away from the conversation about why we don't need the trade-offs.

02:16:46 [UC] However, as we've learned today, we are losing forest for solar. So despite the fact that we can have both often times solar is replacing for

02:17:00 [UC] Russ. So I think it's worth investigating that question, but remember, it doesn't need to be that way, but since it is, let's talk a little bit about Massachusetts for us.

02:17:14 [UC] So we know that Massachusetts, our store houses for carbon and continue to sequester more carbon every second, and you just explain that to us, and that's what we're going to focus on.

02:17:29 [UC] But we also need to

02:17:30 [UC] To remember the forests are far more than buckets of carbon.

02:17:34 [UC] They are providers of clean, air and clean water. They are where we recreate, that's where we find Solace and they are home for just sweets of biodiversity, I'm going to dwell on this, I just want to make sure

02:17:50 [UC] That is mentioned also want to point out that it's that and I think it can be. People can forget that Forest directly absorb carbon from the atmosphere.

02:18:01 [UC] That's what photosynthesis is.

02:18:03 [UC] is. Pull CO2 out, turn it into structural carbon sugars and starches and release, oh, to back into the atmosphere, right?

02:18:12 [UC] So they are a technology for carbon removal.

02:18:15 [UC] is not solar. Doesn't sequester any car.

02:18:19 [UC] Urban at all.

02:18:20 [UC] What it does is help us reduce emissions by supplanting fossil fuels or other carbon-intensive, energy production, right? So they're fundamentally different except that in the end

02:18:35 [UC] Both help us deal with carbon pollution, just in different ways.

02:18:39 [UC] So again, while we say, well, I say it's a false choice, we can have forests and we can have solar in the past, we haven't done a lot to prevent

02:18:54 [UC] Citing within for us. And we saw this from John. I'll say our numbers are slightly different from than John Rogan. These are maps are a combination of his and the do, ER, map, and some hand editing that we've done as we

02:19:09 [UC] Smart.

02:19:10 [UC] So you'll notice a slight differences between the numbers I'm presenting here and what John presented earlier and our map, 60% of ground Mount solar installed in 2010 to 2020, were was right on the

02:19:25 [UC] For a slant.

02:19:26 [UC] And so, you know, if you were to look at a histogram of land cover in Massachusetts, it would look something like this. Massachusetts is about 60%, forested and about 60%

02:19:41 [UC] Of the solar installed in this decade, where they're around 8,000 Acres of new solar landed on first Masters is around 10% Agriculture and about 15% of the solar ended up on agriculture.

02:19:56 [UC] But what this means to me is that it were we're good at citing. This stuff is we are throwing darts at a map, you know. It looks like we've just picked them at random.

02:20:05 [UC] at random. You would end up with something like this distribution and I would argue again that we can do better.

02:20:12 [UC] This of course, loss associated with, this is the equivalent to the annual emissions of over 112,000 cars.

02:20:19 [UC] So given that we seem to be replacing for us with solar, it brings us to the question. The unnecessary question which is what are the trade-offs between the carbon sequestered by Forest and stored by

02:20:35 [UC] Forrest versus the carbon that is not admitted to produce electricity because it is instead being produced by solar. This question comes up a lot.

02:20:48 [UC] I get asked this question all the time.

02:20:49 [UC] I deal a lot in for carbon me. And my lab did the land sector analysis for the Commonwealth and Mylanta studies, and land. Use impacts on forests and Forest carbon all the time. That's what we

02:21:03 [UC] Is fun.

02:21:04 [UC] So typically you know you find an answer that looks like this, I found this on the web it's on synapses website. I have really no, there's no mistake here.

02:21:18 [UC] I would just argue that this is just too simple of a perspective and what this image shows is they take typical forestland and they say. Okay, that is emitted and they say okay it's 31 tons of CO₂.

02:21:33 [UC] Lent and then the avoided emissions associated. With one acre of solar is 510 or 501 and they subtract the two and the difference is the win for soul.

02:21:49 [UC] Now, all that there isn't any particular number.

02:21:53 [UC] I would fault here. I would just argue that. That's an incomplete picture in many ways.

02:22:00 [UC] Solar can be attractive.

02:22:03 [UC] I'm going to Carbon on a carbon scale, under many scenarios, but I think it's worth kind of talking through all the different scenarios. And so what we did was, we built this little online calculator, which started out simple. And like a

02:22:18 [UC] Everything got more and more complicated over time.

02:22:21 [UC] And so, in addition to this calculator, we've built a nice website, a story map that explains how to use this calculator. And I'll give you links to those at the end of the talk, right?

02:22:33 [UC] But this is just a screenshot of that calculator, you can see on the left there are all sorts of buttons that you can pick. And on the right, you get this graph and we'll how to think about this graph is when it goes up.

02:22:47 [UC] It's associated with carbon emissions, right?

02:22:51 [UC] And when it goes down, its associated with carbon, my submissions, right?

02:22:59 [UC] Or the end the together over time, you got the cumulative carbon balance.

02:23:04 [UC] If it's, if the value is below the zero line, it's an overall win for the carbon.

02:23:12 [UC] It's a net carbon sink. If it is above the line, This dotted line, it's a

02:23:17 [UC] That carbon source to the environment. And then you get all these stats at the bottom. So let's take a minute and talk through some of these different variables that we need to think about.

02:23:28 [UC] when we're thinking about the trade-off between the two, okay?

02:23:33 [UC] So first, let's just think on this case we say, oh, we built the solar and here's the emissions, associated with the clearing of the land.

02:23:41 [UC] We assume that it takes them two years before they turn on the power and this upward slope to the line.

02:23:47 [UC] Line represents the foregone sequestration that those trees didn't get to do because they weren't there, and then they turn on the power. And the downward slope is associated with all the natural gas and,

02:24:02 [UC] And other fossil fuels that didn't have to be burned because this acre of forest, had been converted to solar. And you can see by the end of the 2050 period, the line is pretty flat. And that's because in this particular

02:24:17 [UC] Nuclear scenario, we assume that the state is meeting its decarbonization roadmap goals.

02:24:23 [UC] So by the end of this scenario, the grid, the electrical grid is mostly carbon free, right?

02:24:32 [UC] It is so the solar is just replacing other solar or wind or Hydra, right?

02:24:40 [UC] So hopefully that makes some sense and then we can walk through a few of these buttons together.

02:24:48 [UC] The first is the year of clearing, right?

02:24:52 [UC] So let's take a look at how that would impact the trade-off between the two.

02:24:58 [UC] So if we build the solar in 2025, essentially now, well that grid is about 70%, fossil fuels right now, so it's very carbon intensive. And so the solar does quickly,

02:25:13 [UC] No, within before 2030 is in a net sink.

02:25:16 [UC] It's already providing and by that by 2050, which we just picked as an end date to be associated with d carb roadmap.

02:25:25 [UC] It's this single acre of forest has saved the carbon equivalent of about, 200, the annual emissions from 200 Cars, right?

02:25:36 [UC] But if you go out in time, five years, build it in 2030, the grid is much less.

02:25:43 [UC] Intense because of all the other green energy projects, the wind. The other solar, not this particular acre and the hydro and you can see a big difference. And as you go up by the time, you build a solar

02:25:58 [UC] Convert this acre of forest to solar in 2045, you never, you never become a carbon sink. So time is a super important variable. If you're going to build solder, the most impact it will ever have is when the grid

02:26:13 [UC] Is this dirty as it can be?

02:26:15 [UC] I hope that makes sense. So, the time is a really important variable.

02:26:21 [UC] The second one I want to talk about is how much solar capacity was

built in this cleared acre of forest.

02:26:28 [UC] And John Rogan brought this up before, right? And so what this has to do with is

02:26:34 [UC] if the acre is completely covered in solar panels, you end up with a much higher solar capacity per acre.

02:26:43 [UC] If you have setbacks so that the trees don't shade the panel's, then you need to build some roads and maybe the clearing was a lot bigger than the panels that panel itself.

02:26:53 [UC] You end up with a lot less produced. And so here we have while we alter this one variable about the power capacity, we hold all the other variables.

02:27:04 [UC] That their average.

02:27:05 [UC] And so we can see the difference between the, let's say a quarter megawatt or this is, it would another way to think of that is it's four acres per megawatt which is about the industry standard, get to about here.

02:27:20 [UC] Her John said that. In some of the recent data he's seen it was about twice as much land cleared, then the solar panels. So that would put you at 18, which would be way up here.

02:27:33 [UC] So that's another really sensitive thing. You need to know to answer this question.

02:27:40 [UC] How much carbon was in the acre of the forest.

02:27:43 [UC] So we across the state carbon varies, the carbon density of our forest varies widely from old growth forest or high carbon dense forest, this is at the 57 mg per acre.

02:27:57 [UC] This is like the 90th percentile, I think of forests in the state versus the 25th percentile and you can see what the forest look like.

02:28:06 [UC] had a lot of impact on

02:28:09 [UC] The trade-off between the two, I don't have time to go through all of these variables.

02:28:16 [UC] But the other ones we think about was how much down wood is on the site.

02:28:20 [UC] nobody talks about that. But it's often 10 to 20 percent of the live biomass is again in dead snags and down wood.

02:28:28 [UC] happened to carbon and the carbon in the soil, we know from a lot of research at Harvard forest and about a million other places that about half the carbon in a forest is above ground.

02:28:39 [UC] And half is below ground.

02:28:41 [UC] What's going to happen to that below ground? Carbon honestly, no one knows.

02:28:47 [UC] There's reasons to think from our soil warming experiments and the fact that solar arrays tend to be heat islands, that it will heat the soil, that would cause the carbon in the soil to blow out faster.

02:28:59 [UC] But they also create a lot of shade and that slows down microbial, activity and win.

02:29:05 [UC] So all I want to say is that we don't really know so we let you explore, what might happen to the carbon in the soil and how that would affect things. What happens to the remove wood? Does it?

02:29:16 [UC] All end up in, you know, tables and and houses where it's store. Or is it all emitted and burned on site? So we let you explore that? How fast is the electrical grid being decarbonized? All the examples.

02:29:31 [UC] We looked at today assume that Massachusetts meets its

decarbonization roadmap goals, but it might not, we're already a little bit behind and so we let you explore different, decarbonization Pathways as well. We also look at Kurt

02:29:46 [UC] A moment and a few other factors.

02:29:50 [UC] I don't argue that there is any one particular answer here.

02:29:55 [UC] Simply that the question has a lot of nuance and if you are going to think about the trade-offs, it's worth thinking about all the different variables that come in to, to affect that and some of which like time and power density,

02:30:10 [UC] Really can change the difference between a solar project, being a net sink, or a net Source in terms of carbon pollution.

02:30:18 [UC] So, I hope you write down these these bitly sites.

02:30:24 [UC] I highly suggest you go to the website before you go to the calculator.

02:30:28 [UC] That there's links to the calculator in the website but that will explain all the buttons and how to think about them before you go there. And if you have questions and Lucy's going to me if there's

02:30:40 [UC] A million questions but you can contact her directly.

02:30:42 [UC] She's the one who built the website and the calculator and she will hopefully be able to help you.

02:30:48 [UC] You're also very welcome to email me.

02:30:50 [UC] Thank you very much.

02:30:54 [UC] Thank you, Jonathan, very interesting. And I want to thank all the other speakers that presented in this section of the of this session.

02:31:04 [UC] We now have a few minutes for questions and so I'm going to bring up some of the questions that have been entered earlier on to start things off and then move through as many as we can maybe for about six or seven minutes before we take a break

02:31:20 [UC] and so, the first question I'm going to ask came in and I think that probably Andy to imagine might be the one to answer this one, but it had to do with the economics of ground, mount versus rooftop

02:31:35 [UC] And that if the rooftop is less expensive than ground Mount, then why is there so much emphasis on ground mounting?

02:31:45 [UC] Yeah, I guess because I mean I'm not sure well I would say emphasis on Grandma is a question, you know, I think we're emphasizing in this once were talking about land use and obviously round Mounds are a land, use in a way that rooftop isn't will be over, use for building,

02:32:02 [UC] I think that's really kind of the main thing. Rooftop solar has its limits right?

02:32:06 [UC] In terms of what, you know, needs to be owned by. Someone needs to have structural stuff, new roof, no shade ground Mount. You can deploy a lot of solar scale pretty easily.

02:32:17 [UC] So the big scale stuff obviously, you know, they just aren't buildings big enough for multi megawatt solar projects. But I don't know where, you know, I guess I would ask where the emphasis coming from. I'm not sure that it's one over the other I think.

02:32:32 [UC] You know, some people work larger-scale, that's ground and some people work a smaller scale and its more common roof than not.

02:32:40 [UC] Thank you.

02:32:42 [UC] Anybody else? Want to comment on that question?

02:32:50 [UC] Alright next question I think claim your I'll direct this one to you

and then others can chime in if they want but the idea of dual use for agricultural land.

02:33:00 [UC] is there a role for it in terms of providing an opportunity for Farmland to stay in farmland and potentially contribute to the protection of Farmland, by improving the economic outcomes for farmers?

02:33:15 [UC] I think the opportunity exists, I think it's like many things.

02:33:20 [UC] it depends that, as I said, the many factors both on the farm, it were with the farm operation and and with the solar design and you, you're going to need to find the right combination and one of the

02:33:36 [UC] Students of course is to is if you just design a viable system that can work in a dual, you do is setting is that a change of agricultural use.

02:33:47 [UC] That's otherwise.

02:33:48 [UC] Desirable that's a question that sometimes doesn't get asked.

02:33:51 [UC] It sort of goes back to what's the Baseline?

02:33:53 [UC] What do we?

02:33:54 [UC] what kind of Agriculture do we have now? We're kind of Agriculture. Do we want? Who gets to decide and so sometimes you end up looking sort of narrowly and saying okay, yes. Hey,

02:34:05 [UC] Can work under these panels in this situation. But it's you also may want to step back and say, is hey, the right crop for this farmer, these soils, this, you know, this Farm economy who benefits from

02:34:20 [UC] And again that gets into these questions of who owns the land versus who manages it, which are often often different.

02:34:27 [UC] And so, I would say, you know, there's an opportunity, but it's, and we're still trying to do research to figure out which crops actually thrive in those environments in which don't. And so, that's a very basic question, that's

02:34:42 [UC] Well answered. But I think that beyond the answering that question there are a lot of other factors that need to be considered in order to find sort of where those sweet spots are where dual use solar may prove to be a win-win.

02:34:57 [UC] I think everybody wants to simplify things to a win-win but I think that's that's probably it's just never going to be that simple.

02:35:09 [UC] Thank you.

02:35:13 [UC] I think another question that's come up is the idea of storage energy storage? And what? How that factors into the viability of different solar installations? And in particular I think Josh I'll direct it to you in the urban environment or the the developed

02:35:28 [UC] Armand, do you see that the need for energy storage to be a constraint that we're going to run into as we continue to produce more and more solar

02:35:42 [UC] The main Theory there goes solar is an intermittent resource and so if you want to have really high percentages of solar and wind and other intermittent renewable resources in the grade, you need to balance that with a significant amount of storage and

02:35:58 [UC] Dispatchable base load power.

02:35:59 [UC] So, you know, we put a basement you know, battery system in someone's basement or garage. But the reality is that like a lot of things with Renewables at some point, you want to start doing it

02:36:14 [UC] Gail you know not the scale of a residence and you want to start doing it the scale of the grid and that's when you start to see you know, Cee container type of battery storage systems and you know, certainly from a policy

02:36:29 [UC] Example, we've been trying to encourage those to get developed alongside of the larger scale solar.

02:36:34 [UC] So that this co-located and you know, like the smart program has a requirement for storage that kicks in at 500 kilowatts.

02:36:43 [UC] But yeah, the main, the main theory is once your, you know, once you're over 20 percent, or so of your grid is an intermittent resource, you need firming.

02:36:54 [UC] you have the reliability that you associate with the current grid.

02:37:01 [UC] Thank you, Andy. Do you have anything you'd like to add to that?

02:37:05 [UC] Not really just that, I think.

02:37:08 [UC] Well the one thing I'll add is this in storage appointment.

02:37:10 [UC] I think you know, as Josh notes is sort of really critical to balancing Our Generation. I think utilities are starting to look at this on their own, but you know, batteries are complex, bought batteries have a lot more, you know, both both health and environmental risk to them, then solar panels

02:37:26 [UC] Alps and you know, those raised concerns I think those need to be weighed, you know, compared to say coal plants and nuclear which also are perfect.

02:37:35 [UC] But you know, I think batteries are a frontier, you know, kind of the growth we've seen in solar generation over the past decade.

02:37:42 [UC] We're going to see people looking at batteries but increased level of scrutiny and figuring out how to permit them, how to implement them safely, you know where they make sense.

02:37:50 [UC] It's going to be a real Frontier over the next 10 years or so.

02:37:56 [UC] Ken, is there anything that you can add to this in terms of Planning and Zoning with regard to storage and what constraints there may be based on regulation or laws

02:38:12 [UC] That would affect storage differently than the actual solar arrays.

02:38:15 [UC] Well, I think what we're gathering at least, from some of the case law that I'm finding with regards to battery energy storage, it seems as if they gl's, office is looking at that as like

02:38:31 [UC] And ancillary use of solar.

02:38:33 [UC] So I think there may be a case with regards to towns. Having prohibited battery energy storage in the context of, however, they're putting it into

02:38:48 [UC] By law and then agl's office, finding, you know, some trouble that they might find some issues with towns. Adopting, prohibition on those types of uses.

02:39:02 [UC] Typically, I think the appetite for battery energy storage is if they're included for a solar array development plan.

02:39:10 [UC] So and I think as having been, you know, part of conversations back in 28,

02:39:18 [UC] 18, 2019. When solar was ramping up at least here in western Mass.

02:39:25 [UC] There were amendments in those site plan. Approvals at the time that included batteries being installed.

02:39:31 [UC] So I think we're both getting to see what impacts if there were any and that time.

02:39:36 [UC] But also, now that batteries are being addressed as an, only a singular type of use that, I think that they're still going to be challenges and we'll see.

02:39:48 [UC] See, you know how towns navigate some of those legal questions?

02:39:54 [UC] Thank you and sticking with you can.

02:39:57 [UC] there's been a question that sort of expressed some it's a question and a frustration that you know these blueprints for conserving, you know, biodiversity the bio map project and also the prioritization for

02:40:12 [UC] In Farmland.

02:40:14 [UC] Is there a way that that can be incorporated into zoning to try to help achieve those objectives?

02:40:21 [UC] I think that there have been challenges to that and I think some towns have been successful in and the application of of utilizing some of those particular like things like bio map or other types of

02:40:39 [UC] Natural resources, studies that you would include in the regulation I think, typically they would also be included in some of the other planning documents for the town. I think what I've also found is the more

02:40:54 [UC] Are places in your town documents that you include these types of reviews or reviews of these particular Maps, like bio map. Like the National Heritage is map

02:41:09 [UC] That you know there may be an ability to if there happens to be a legal legal question regarding the using those particular criteria. So what I'll say is I think it's nebulous I think that

02:41:24 [UC] There is room for discussion on how to include that and I think some towns have been successful in doing that.

02:41:32 [UC] I also think that there could be in the application of using that those criteria for the review of an Solar Development is when you know, there's scrutiny around it

02:41:47 [UC] specially, if it happens to be contentious and or you know, just seems to be out of the ordinary and but I do think that there seems to be a trend that towns are adopting a more rigorous environmental

02:42:03 [UC] Providing a having the applicant provide and an environmental review of. Is this particular site.

02:42:10 [UC] the best site to install solar. So I think you know it's not necessarily an answer that is I think legally. It just seems as towns are trying to do that and if they get challenged then

02:42:26 [UC] I think it just follows from that point, but it is something that I'm seeing Tom's be more.

02:42:34 [UC] App to passing.

02:42:37 [UC] Thank you.

02:42:38 [UC] I'm going to ask one more question and then we're going to take a break and I think this one is for Andy and Johnathan, one of the questioners asks about different Forest types and their ability to store or sequester carbon or

02:42:53 [UC] Become carbon emitters, like Hemlock or potentially, you know, something like Beech forests that are being affected by Beach Park disease.

02:43:04 [UC] Is there a role for sort of prioritizing certain kinds of forests? If you're going to have to do a conversion, your certain force that are going to be more effective at sequestering and storing carbon.

02:43:14 [UC] And is there a role for silviculture to manage these forests in order to increase the rate of sequestration?

02:43:23 [UC] You want me to go first Indy? Or you want to definitely you you to go for that?

02:43:29 [UC] Yeah, I'm a, I'm a leg or a little bit.

02:43:32 [UC] So I'd say it's a concern. It's a to answer the question.

02:43:39 [UC] Yes, some Forest sequester more carbon than others.

02:43:42 [UC] Also, for us that are affected by insects and disease such as Hemlock. And sadly Beach is just now being devastated by Beach, Leaf Disease, are there opportunities

02:43:57 [UC] For silviculture to mitigate some of these carbon lessons.

02:44:00 [UC] Yes. So all of that but I don't I can't take the next step and say that. So therefore we should convert them to solar.

02:44:08 [UC] I think there are ways to reach our solar targets without going into the forest footprint or minimally going into the forest footprint and I wouldn't seek out certain Forest types.

02:44:21 [UC] So as you know, less harmful from the

02:44:27 [UC] Of of carbon laws. You know, we've been we've had an Eddy flux Tower, which measures carbon fluxes in and out of the forest, six times a second and a Hemlock Forest now for like 25 years, right?

02:44:40 [UC] And we saw that it was only about five years that the accumulation of carbon sort of stabilized in the hemlock before it started going up again.

02:44:51 [UC] And why is that?

02:44:52 [UC] It's because black Birch got established in the understory. Massachusetts is a place that wants to

02:44:57 [UC] E forested just stop mowing your lawn if you don't believe me because it will come back as forest.

02:45:03 [UC] And from the perspective of carbon, you know, car, a carbon molecule is a carbon molecule, has a carbon molecule.

02:45:10 [UC] It doesn't matter if it cycled through Hemlock or a black Birch.

02:45:15 [UC] Getting to the hemlock and cutting it down.

02:45:18 [UC] You didn't really do much from the carbon perspective because there would have been another species of tree there.

02:45:25 [UC] sequestering carbon anyway that said I see lots of roles for silviculture.

02:45:30 [UC] I see lots of rules for you know, I'm a Forester and I like wood and I have all these things.

02:45:36 [UC] I'm not trying to suggest that there are not roles for that. Just not in the context of citing new ground months old.

02:45:44 [UC] Andy.

02:45:45 [UC] Yeah, I'm not a 40.

02:45:47 [UC] I'm the wrong ND sorry.

02:45:49 [UC] Okay. Like I don't know a lot about this because I were both actually, I was my fault three and he's on the agenda today. We're another one this afternoon. Yeah, seem very similar to Jonathan.

02:46:00 [UC] I think there's definitely a role for silviculture to restore and manage forests that are degraded from the Native insects and diseases that like we've been talking about and other factors. And and the goal would be

02:46:14 [UC] Be to improve their resilience, their carbon function, and their habitats values.

02:46:20 [UC] So I, similarly, I don't think it currently challenge forest or one that's being a impacted by these.

02:46:29 [UC] Insects and diseases, is a tarp should be a target for development of any kind. Especially, habitat is often the condition is a current condition at this moment in time. But when we're talking about habitat resilient have

02:46:44 [UC] That we're talking about over decades centuries and even longer as

natural processes.

02:46:51 [UC] Protected. Take place and support by diversity over those long time frames.

02:46:58 [UC] Well, thank you, and thanks to all of you for your contributions, both in your presentations and in the Q&A, we're going to draw to a close, this first, part of the afternoon forum and take a break.

02:47:11 [UC] And now we're about 15 minutes over time, but we'll try to earn some of that back in the intro and the Q&A after the break. So let's take a break for 10 minutes and that means that we'll reconvene at 225.

02:47:27 [UC] The zoom meeting will stay open.

02:47:29 [UC] I've just going to mute myself and stop by video and you're welcome to do the same and we'll see you all back here at 225.

02:47:36 [UC] Thanks again.

02:48:54 [UC] Call.

02:57:26 [UC] Okay. 525, 525.

02:57:29 [UC] Sorry, I'm sure it's 5:25, somewhere on the globe.

02:57:36 [UC] We're ready to start up again.

02:57:37 [UC] part 2 of session. Two of the solar forum and we're going to begin with a short presentation that I'm going to do about relevant state regulations and programs.

02:57:50 [UC] So I'm going to talk a little bit about the wetlands protection. Act. Masssec sits Endangered, Species Act and mass D. EPS brownfields initiative or program.

02:58:03 [UC] So let me just get myself. Set up here, share screen.

02:58:30 [UC] We got to get on the right slide.

02:58:38 [UC] There.

02:58:41 [UC] So I'm going to talk about these three programs, very briefly, it's going to be just a broad overview and I do not work for any of these programs.

02:58:49 [UC] So I can't really speak for them but I can give you some information about how those regulations might pertain to the the site, the siding or the construction of solar.

02:59:06 [UC] All right.

02:59:07 [UC] See I got a note that says you can't see anything.

02:59:09 [UC] Can you see it now?

02:59:15 [UC] Let me double check and make sure.

02:59:20 [UC] There we go.

02:59:28 [UC] Alright, first, we will start with the mass Endangered Species Act Misa, and there's a bunch of text on these slides and that way the slides will be really useful for you to get the details that you're not going to get in this very brief, overview of three, different topics and

02:59:43 [UC] About 10 minutes. But essentially, the Massachusetts, Endangered Species, Act, which was passed in 1990 and regulations promulgated in 1992. Prohibits the unauthorized take of rare

02:59:58 [UC] Or endangered species has listed by the natural heritage and endangered species program, part of the Mass Department of Fish and Game.

03:00:06 [UC] So when we talk about a take, we mean to harm or disrupt the breeding nesting and feeding or migratory activity.

03:00:15 [UC] And so in some ways the destruction of habitat is one way that you can disrupt nesting breeding feeding or migratory activity and that's where it may pertain to solar.

03:00:28 [UC] Installations.

03:00:30 [UC] it defines priority habitat by unifying ahead areas where

03:00:37 [UC] They do occur.

03:00:38 [UC] And so when you propose a project within priority habitat, it triggers a review process by the natural heritage, endangered species program to ensure that there will not be a take.

03:00:54 [UC] so basically what you see on the right hand side, in addition to the picture of a marbled salamander is an outline of polygons that was drawn based on known occurrences of Marble Marble salamanders, and

03:01:09 [UC] Defines an area of priority habitat.

03:01:12 [UC] and so a project that's proposed in a polygon like that in requires review by the natural heritage and endangered species program, either through the wetlands protection act processes or through the Massachusetts,

03:01:27 [UC] Species Act.

03:01:30 [UC] If the project is determined by natural heritage to result in a taking of a particular species, that is listed State listed in Massachusetts, then you have to meet certain performance standards.

03:01:46 [UC] In order for a permit to be issued and for you to be given the green light to proceed. So in order to do that, you're going to need to Alternatives that would minimize the impacts or potentially avoid those impacts.

03:02:03 [UC] If the impact is in significant impacts an insignificant portion of the local population.

03:02:08 [UC] That's something that's important.

03:02:10 [UC] The document. And then in most cases, if it's a project that is determined that as it is originally proposed would result in a take then you would need to implement a conservation and management plan providing some long term. Net benefit

03:02:25 [UC] The species that would be affected.

03:02:29 [UC] And so, all of this review takes place by the natural heritage and endangered species program, and they now have a Heritage Hub that you can use in order to do some of the things that you might need to do in order to proceed with your project.

03:02:45 [UC] So, you can, if you can process online payments, you can upload information.

03:02:52 [UC] Consul and you can initiate the Misa review process by using their Hub.

03:02:59 [UC] And it's highly advised that you go ahead and do a pre-filing consultation natural heritage encourages this.

03:03:08 [UC] So that before you get too far down the road in your design, you're aware of what constraints might be on the property because of the presence of rare species in or around that area.

03:03:20 [UC] And if the species that you're potentially impacting, or if the project requires a federal permit, then you have to use its advised that you go through the aipac process and so that basically just is

03:03:36 [UC] Mission for planning and consultation administered by the US fish and wildlife service.

03:03:41 [UC] And so you'll need to go through that review.

03:03:43 [UC] In addition to the natural heritage review, natural heritage will probably be part of the aipac review so that it can be, it can be economized, made more efficient that way.

03:03:57 [UC] Moving on to the wetlands protection act, there's actually rare species protections that are built into the wetlands protection act. And what this in those regulations it only looks at rare Wetlands Wildlife so it's

03:04:12 [UC] Talking about State listed plants and only when they fall within the jurisdiction of the wetlands protection, act in areas subject to protection under the ACT.

03:04:23 [UC] So there are other Maps, so, priority Maps, priority habitat maps have been created, in order to determine that where you need pre- construction review under me. So but there are other maps called estimated habitat Maps, which are

03:04:39 [UC] Estimated habitat polygons that are set up just for rare Wetlands wildlife.

03:04:45 [UC] and so under the wetlands protection act, if you propose a project that's within estimated habitat that project needs to be reviewed by the natural heritage and endangered species program, and the performance standards under the wetlands, a car that there be no

03:05:00 [UC] Short or long-term adverse impacts to habitats of rare Wetlands wildlife.

03:05:07 [UC] Now there's also a process where you can use the wetlands protection act.

03:05:12 [UC] If you already have to do review underestimated, habitat, and there are other areas that are outside of jurisdiction process through the wetlands protection act because you in both cases, natural heritage will be doing the review

03:05:27 [UC] And determining what's acceptable in terms of impacts.

03:05:32 [UC] So moving on to talk about the basic structure of the wetlands protection act and how it may pertain to solar the jurisdiction of the wetlands protection act is land subject to protection and buffer zones and so

03:05:47 [UC] Buffer zones are not protected under the wetlands protection act.

03:05:50 [UC] They are areas of pre- construction review but there are a number of areas that are protected under the regulations.

03:05:58 [UC] So in the Inland section of the regulations, there are bordering vegetated Wetlands Rivers streams, lakes and ponds, land within 200 feet of rivers, and perennial streams.

03:06:09 [UC] Floodplains and isolated lands that are subject to flooding to a certain volume of water every year.

03:06:17 [UC] What's important? Here is the third bullet, the 200 feet within the area within 200 feet of rivers and perennial streams is known as the riverfront area and some people call it a buffer.

03:06:29 [UC] It's not a buffer buffer areas where they're not protected but activities can be regulated instead. The riverfront area is a land subject to protection.

03:06:41 [UC] It's actually protected under the wetlands protection act in coastal areas and here I'm

03:06:47 [UC] Lapsing, the sort of technical terms from the regulations to keep it more in. Layman terms terms, land under the ocean salt, marshes, Salt Ponds Coastal beaches Bank, sand dunes, and Rocky intertidal Shores are all protected under the wetlands

03:07:02 [UC] Text neck, not all of those areas are actually Wetlands but they're all together protected areas under the wetlands Act.

03:07:12 [UC] The buffer zone Supply to only certain of those protected areas.

03:07:16 [UC] So in the Inland Zone, its bordering vegetated wetlands and then another resource area called Banks which o is always present where there are rivers streams lakes and ponds.

03:07:27 [UC] And then in coastal areas, salt marshes, and Coastal beaches Banks and dunes have buffer zones as well.

03:07:36 [UC] The regulatory process is a bit complex.

03:07:38 [UC] It's the wetlands protection act is a state law.

03:07:41 [UC] That is administered at the local level by conservation Commission's.

03:07:45 [UC] And so the regulations are written by dep and then implemented by conservation commission's. So the regulatory process involves one stage for jurisdiction, another process for project review and

03:08:00 [UC] There's permitting.

03:08:01 [UC] So if your concern is whether you need to get an order of conditions under the wetlands protection act, you can go through a process to determine whether there is jurisdiction.

03:08:12 [UC] And so any work that occurs within land subject to protection or within the buffer zone is supposed to at least file a request for determination of applicability, which is an official request to determine whether the

03:08:27 [UC] Balance act applies to either an area that you're looking at or project that you're proceeding with would like to proceed with.

03:08:35 [UC] So that would generally involve a site, visit a discussion at a public meeting and then the issuance of a determination of applicability which much like a cancer screening - is good.

03:08:48 [UC] if you get a negative determination of applicability, that means that you don't need to go any farther in the permitting process. For what you have described as the

03:08:56 [UC] Posed activity.

03:08:57 [UC] If however you do need to get an order of conditions, then you need to go into the project review portion where you're going to file. A notice of intent which is essentially an application for a permit.

03:09:11 [UC] Again, we have a site visit, we're going to identify those protected areas will be a public hearing.

03:09:18 [UC] We're going to determine whether limited project status might apply to your project and I'll talk in a minute about what that means and then review the performance standards and if your project can be can be designed to meet all the performance standards then you'll

03:09:34 [UC] And get an order of conditions which is essentially a permit under the wetlands Act.

03:09:40 [UC] And then, you know, as you do the work, they'll be monitoring and once you've completed that work in compliance with the order of conditions, you receive a certificate of compliance.

03:09:50 [UC] And so, that's the process, some key areas as they relate to Solar Development, is there is a relevant exemption for the maintenance of existing utilities.

03:10:00 [UC] So if it is a utility scale, solar project, once it's built, it can be maintained without without going through any filings with conservation.

03:10:10 [UC] Mission.

03:10:12 [UC] There is a category of projects called limited projects which means that there's a limited number of projects for which strict adherence to the

performance standards and not required.

03:10:22 [UC] And so one of the categories of limited project, our new Public Utilities, so this means that you still have to go through the permitting process.

03:10:30 [UC] But there will be accommodations made to sort of compromise the resource protection for the need to produce electricity.

03:10:41 [UC] City in this case.

03:10:44 [UC] And then the other area I wanted to point out is minor activities in the river front area of buffer zone.

03:10:50 [UC] As they're defined in the regulations. Do not need to file, they can just go forward and so there are a long list of things that qualify as minor activities but the one I want to focus on is this one the

03:11:03 [UC] In a blonde to uses accessory to residential structures. Such as decks sheds, patios pools, Etc.

03:11:12 [UC] And in my town in whateley where I serve as chair of the Conservation Commission, some years ago, we had a solarized whateley program that really encourage homeowners to get residential scale, solar either

03:11:27 [UC] Rooftop or ground-mounted and there was quite an enthusiastic response. But for those people that needed to use ground mounted solar, there were lots of questions to the Conservation Commission about.

03:11:39 [UC] Do I need to file with you?

03:11:41 [UC] And so at the commission we consider this and this term such as means that it's not limited to decks sheds patios pools Etc.

03:11:52 [UC] And we decided to issue a policy that said that solar residential solar ground mounted, solar is comparable to sheds decks patios and pools and therefore we would consider as a minor

03:12:07 [UC] Tivity.

03:12:08 [UC] When it occurs in areas of law that are being converted, of course, there are qualifications. So it's provided. Those activities are located. No closer than 50 feet from being annual high water, land line

03:12:23 [UC] Riverfront area or from bordering vegetated wetlands and that erosion and sedimentation controls are implemented during construction.

03:12:32 [UC] So this is one step that could be taken to try to make the permitting a little more efficient for residential scale solar.

03:12:41 [UC] And then D EP released a policy in 2017 Wetlands program policy 17-1 about the review of photovoltaic systems. And as part of that policy, they determined that placing solar

03:12:57 [UC] Raised over bordering vegetated.

03:12:58 [UC] Wetland will result in an impairment that is prohibited or that otherwise would require mitigation.

03:13:05 [UC] Otherwise all normal procedures and performance standards under the regulations will apply stormwater management. Is one consideration that is taken into account when the Conservation Commission reviews these projects and some of

03:13:20 [UC] Is projects might actually qualify as limited projects, if they raised to the, if their ad could be considered to be a public utility.

03:13:30 [UC] And then, if you have to mitigate for impacts to boarding vegetative Wetlands, there's a requirement to First avoid impacts, then minimize them and then mitigate

03:13:44 [UC] And then, finally, the dep brownfields program provides technical assistance and financial incentives to clean up. And redevelop contaminated properties these can be used for solar, although it's not specific to solar that

can be used for other

03:14:00 [UC] Other uses as well and there's the link that you can go to to learn more of the specifics about the program, some of the program, some of the resources, they provide our solar specific information such as fact sheets

03:14:16 [UC] Maps of existing solar and wind sights on contaminated land, past state level training and a connection to EPA program as well.

03:14:27 [UC] There's a library of insurance incentives and funding information.

03:14:31 [UC] And they want you to note that they're smart solar incentive program provides an Adder incentive for Solar Development of land, filled landfills and brownfields and original.

03:14:46 [UC] I'm Fields coordinators and searchable list and map of known Brownfield sites.

03:14:54 [UC] And today, as of when the information was passed on to me, 116 solar projects have been developed on. Massachusetts landfills that were approved by mass dep, 85 of which are operational.

03:15:10 [UC] And that's it.

03:15:11 [UC] And so if you have questions about any of that, we can perhaps take some of those when we get to the panel discussion at the end of this session.

03:15:22 [UC] But for the moment, we're going to move on.

03:15:26 [UC] So our next speaker is what's going to be in deep.

03:15:30 [UC] All from the Mast eot and he was going to talk about some of the solar initiatives that DOD is doing. But unfortunately he could not be here today. So we're going to move on to carry judge from the Mast apartment of energy resources, the talk about the

03:15:45 [UC] Dio, e our technical potential of solar study.

03:15:49 [UC] It's all yours tick, carry

03:15:57 [UC] Alright. Hello.

03:15:58 [UC] Can you see my screen?

03:15:59 [UC] Okay.

03:16:01 [UC] Yep, looks good.

03:16:02 [UC] Okay, I'm sorry.

03:16:04 [UC] All right.

03:16:06 [UC] hi everyone.

03:16:08 [UC] I'm Carrie judge. I'm a program coordinator with the Department of energy resources in the renewable energy Division and yeah, thanks to the clean energy extension for inviting me to talk to you all about the technical potential of solar study.

03:16:23 [UC] So just a quick kind of overview of the study so the clean energy and climate plan estimates that Massachusetts will need between 27 and 34 gigawatts of solar by 2050 to achieve our Statewide emissions goals.

03:16:39 [UC] So doar, undertook the technical potential of solar study in light of this to sort of understand the total amount of solar that can physically be built in Massachusetts as well as to establish a framework to rank solar potential based

03:16:54 [UC] Relative stability in terms of both natural resource impacts as well as cost impacts.

03:17:00 [UC] And the results of this analysis are hosted in an interactive story map, that allows users to see the total solar potential for roof, top canopy and ground mounted, solar in every tax parcel in the state.

03:17:15 [UC] As well as the suitability scores assigned to that solar potential.

03:17:21 [UC] So just a quick overview of the sort of process that we took with the

study.

03:17:26 [UC] So doar was committed to stakeholder engagement throughout the study, we convened, a technical advisory committee.

03:17:32 [UC] That included many of the folks that are speaking today or are attending this meeting. So it's great to see you guys and this included members of conservation and land. Use organizations Regional planners solar developers and other

03:17:48 [UC] Eight agencies including dep and this group met throughout the project development and they were really instrumental in shaping the methodology. We also held we issued a public survey that received over 3,000

03:18:03 [UC] Juan says and held public stakeholder meetings to get the Public's feedback on their attitudes priorities and concerns around solar sighting.

03:18:14 [UC] And then concurrently with that stakeholder engagement process, we were developing our geospatial analysis and sort of iterating on that methodology based on the feedback that we were receiving.

03:18:27 [UC] So the first step in the analysis was to categorize every tax parcel in Massachusetts in to spatial objects, based on the type or types of solar it could potentially host. So in a given parcel, any building footprint would be categorized

03:18:42 [UC] As rooftop solar potential, any parking lot or other paved surface would be categorized as canopy solar potential and then any open space would be categorized as ground-mounted. Potential from there we applied some permissibility

03:18:58 [UC] It's feasibility screenings to remove land that's unlikely or unable to be developed this included protected, open space wetlands and surface water roads.

03:19:09 [UC] then also applying setbacks and parcel. Smoothing and then this left us with the total technical potential estimated for each type of solar in every parcel.

03:19:22 [UC] So from there, we applied our suitability analysis, which left us with an overall solar suitability score for each tax parcel in the state.

03:19:36 [UC] This is a lot of words.

03:19:38 [UC] This is also on the website that I'll put in the chat.

03:19:41 [UC] So don't worry about getting all this down. But this is the suitability crime categories and criteria that we use for our analysis.

03:19:49 [UC] So for the biodiversity suitability category, we looked at whether and to what extent, a parcel overlaps with bio map area, for the agriculture suitability category. We looked at whether the parcel contains,

03:20:04 [UC] Soils or is designated as farmland for other ecosystem Services?

03:20:10 [UC] We looked at whether there's an overlap with a Wellhead protection area or area of critical environmental concern for embedded CO2. We looked at how much embedded and foregone CO2 the parcel contains

03:20:25 [UC] And then for grid infrastructure, we looked at the distance of the parcel from a substation. And then for slope and aspect, we looked at the parcels grade and what direction it faces and one important piece to

03:20:40 [UC] Call out quickly is that for rooftop and canopy.

03:20:45 [UC] sit up solar potential.

03:20:47 [UC] They receive days in every category except for these last two just assuming that that land has already been developed. So any of these sort of land-use impacts would be minimal.

03:21:00 [UC] So the sort of key take away with a caveat is that if we built solar

everywhere that we possibly could, we estimate that Massachusetts has 506 gigawatts of solar potential.

03:21:15 [UC] the caveat being that. This is a very optimistic estimate particularly in the rooftop solar category. One important thing to note is that we did not look at roof age and condition and we know that roof replacement is a key.

03:21:29 [UC] Barrier to Rooftop solar deployment.

03:21:32 [UC] So, the rooftop numbers should be taken with a grain of salt. At least given sort of the building and roof stock as it is now.

03:21:44 [UC] Sort of high-level suitability results.

03:21:47 [UC] The key takeaway here is that with 152 gigawatts of solar potential, receiving an A or a B in every category and 52 gigawatts, receiving an A in every category, we have

03:22:02 [UC] Suitable.

03:22:03 [UC] Solar potential that we can be strategic about where we cite solar.

03:22:08 [UC] I think going back to one of the previous presentations that we might not have as many trade-offs. As we as we tend to think we do, we can be strategic about where we're citing solar and we can balance land use and conservation needs while also

03:22:23 [UC] Eating our solar deployment needs.

03:22:28 [UC] A little bit more detail on the suitable, potential by type of solar.

03:22:32 [UC] So as I stated before, the rooftop estimate is likely to be an over estimate, especially in the residential sector, but just some sort of key estimates particularly for land use types that

03:22:48 [UC] And what has minimal land. Use impacts.

03:22:50 [UC] So for commercial and Industrial roof tops.

03:22:52 [UC] We estimated 7 point 5, gigawatts of suitable potential and then for landfill landfills and brownfields we estimated point for gigawatts of suitable potential.

03:23:06 [UC] And then the distribution of solar potential across the state.

03:23:12 [UC] So generally, we found that in western Mass the counties have higher potential per capita than the rest of the state.

03:23:21 [UC] I think that is that is to be expected.

03:23:24 [UC] And our analysis did find that every County except for Suffolk County has enough potential to meet its likely share of the solar.

03:23:35 [UC] Acquirements for 2050, normalized by population.

03:23:44 [UC] So these are just some examples.

03:23:46 [UC] I don't know if folks on the call and had a chance to go in and sort of play around with the story map if you haven't.

03:23:53 [UC] Like I said, I'll drop a link in and highly recommend. You go take a look, but these are just some examples that I pulled to sort of show.

03:24:02 [UC] show. What it looks like when you come in and how you can use this information. So this first one is a multi-use parcel in Pittsfield and when you

03:24:12 [UC] Into it.

03:24:14 [UC] With the teal outline when you click into it and you scroll down into this detail box. It identifies that 99.9% of this. Parcel is covered by protected open space.

03:24:27 [UC] So you'll remember I previously said that during the feasibility and permissibility screening, we removed any land that is protected.

03:24:36 [UC] open space.

03:24:37 [UC] Any solar potential on that land would not be counted and so you can

see that reflected in the 0.

03:24:43 [UC] 40 KW of ground potential.

03:24:47 [UC] There is a small amount of building mounted potential on this parcel and all of it receives a score of a which is why the entire parcel is colored in blue.

03:24:57 [UC] But the, the potential represented is actually only a very small amount of the parcel.

03:25:04 [UC] And then, over here, we have a municipal parcel in Leeds.

03:25:09 [UC] actually I believe in elementary school.

03:25:13 [UC] 48.8% of this parcel is protected, space. So that again is not included in the ground mounted.

03:25:20 [UC] potential and this parcel has ground mounted, canopy and building mounted potential and receives AIDS. And every category, except for receives a b, and the agriculture category for its ground potential.

03:25:39 [UC] Sorry, that wasn't to go after this one.

03:25:42 [UC] So just some policy considerations to think about you know, as you're thinking about how you might be able to use this tool, or how it might be able to inform sort of your planning first, we do not assume that

03:25:58 [UC] All solar will be built in highly suitable, locations or that all highly suitable locations will have solar deployed on them.

03:26:06 [UC] Our analysis is not comprehensive the six suitability categories were, you know, developed in consultation with our stakeholders and sort of represent like key themes that emerge through that engagement process.

03:26:21 [UC] But of course there are countless Community or site specific considerations that may impact the sights.

03:26:27 [UC] Suitability, like I said, Ruth age and condition as well as potential competition with other types of development.

03:26:38 [UC] Another important thing to flag is grid. Infrastructure is obviously a major barrier to solar deployment.

03:26:44 [UC] Our analysis accounted for proximity to substations as one of our suitability criteria but did not look at current hosting capacity at those substations.

03:26:55 [UC] And the reason for this is that with the edc's electric sector modernization plans, now under review and a lot of ongoing work into grid Investments upcoming over the

03:27:06 [UC] Next decades, we did not want to tie this tool, too much to discuss the current state of the grid knowing that the work will be on going to complete the necessary upgrades to bring needed Renewables online.

03:27:20 [UC] So instead we sort of look at this as hoping that this can provide some additional information and data to

03:27:27 [UC] Help inform where to prioritize investments in the grid to make sure that wherever we have large amounts of Highly suitable solar potential.

03:27:36 [UC] We want to make sure that we have the grid infrastructure to support that

03:27:43 [UC] and then in terms of how it can be used by local officials and local planning, we really encourage local officials and planners to use the story map as a tool to solar potential in their communities.

03:27:58 [UC] And the shape files are available for download on our website, I can drop a link to that data as well.

03:28:03 [UC] This will allow you to get a sense of the solar potential in your

communities, where it's located, and then how it scores on our suitability criteria. And how its

03:28:12 [UC] his relative potentially to other parcels, and I'll just once again, reiterate that, this is intended as an informational tool for preliminary site assessments, not necessarily to tell you, where you should or, should not install solar, but to

03:28:27 [UC] Vide some baseline information about potential land, use impacts and relative costs. And we took a broad Statewide approach so it is more than likely that there are additional considerations specific to your community or to any

03:28:42 [UC] That you're looking at that would need to be incorporated as well.

03:28:47 [UC] So, I'll just go back really quick.

03:28:51 [UC] So I'll drop these links in the chat as well, but this is the link to the story map and then we also published a report that goes into a little bit more detail on some of our findings.

03:29:02 [UC] And then you can also just feel free to reach out to me if you have any specific questions.

03:29:10 [UC] Well, thank you Carrie. I'm going to pose one question to you because we've had a number of people that are prompted us for that. And that is, you know, any kind of analysis of this type is going to have errors and some people are

03:29:26 [UC] Them.

03:29:26 [UC] So they are using your site and in particular wondering about certain areas of protected open space that are also shown as suitable for solar, have you what your plans for reviewing this data layer and, you know, kind to

03:29:41 [UC] Out what the error rate is and how it can be improved.

03:29:44 [UC] Yeah, so we have been working with so we did the analysis with synapse energy economics. I should have mentioned that at the beginning.

03:29:52 [UC] They were our consultant who built the story map. So yeah since it was published, people have been coming to us and flagging errors.

03:30:01 [UC] They've been going in and reviewing them.

03:30:03 [UC] I think a lot of what's been happening is where there are large Parcels that contain a lot of protected open space.

03:30:11 [UC] So if there is a portion of that parcel, that's not protected, we would have counted that towards our potential. But then the way that it shows up on the story map is that the entire parcel is is coded as suitable.

03:30:26 [UC] But if you look at the capacities, they should be much smaller.

03:30:30 [UC] We've gone in and tried to make some edits that sort of detail that I showed about the purpose of the proportion of the parcel. That is protected.

03:30:40 [UC] That's new.

03:30:40 [UC] We're working on ways to make that more clear.

03:30:44 [UC] But yeah and if you have any specific sites that you're aware of that, you'd like to take a look at, please let us know. We don't have any formal plans at this point to undertake a review.

03:30:56 [UC] But we've been sort of working with synapse on like an ad hoc basis as as these flags come in. So would it be fair to say that the way to use this map is that it shows Parcels, where there may be some capacity for

03:31:11 [UC] Older. But not necessarily the entire parcel.

03:31:15 [UC] is a solar. Yeah and it's a bit of like a visualization problem because it looks like the entire parcel is suitable but if it has protected open space that portion is not being counted towards the potential.

03:31:30 [UC] Great, thanks.

03:31:33 [UC] Okay so now we're going to move on to our next speaker. Michelle mannion from Massachusetts Audubon Society is going to talk about the mess out of on Harvard Forest report.

03:31:44 [UC] Go ahead. It's all yours Michelle.

03:31:47 [UC] Thanks so much Scott can everyone hear me, okay?

03:31:52 [UC] Great.

03:31:52 [UC] And I want to thank the UMass and and Zara and Dwayne for putting this forum together.

03:31:57 [UC] It's an incredibly important Forum. I know it took a lot of organization on their side and and really appreciate the welcome.

03:32:04 [UC] I feel like I need to preface this a little bit with a sense of disappointment.

03:32:11 [UC] You might all feel at the end because we are we actually pushed off our release date for our growing growing solar protecting nature report release to October 2nd we had

03:32:21 [UC] Then releasing it tomorrow.

03:32:23 [UC] So we were pretty close to 2 and I was going to share most of the results, but I'm actually just going to kind of give you a little bit of a high-level framing of why we did this work, how we did this work and then a sense of our kind of high level results and Aquatic

03:32:38 [UC] Qualitative way and hopefully whet your appetites for tuning in on October 2nd to see the much more detailed results and the interpretation in our recommendations for policy.

03:32:51 [UC] So, so hopefully, this will still be useful for folks because I do think following on with, to do ERS, work on their technical potential is kind of a nice segue because there are some key differences in what

03:33:06 [UC] It.

03:33:06 [UC] So what do I start with?

03:33:09 [UC] And I know you all heard from Jonathan. Thompson are co-principal investigator earlier and Harvard Forest along with our energy modelers Have Been instrumental in designing this work, but really

03:33:24 [UC] Point of Departure for this work and our motivation was, you know, we at Mass Audubon have a very strong point of view, about the need to reduce climate emissions in line with the Commonwealth's really ambitious

03:33:38 [UC] Roadmap goals.

03:33:40 [UC] and we know that, you know, decarbonizing the power sector first is foundational to being able to decarbonize the rest of our economy. So the question is, how do we get there?

03:33:50 [UC] And I think really importantly is, you know, how can we also do so, with, as much balance with impacts on our natural, working lands as is feasible because we also know that the public is

03:34:06 [UC] Really seeking that balance.

03:34:07 [UC] One of the things that DVR did along with technical potential work was a survey that showed really strong public support for solar, but also incredibly strong public support for balancing.

03:34:20 [UC] The solar, with our natural working lands and a lot of the ecosystem services that they and only they can provide. So that sort of, you know, let us to look at some other, the numbers, the top level numbers from the 2020 clean energy and climate

03:34:35 [UC] Plan is carried judge mentioned you know sort of in the least 27

gigawatts of solar by 2050 you know possibly is high as thirty four and in the shorter term out to 2030 we probably need at least another

03:34:50 [UC] 4 5, gigawatts from where we are now and roughly four gigawatts of installed solar.

03:34:54 [UC] So, you know, the question that we tried to fundamentally answer was with our research. We set up a series of research questions and the Top Line question is really, you know, how much has it has the current build out of a ground? Mount solar,

03:35:09 [UC] then the impact to Nature, and our working lands from what we've done really over the last decade decade plus, and really looked at, you know, a couple of key metrics for, for nature and working lands, first of which is Forest carbon

03:35:25 [UC] We looked also at impact on the state's mapping of biodiversity resources.

03:35:30 [UC] We used the nature conservancy's climate. Resiliency mapping is another indicator of lands that are especially important as we experience more and more of the impacts of extreme floods.

03:35:42 [UC] and he and also where our most productive Farmland.

03:35:46 [UC] So we sort of took a snapshot of really the last decade or so of that footprint. And then really said, well, you know, if we continue okay

03:35:54 [UC] I did a couple of scenarios, the first of, which is kind of a, you know, current practices scenario really an extension of our current, you know, legal requirements, but with no other consideration of land attributes. So we did a

03:36:09 [UC] people potential, for what we're calling, our current current sighting

03:36:14 [UC] And and then we created two other scenarios that we then modeled which are much more protective of natural working lands in terms of locations where we would model putting ground Mount solar and the questions were really trying to

03:36:29 [UC] Answer here in this prospective look with the modeling that we've done. Is you know, how much solar can we do that? Maximizes lands that are not our natural working lands.

03:36:40 [UC] These are developed lands.

03:36:41 [UC] Lands that are good candidates for redevelopment along with our built environment.

03:36:47 [UC] So there's rooftops and canopies, you know, our starting point of the estimates for Total Space. For rooftops is about 100 about 120,000 Acres, you know, we know, it's a small subset of that roughly

03:36:59 [UC] 30% of that that's probably currently best suited for deployment of solar. And then on the canopy side we have about 55,000 Acres of parking lots and we have I think a pretty conservative setback assumptions that we're looking about

03:37:14 [UC] 35,000.

03:37:15 [UC] acres for canopy solar.

03:37:18 [UC] So we also are looking at, you know, within the footprints of we've created for current citing practices and then scenarios where we're looking at much lower impact on natural working lands.

03:37:32 [UC] trying to really understand, you know, where the solar would would go with smaller Footprints in terms of the parcels available for the ground, Mount solar, but also really trying to maximize some of that.

03:37:43 [UC] At built environment under the assumptions, I just described and then we look at, you know, we've done a really a I think a Step Beyond what do we are is done in terms of the technical potential. We run all of our technical potential

through an energy economic model to say

03:37:59 [UC] What is the cost? Differential between sort of continuing the sighting practices that we have currently seen over the last decade.

03:38:07 [UC] And what does that cost of rental just on the pure economic costs of the solar under a more expansive ground mount versus one. That is a reduced ground Mount but with more on the built

03:38:22 [UC] Miss.

03:38:23 [UC] So we looked at a pure Financial cost. And then we also mapped all of the solar that comes out of our economic modeling and we've looked at all of the impacts to those by a fist by a physical characteristics that I just mentioned the forest carbon

03:38:39 [UC] Resilient lands, biodiversity and productive.

03:38:43 [UC] Farmland.

03:38:45 [UC] And so, you know, just to kind of sneak preview of our high level outcomes here is, you know, our Top Line. Bottom line is that we think

03:38:55 [UC] That we have a both and kind of happy scenario here, which is, you know, we have places to put solar all of the scenarios. We've run meet our climate goals are greenhouse gas reduction goals for all of the Decades.

03:39:11 [UC] Featured in the climate roadmap, and we can do.

03:39:15 [UC] So, in a way, that is more, protective of natural working lands than the build out. That we've seen over the last decade, we also are seeing not nearly as big as sort of a difference in the financial cost of these scenarios

03:39:30 [UC] Is over 10 years when you look at the total cost of the Energy System Investments, we're going to be making over the next three decades, the differential.

03:39:38 [UC] And just this sort of financial cost of one type of solar build-out and the other is not as significant as we were expecting to be honest, but that is not inclusive of actually counting the cost of carbon and the

03:39:53 [UC] Potential, avoided, losses of biodiversity. And these other attributes that we know are very difficult to replace. If not impossible to replace. So, you know, there's also some insights about the just a magnitude of the built environment

03:40:08 [UC] Any that we have you know I mentioned the sort of even with relatively conservative assumptions about how much we can do on rooftops and on parking lots even with their higher cost. There's a pretty significant potential there which is going to take

03:40:23 [UC] Some concerted effort, both on the part of towns but I think also state government in terms of addressing some of the local barriers, the permitting, the sighting in some of those soft costs that we know are slowing down or making some of those opportunities less attractive.

03:40:38 [UC] And we also see a pretty interesting cross cut with the the lands that developed plans that we've identified as good candidates for Hosting Ground. Mount with State ownership and City ownership by municipalities and nonprofits like like maths Audobon and a lot of

03:40:53 [UC] Our nonprofit institutions.

03:40:54 [UC] So you know we actually sitting in one of our conference rooms or more looking out at our own ground. Mount solar installation here in Lincoln Mass.

03:41:03 [UC] It's about a quarter of an acre of land that we've devoted to that and we have these around a bunch of our sanctuaries around the state.

03:41:09 [UC] So it's really, you know, for us commitment not just to reducing our

own energy bills, but a serious commitment on climate and reducing our climate foot print. So we think there's a real synergy.

03:41:22 [UC] G with where some of the best ground mon opportunities are. And the owners of that those places and folks that are also really dedicated to making their own Net Zero commitment. So we're hoping that, you know, with

03:41:37 [UC] Incredible influx of federal dollars through both the inflation reduction act and epa's solar for all program, which the state is putting together an impressive bid for that.

03:41:50 [UC] We can really lean and on these opportunities for the built environment and specifically for really deploying as much of the community solar on some of these lower impact lands and the built environment to really maximize the benefits to some of our lower income

03:42:05 [UC] Rate payers, who can always post these projects?

03:42:08 [UC] So I feel like that's probably a little bit unsatisfying.

03:42:12 [UC] As far as the results that some of you might have been looking to see today, but I'm hoping it kind of whets your appetite to tune in on October 2nd for the sort of full monty but just wanted to kind of

03:42:27 [UC] Leave it there and I think, you know, we're super interested in this path forward.

03:42:33 [UC] We think there's there's a way forward that can address a lot of the concerns in the conflict that we're seeing.

03:42:38 [UC] This is really the camels nose Under the Tent just with solar because we know we've got a lot of transmission that needs to get built in New England not just New England but across the country to realize these clean energy goals. And you know, I think if we can find a way

03:42:54 [UC] Forward on some of the the solar citing issues that's going to Port end well for for the next tranche of energy infrastructure Investments that we've gotta make and site.

03:43:04 [UC] with that, I'll just leave it for any questions.

03:43:12 [UC] All right.

03:43:12 [UC] Well, thank you so much, Michelle.

03:43:15 [UC] I think what we'll do is hold questions until we get to the panel at the end so that we can get through our last two presentations and then have the rest of the time left to us to deal with questions coming in from the audience.

03:43:30 [UC] It's so thank you again, Michelle. The next speaker is going to be Zara Dowling, who's from Mass UMass, clean energy extension, and she's going to talk about some of the initiatives of the clean energy extension.

03:43:43 [UC] With it related to solar.

03:43:47 [UC] Thanks Scott.

03:43:52 [UC] Does that look okay?

03:43:54 [UC] Looks good.

03:43:55 [UC] Great.

03:43:56 [UC] Okay, thanks everybody.

03:43:58 [UC] As Scott said, I'm going to talk a little bit about some of you masculine energy. Extensions efforts to address some of the solar and land use issues that we've been talking about all day today.

03:44:08 [UC] if you aren't familiar with UMass clean energy extension by this point, we're one of the hosts and Main organizers of this forum but we're also working on several other initiatives related to solar that I'm going to touch on.

03:44:24 [UC] On, we're a program.

03:44:25 [UC] That's a part of the center, for agriculture, food in the environment at UMass. But unlike other extension programs, many of which focus on agriculture and food. We focus on renewable energy and Energy Efficiency.

03:44:35 [UC] So we have a really small team, but we do a lot related to all kinds of things Energy Efficiency, energy storage offshore wind and solar. As I said,

03:44:46 [UC] And you can find a lot more information at our website, okay?

03:44:51 [UC] So to jump right into it.

03:44:52 [UC] The first topic I wanted to talk about, was our work on, developing a community planning, for solar toolkit. We just heard quite a bit about kind of solar planning and mapping out possibilities at the state level.

03:45:06 [UC] And this is really getting down to the local community level and thinking about solar siting in the context of in a very local context. We also heard a bit from Ken

03:45:16 [UC] earlier about the sometimes kind of contentious relationship that often develops, when a large solar developer comes into a town with a project.

03:45:26 [UC] You know, sometimes those are projects that the communities are really excited about but other times it might be a project that's in a location that a few residents or the town as a whole aren't as excited about and that can be quite challenging. And so

03:45:41 [UC] Thinking about how much solar we need to develop out developed by 2050, one thing that we were thinking, is it rather than have communities. And its really reactive position where there's only the, you know, where they're just kind of reacting to a project that's coming

03:45:56 [UC] In and their only option is to respond through a permitting process.

03:45:59 [UC] That it would be really helpful for communities to think up front about what they want for solar, how can we proactively plan?

03:46:07 [UC] So that the the kind of Permitting process and Zoning is set up to be aligned with local preferences and hopefully that's going to lead to more solar projects, that communities are excited about and actually actively encouraging to come into

03:46:22 [UC] Their communities and reduce some of that conflict.

03:46:25 [UC] So, we are really lucky in that the national renewable energy laboratory. While we were having these conversations had an opportunity to work on solar and Rural communities and we applied and got grant funding and we're able able to compile a really great

03:46:40 [UC] Team locally and at the state level and also with colleagues at the national level to work on this. So I'm going to talk really briefly about this, but you can find more information again at our website and particularly at this link here.

03:46:55 [UC] So the community planning for solar process has several steps in it.

03:47:01 [UC] I'm just going to highlight a couple. The first step that we tell encourage people to go through and provide steps to do. And also have helped towns through is a solar resource and infrastructure assessment which is essentially to do a lot of the mapping

03:47:16 [UC] Folks were just talking about but at the Town level, as well as to understand sort of the local context of zoning and existing plans, like open space and Recreation plans, Master plans, Etc. Also to look at publicly available data

03:47:31 [UC] Indicating what the local electricity grid.

03:47:34 [UC] Infrastructure is where those three phases lines are that are, it would be needed to connect large solar projects.

03:47:39 [UC] existing renewable energy facilities and another infrastructure like businesses farms and households.

03:47:48 [UC] Then we also do a GIS analysis is part of that assessment to actually quantify the available potential for solar on all different, kinds of sites. So residential rooftops, and properties, medium to large scale, rooftops parking, lots

03:48:03 [UC] Landfills brownfields other previously Disturbed sites like for ease and gravel pits.

03:48:08 [UC] that kind of thing potential on farms. And then undeveloped land that might be suitable for commercial development. And when I say suitable for commercial development, I mean something that would be located near three phase line. Parcel area of at least five acres, that doesn't have

03:48:24 [UC] A Wetlands that would be breaking up the site and making it be difficult for Solar Development.

03:48:28 [UC] So we just kind of quantify.

03:48:29 [UC] what is the total technical potential.

03:48:31 [UC] So that there's a realistic idea of how much solar could be built in the community on all these different kinds of locations.

03:48:37 [UC] We've been doing this through our own GIS analysis, but it might be made a lot easier through the State's new tool, in this may become a much easier process for communities to do so, like I said, we go through G is process.

03:48:51 [UC] we come out with a report and then that can help it.

03:48:54 [UC] Inform when we start to ask the community what they want, what is actually feasibly possible.

03:49:01 [UC] So we if the town isn't conducting the community planning themselves and we work with a solar planning committee composed of Municipal Representatives both to make sure that what we're finding in a desktop analysis is actually true on the ground

03:49:16 [UC] Also to understand the communities experience with Solar Development to date. And we encourage the town to go through a community solar survey process, where surveys put out to all Town residents and Property Owners.

03:49:31 [UC] The goal of that survey is to Canvas the town as a whole and to understand people's preferred development options and that takes into account a lot of different things. So one thing is capacity to people want to sort of a laissez-faire process where solar is built out.

03:49:46 [UC] Out as it typically is in most towns without any kind of advance planning or two people want to set some kind of goal, do they want to try to produce enough electricity in their Community to meet all the community needs for electricity or help

03:50:01 [UC] Regional western Mass goals for solar or help meet State goals for solar.

03:50:05 [UC] We have some Financial tools as part of the tool kit that helped inform different ownership structures and different Financial options that and Community benefits that people might can express preferences about. And then importantly, you know,

03:50:21 [UC] Talk about all of today is location location location. What types of locations where people prefer to see development and whatnot.

03:50:27 [UC] So once we've taken into account, what's physically possible in the town taken into account people's preferences and we can also look at Financial scenarios using those financial tools to understand what is currently feasible from an economic perspective

03:50:44 [UC] For Community residents for businesses, for the municipality itself, we can bring those together to develop a community, solar action plan. And the idea is that these action plans are actually, very are very actionable, right?

03:50:58 [UC] So to say, okay, what are, what are exactly are the next steps that would need to be taken to advance, the kind of solar that people want to see in their communities. Who exactly is going to carry out those steps? What entities will they need to help them through that process.

03:51:13 [UC] Us. And then an estimated timeline for that.

03:51:18 [UC] So these might include things like updates, to solar bylaws and ordinances pursuing specific projects, on Municipal land or buildings, promoting rooftop solar projects if that's a, if that's a solar-type that's preferred by the community and then

03:51:33 [UC] And on, in terms of ground mounted, solar working with interested in the private, landowners to encourage development on locations that are preferred by the community.

03:51:41 [UC] And also, if there are kinds of land that people really don't want to see development occur that are mere three phase lines and therefore might be open to Solar Development.

03:51:52 [UC] Another option is to say, how can we conserve those lands and maybe working with a local land trust or other group to try to identify persons? That might be

03:52:03 [UC] at risk in particular of Solar Development that have high biodiversity value and see if those can be conserved

03:52:11 [UC] So, our next steps on this process, we worked with three pilot communities who really helped us through the developing, the tool kit in the first place and providing us feedback on the initial drafts of the tools.

03:52:23 [UC] This past year, we work with an additional ten communities, as well as a class of 12 UMass under graduate undergraduate students to go through the solar planning process, and all of those Towns. Now have draft action plans.

03:52:38 [UC] So we're working with them to get review.

03:52:40 [UC] You by Town boards to see what they want to take on and then hold Community forums in each of those communities.

03:52:46 [UC] But the real challenge for us is how do we further build this out to 351 towns and cities.

03:52:54 [UC] Certainly not something that we can do on our own.

03:52:56 [UC] So we're thinking about how certainly some communities can take this on on their own, but for those that need a little extra help because they don't have the capacity to do this, can we work with regional planning agencies and others to make that happen?

03:53:09 [UC] Okay, moving quickly along to the next topic.

03:53:15 [UC] Pollinator-friendly solar.

03:53:15 [UC] We also run a certification program for solar facilities that want to be certified as pollinator friendly.

03:53:21 [UC] And the basic idea here is that rather wherever you're building out solar.

03:53:27 [UC] So I think Scott brought up this kind of avoid minimize mitigate concept within the wetlands protection act. And, you know, sighting is certainly a way to avoid certain locations for solar

03:53:39 [UC] But wherever solar is built out, whether it's on a brown field or a former forest or a former agricultural field.

03:53:48 [UC] The idea here is that putting down native putting in native plants is probably going to be provide better habitat value for wildlife than than just having gravel or turf grass

03:54:04 [UC] Or.

03:54:06 [UC] Or some kind of mix of turf grass and Fescue, which is another common.

03:54:11 [UC] Option that people put down sorry I just had a phone call coming in. Um

03:54:21 [UC] So our certification program was based off of some that were put in on other in other states, but we took their criteria.

03:54:30 [UC] And then we worked with a group of local experts, to design, really strict, criteria for Massachusetts, both for establishment.

03:54:37 [UC] And then for monitoring over, time to make sure that those facilities continue to offer good habitat value. And so the main thing is that our criteria deal with our seed,

03:54:50 [UC] Mixes and plantings that go in at the array and making sure that it's a native seed mix with a high number of wild flower species that are super senses supporting specialist bees, supporting rare lepidoptera

03:55:06 [UC] Blooming throughout the season and that, that is occurring within the array footprint. But also in the array perimeter, also any vegetation screenings.

03:55:15 [UC] Also in other locations, like a storm water, retention Basin. You're putting in Native species and then, secondly, making sure that you're not reducing.

03:55:25 [UC] You're not kind of increasing habitat fragmentation to the extent possible.

03:55:29 [UC] So we require that these sites, put in a fence Gap, along the bottom of the fence at 6:00 to 8:00,

03:55:35 [UC] Inches above the ground, so that animals like turtles and smaller. Mammals kind of medium-sized mammals like raccoons and foxes and coyotes can all get into and use that habitat without any issue.

03:55:50 [UC] Analyzing that this isn't this isn't really necessarily going to help deer moose bear, that kind of thing.

03:56:00 [UC] As of January 20 23, we had 45 projects that had been certified totaling over. 600 acres of pollinator-friendly habitat that was established or to be established.

03:56:12 [UC] but unfortunately there's been some regulatory uncertainty that's threatened. The continued participation of a number of projects and I don't have to get into the details of that, but essentially there's been some disagreement between

03:56:27 [UC] D pu doar with feedback from the Attorney General's office about the validity of this pollinator-friendly incentive, which is part of the smart program, which has really made it financially

03:56:42 [UC] Reasonable for solar developers to participate in our program.

03:56:46 [UC] There are additional cost pollinator-friendly development including the cost of native seed.

03:56:51 [UC] It's not a huge amount more but it does add cost with this Adder, these projects can essentially break even. And so they often if they can break, even will do the project because it, you know, it's good from a PR perspective, it's kind of

03:57:06 [UC] Feel-good thing from the from an environmental perspective, so if they can make it work, they'll often do it.

03:57:11 [UC] But this uncertainty about the adder has made that difficult so that's been very disappointing. But in terms of next steps we hope that continued work between DP you and doar and that their decision making will ultimately relieve this and Regulatory uncertainty.

03:57:26 [UC] And T and solar facilities know that they can continue to receive the adder in some form. And then from our perspective, you know there's a lot that's not known these projects are really new.

03:57:40 [UC] We don't know, pollinator habitat is difficult to establish. We don't know how compatible it's going to be with solar and practice and so, we'll see those that over time.

03:57:51 [UC] And we also don't know with conventional sites. The extent to which

03:57:55 [UC] Of species might Ceci succeed in to the array. And, you know, they might also become have a higher percentage of native species over time.

03:58:06 [UC] So this is just some work that a student did this summer looking at pollinator-friendly and conventional sites with camera traps that just a handful of sites to start. Just start to document what kinds of animals are using solar arrays.

03:58:20 [UC] Okay, and then extremely briefly.

03:58:24 [UC] I'm going to talk about agriculture agriculture takes, which has been a common theme that's come up in in our discussions today, as you can see, from these pictures solar can go on a lot of places on farms, but the reason that sort of

03:58:40 [UC] Use solar in agriculture agrawal takes as it's called which is solar and farming occurring on the same piece of land.

03:58:46 [UC] The reason that that is so appealing to people is both because it sounds good.

03:58:50 [UC] I think as Andy said it also looks good and finally it's something that can really be deployed at scale which some of these other projects rooftops parking lots.

03:59:02 [UC] They're often projects that are deployed at a smaller scale. So if you're trying to get to high-capacity this is one way to do that. But as Clem said there's a lot.

03:59:09 [UC] Of questions about the best way to implement Agra voltaics and how successful it can be from an agricultural production perspective.

03:59:19 [UC] So, under in Massachusetts, there are actually regulations under the smart program that Define what a Agra voltaic or dual use solar and agriculture project is.

03:59:31 [UC] And so we review projects that come in under that under that program and provide feedback to the state on those.

03:59:40 [UC] Applications, which allows us to get a sense of in general.

03:59:43 [UC] What, what kinds of projects are being seen? And also to provide information to Farmers and developers that they need to make decisions about how to develop those arrays.

03:59:51 [UC] But we're operating in a bit of a vacuum where we don't have a great deal of information about the agricultural productivity of these sites and so forth.

04:00:01 [UC] Years. There's been some work that's been done in a small scale for a long time at the UMass research Farm but recently the cranberry station at you met part of UMass extension out in the eastern part of the state has started doing work on cranberries and

04:00:16 [UC] As clown mentioned, there's now this deal we funded research study to look at crop productivity and economics associated with a gravel take systems.

04:00:28 [UC] In.

04:00:28 [UC] So the goals of that of that project, as I said are basically to understand the impacts of a gravel take systems on agricultural, productivity across different kinds of crops in different kinds of locations.

04:00:43 [UC] Shins and they're not, look at it economically from from a financial perspective at the end of our vegetable farm level but also at the agricultural economy, more broadly and it's impacts on the Massachusetts economy and finally disseminate this

04:00:57 [UC] Information to stakeholders and researchers and communities.

04:01:01 [UC] So here's just some pictures.

04:01:03 [UC] We don't have research results yet because this is all very new but just some pictures of the work that's going on at different kinds of sites.

04:01:15 [UC] And finally the next steps there are that we will get some research results and be able to disseminate them and that will start to give us the beginning of a picture and there's probably going to be a lot more research needed. So apologies for the Whirlwind tour, but that's

04:01:31 [UC] some of the work that we're doing at UMass extension,

04:01:36 [UC] That's great.

04:01:37 [UC] Thank you so much, Sarah.

04:01:39 [UC] We have one more speaker before we go to the final panel for Q&A and that's Lena Anton from neighbor to neighbor going to talk about solar in urban context, Redevelopment of the Mount Tom Cole facility. Go ahead Lena.

04:01:54 [UC] Great.

04:01:55 [UC] Thank you.

04:01:56 [UC] It's great to be here.

04:01:57 [UC] How are you all doing?

04:01:58 [UC] I know this.

04:01:59 [UC] You've all been sitting through many. Many wonderful speakers.

04:02:03 [UC] If you want to take a minute and just like, shake out your arms, get some energy back in your bodies.

04:02:08 [UC] We all know that this work is about being grounded and connected with the environment around us.

04:02:17 [UC] So we're all we're wrapping up here but just shake yourself out, bring back some energy.

04:02:25 [UC] And just to jump in, I'm with neighbor to neighbor Massachusetts and we organize and Holyoke and Springfield locally, and across the state, organizing and black and brown and working class communities for True democracy.

04:02:40 [UC] Chrissy.

04:02:39 [UC] and we ran our first environmental justice campaign right nearby in Holyoke Massachusetts and I'm going to talk briefly about our campaign to organize to shut down a local coal plant in transition to solar

04:02:55 [UC] Energy and as Sarah mentioned about Community input is so critical in the placement of new facilities right in. So that's what Neighbors The Neighbors work is about

04:03:10 [UC] Is bringing the community together so that local residents are making the decisions about about their environment, including fossil fuels and the transition to clean energy.

04:03:22 [UC] So I am just going to pull up my slides here and get started.

04:03:33 [UC] So in 2009 neighbor to neighbor members were approached by the Sierra Club, whose and Sierra club members said, hey neighbor to neighbor, do you want to organize to take on this cult? This local coal plant and

04:03:48 [UC] Pretty neighborhood.

04:03:48 [UC] Never worked on an environmental justice campaign before. But what we found as we started talking about the impacts of burning coal is that members were sharing stories of being impacted by asthma and respiratory problems and heart problems.

04:04:04 [UC] And realized that fighting for environmental, justice was critical to our members, everyday lives to quality of life. And at that time, some some activists were proposing transitioning from the bridge fuel

04:04:19 [UC] Of nat to natural gas and neighbor, to neighbor members shared these stories of pipelines. Gas pipelines exploding on the highways in Puerto Rico and talked about the same time, coal plants being

04:04:35 [UC] Shuddered and in Puerto Rico, and there being no transition plan. So, neighbor to neighbor members were clear, we are not transitioning from coal to more fossil fuels.

04:04:43 [UC] We want to transition to something clean, clean energy.

04:04:48 [UC] That's not going to threaten our threaten, our health.

04:04:53 [UC] So neighbor did Neighbors Vision. You can see our group of core leaders here was to cult close the plant clean up the site.

04:05:03 [UC] Here for the workers in transition to solar energy.

04:05:07 [UC] What do I mean by care for the workers neighbor to neighbor members? At this point, our core leaders were all former Factory workers. And Rosa talked about how our spiral to depression when her local Factory, shut down and moved abroad.

04:05:21 [UC] And so members were clear that we are not going to shut down an industry.

04:05:26 [UC] Without talking about what happens to the workers and having what we call it just transition, this is in the early days of just

04:05:33 [UC] s transition Tak think back to 2009.

04:05:37 [UC] And so of course all of you who are organizers at this at their know this that the key neighbor to neighbor principles are that the people most impacted lead the work so neighbor to neighbor members, who are have been breathing the air for 50

04:05:52 [UC] Where is from a coal plant and suffering from asthma and other respiratory problems, lead the strategy in the advocacy work, right?

04:06:01 [UC] I wasn't at the Statehouse. I wasn't meeting with the owners of the coal plant neighbor to neighbor members.

04:06:06 [UC] We're doing that and then we needed to recruit and build our group.

04:06:11 [UC] You saw that group of core leaders.

04:06:12 [UC] Those eight people were not going to win a campaign.

04:06:15 [UC] We're not going to shut down a coal plant in transition to clean energy and then, of course, a steady stream of pressure

04:06:22 [UC] We need to escalate slowly over time.

04:06:25 [UC] So the key principle to organizing is knocked on the door, first right? Ask your decision maker and then escalate over time. So here you see as door knocking with former state representative Erin Vega,

04:06:40 [UC] So, carrying out the coldest Soul campaign. The first step once we had our group of core leaders, and we're out door, knocking and building, our base

was to form a coalition. So we work together with the Sierra Club, with toxics action center with and was racist.

04:06:56 [UC] And then part of the strategy was to get the municipality invested in a reuse study and this sort of gets to its Zara was mentioning about how do we have the community.

04:07:07 [UC] Make the decisions about about any renewable energy that's coming to town. And so we worked with the city to say, we know you've been getting tax dollars and jobs from this coal plant but we know it's going to shut down.

04:07:21 [UC] And so, we were working with the city to say, you need a reuse plan and we need members of neighbor to neighbor and community members on the team to decide who the Consultants going to be, and to organize a series of forums, to engage the community.

04:07:36 [UC] So that we're getting real input about what happens with the site.

04:07:41 [UC] And the next piece is engaging the public from a health angle.

04:07:45 [UC] we weren't going to organize by talking about climate, we were knocking the doors talking about climate change and people were like, yeah, I can't pay my bills move on.

04:07:53 [UC] But when we talked about asthma and we talked about respiratory problems and heart disease, that's when people started pouring out touring meetings and that this is a picture of a visioning session that we had around healthy sustainable Holyoke

04:08:08 [UC] The next piece of the campaign was a corporate campaign to leverage public pressure on the company. That owns the land.

04:08:15 [UC] So here we are. I'm interpreting for someone in this photo, who sharing her story about respiratory problems, and why she's calling for the closing of the coal plant. So we know that labor and environment can be pitted

04:08:30 [UC] Each other, and we also know that we have our interests are actually aligned, right?

04:08:36 [UC] We want good jobs for workers in the new economy and so we organized forums with our labor friends and our environmental friends to talk about what is jobs Beyond, coal, look like right, what are the possibilities for working together?

04:08:52 [UC] And so we brought them, we brought in the next piece of the campaign was fighting at the state level for State.

04:09:01 [UC] investments, in clean renewable energy, because we all know with more Investments, we'd be more likely to get the company to transition.

04:09:07 [UC] So he remembers our at the State House talking with then state representative shower, Cheryl Rivera holding her feet to the fire to support clean. Renewable energy.

04:09:19 [UC] And so we've got the local Municipal campaign.

04:09:22 [UC] we've got the State Legislative campaign. We've got the corporate campaign and the last piece is the regulatory campaign.

04:09:29 [UC] Because what's going to happen when we shut down, a fossil fuel, what's going to happen with all that coal, ash, Carmelo Diaz told these stories of a coal plant in Puerto Rico, shutting down and just padlocking, and he said, whenever it rained he could see

04:09:45 [UC] He could just see the contamination, seeping through the chimney, and into the Earth, and into the farms, and into the water, and we were determined to not let that happen.

04:09:54 [UC] So, here we are meeting with the DP you. We had meetings with

Department of Public Utilities, we had meetings with the Department of Environmental Protection to look at.

04:10:04 [UC] What's the transition process? Look like, what's the cleanup?

04:10:08 [UC] To be honest, some of the challenges we faced for a reuse study process.

04:10:13 [UC] We really we really wish we had chosen a consultant who can really think big picture.

04:10:19 [UC] We only looked at the coal plant site and we wish we'd looked at the Clean Energy Future for the whole city.

04:10:24 [UC] And what does that look like as something that happened throughout the campaign is Kim, members were really involved around door knocking around asthma and respiratory problems. But when it came to the detailed conversations Around, clean up,

04:10:38 [UC] Yup.

04:10:39 [UC] That's what it got harder to be Grass, Roots LED. So it's an ongoing Challenge and how do you keep members engaged for a 10-year campaign? Right? This campaign started at 2009.

04:10:50 [UC] We didn't see the chimney come down to 2018.

04:10:53 [UC] It was a long campaign.

04:10:57 [UC] So, to move on to the victory, part of the campaign, we had quite a campaign tenure campaign. And we saw, we, or after we organized a transition process, where you study process

04:11:12 [UC] Press conference after press conference.

04:11:15 [UC] We met with coal plant leaders, Carlos Rodriguez.

04:11:19 [UC] And Rosa Gonzales a shared their stories about how they were impacted by the burning of coal called for the carrying of workers called for the shutting down of the plant and the transition to solar energy and

04:11:35 [UC] Just look at him, my time here at a time and we were excited that we got a commitment from the coal. Plant owners in a meeting with them to consider transitioning to solar energy and

04:11:50 [UC] have to organizing until we got a commitment from the coal plant to tear down the coal plant and to redevelop the site including addressing over 50 acres of on-site, coal ash, which took some work with dep as you can imagine

04:12:06 [UC] Now, the next exciting part was not only were we able to shut down the coal plant, but our vision had always been moving to clean energy. So, we got a commitment from the company to build 5.7 megawatts of solar energy

04:12:22 [UC] And they added on solar three megawatts of energy storage on site in Holyoke. So, it was an amazing transition, the facility generates seventy three hundred megawatts

04:12:37 [UC] I go out h of solar production, which is enough to power 1800 homes in the area.

04:12:42 [UC] So what's the last step is celebrating and just quickly some real take homes. Here, were the members engagement and sharing their stories of how they were impacted by the

04:12:57 [UC] King of coal and their Vision around, moving to solar energy and the just transition piece of working closely. With local unions working closely with labor, we fought for labor again and again and actually secured a

04:13:12 [UC] Mint from the company. The company provided retirement, clamp retirement packages a transition, a bridge from for healthcare for retirees and job training programs, because we really needed the whole package.

04:13:27 [UC] Maybe so that's all for me.

04:13:33 [UC] Thank you.

04:13:34 [UC] Thank you Lena. That's a very inspiring story and a great way to put a little bit of energy. At the end of this long afternoon, we're now moving to the final panel. And so I would I see in the

04:13:49 [UC] The participants that a lot of our presenters from the afternoon or still here.

04:13:53 [UC] So I would encourage all of you to turn on your cameras and be available for questions and I'll put out a couple of questions for some of the people that most recently spoke. And then we'll see if there are additional questions that we can field before we close for the day.

04:14:10 [UC] So carry one of the questions that's come up. Is what is DOA are planning to do with this prioritization? Is this something that's going to be integrated into the smart program?

04:14:21 [UC] How do you work with landowners to ensure that the landowners are receptive?

04:14:26 [UC] The those that are on the best potential lands?

04:14:29 [UC] Because all of this is going to depend on how receptive landowners are to actually putting solar on their land.

04:14:38 [UC] Yeah, so we sort of see this as a tool for kind of our long-term energy planning in terms of the smart program.

04:14:48 [UC] Know, sort of official commitment as to how the results of this will be integrated into smart.

04:14:54 [UC] We are separately undertaking a review of the smart program right now to look at sort of correcting our incentive levels that program is a

04:15:08 [UC] It stalled out in the residential space right now.

04:15:11 [UC] And I think looking at sort of the land use restrictions and smart is definitely on the table.

04:15:18 [UC] And then, like I said, we are hoping to use this as well as sort of guidance for the ongoing grid modernization and infrastructure upgrades.

04:15:33 [UC] Thank you. And to expand on that and maybe bring in Michelle and Jonathan.

04:15:39 [UC] Has there been any effort to really try to get a real in-depth understanding of landowners and building owners in terms of their receptivity to putting solar on their roofs or putting solar on their property because

04:15:55 [UC] We can do all these assessments where we say?

04:15:57 [UC] well, it could go there or it could go there. But there may be some ways that these are really unrealistic projections and wondering if there's been surveys of landowners or homeowners that we can look to for guidance on that.

04:16:14 [UC] I can speak to the specifically commercial rooftop, space and canopy potential in the commercial space as well.

04:16:22 [UC] It's actually something that surfaced during our stakeholder engagement process.

04:16:26 [UC] With the developer Community is developers saying that, you know, they had approached, sort of every large commercial space, you know, all the malls, all the big box stores, any good commercial roof, top in the state that doesn't have solar

04:16:42 [UC] Yeah. And that there's just not a big appetite there from from their initial conversations for, you know, a number of reasons, kind of wanting to preserve some flexibility for tenants and

04:16:57 [UC] I think that's something that we'll be looking at in the smart program with, with where we need to sort of set the incentive levels to to get those building owners. You know, incentivize to put solar on their buildings.

04:17:16 [UC] Michelle anything you want to add?

04:17:18 [UC] Yeah, thanks Scott.

04:17:19 [UC] I've been, I think I do, you know not aware of Sir.

04:17:23 [UC] We've certainly didn't do any surveying of individual landowners, in our in our work, but one of the things we did do to try to account for the fact that, you know, the our estimates of what is the sort of most economic opportunities is not the same as what

04:17:38 [UC] the landowner in business, owner, decisions are, and so, we did some randomization of our results to account for the fact that, you know, where solar is actually build is, is based on different criteria than what are sort of economic modeling is based on

04:17:54 [UC] But I think the sort of top level finding again is that we've got sort of more than enough space.

04:18:00 [UC] So, even if the sort of most economic Parcels aren't the ones that get developed first, there are other Parcels.

04:18:06 [UC] So, I don't know, the Jonathan still on wanted to say, anything else about that piece, but I do think that is the, that is the rub, it, sort of, we've got these opportunities, but then how do we really be shift the incentives and do the public education, and do the Outreach.

04:18:21 [UC] So that folks who, you know, might have been resistant or think it's not for them, that might be based on a misunderstanding of how it works or how it could be flexible to their future needs.

04:18:32 [UC] I think that's a piece where both the state and the town's can really be very helpful in terms of leveraging programs. Already have like green communities, you know, hopefully, if we succeed on this EP, a solar for all grant, that should

04:18:47 [UC] Usually beneficial as well.

04:18:51 [UC] I just want to encourage people have questions. Please type them into the Q&A box, on the, on the portal. We're not we don't have the capacity to unmute you and take questions from the floor Lena just

04:19:06 [UC] To sort of build on that a little bit to what extent did incentives or or subsidies or other things help you persuade the landowner to go ahead and start putting in solar where there was once a coal plant.

04:19:22 [UC] Deputies were critical, especially there's it was the beginning of the move of right fields, brownfields to Bright fields and so I don't think the owners would have transition to solar. They could told us. They couldn't make a profit without the subsidies.

04:19:37 [UC] Um, yeah.

04:19:38 [UC] and subsidies. They made the decision sort of quickly. After there had been an influx of subsidies for solar

04:19:50 [UC] question for you, Zara, you had talked about, you know, the difficulty of maintaining pollinator habitat and that perhaps natives will move in on their own one observation that I've had when I've walked around solar sites

04:20:05 [UC] As part of conch homework is that there's often a whole line of invasives right along the fence. And so, as Birds perch on these fences, they are seeding in all kinds of Bittersweet and other invasives. And I wonder to what extent

04:20:20 [UC] And you might be looking into that as either a potential problem or what might be some potential solutions to that.

04:20:27 [UC] Yeah, well I think one simple solution at least for facilities that are participating in our program is that we have requirements in that follow-up monitoring about the percentage of the site that is covered by invasives and

04:20:43 [UC] More than a certain percentage of the site than they could lose that certification and lose that a door. So it's a little bit of a kind of carrot and stick scenario that obviously, is it going to apply it all facilities across the state? But if they're participating in the program they have an incentive to

04:20:58 [UC] You keep the site clean. And I think that's like 111 beneficial, a logical aspect of the program and we certainly are when we review the plans that come in the new kind of new plans that come in, we ask them to

04:21:13 [UC] To talk about the existing vegetation. And if there's a lot of invasives on site, that's something that we're certainly saying, okay?

04:21:20 [UC] Then examining that management plan to make sure that there's a plan for dealing with those invasive species.

04:21:25 [UC] And I was just going to add on that previous question that, you know, we only did surveys in 13 small towns as part of our solar planning. But we did ask residents about their interest in installing residential solar at their property

04:21:40 [UC] And we saw a lot of interest like a lot of interest and a lot of a lot of not sure. So there was the I would say the vast majority of people who didn't have solar, you know, obviously survey respondents to a seller survey are probably people that are more interested in solar one way or the other,

04:21:55 [UC] Than than other than the average person.

04:21:58 [UC] But we saw a lot of interest in solar residential solar and a lot of interest or a lot of sort of not sure's. And the main reasons that people cited were financial reasons, followed by not being sure about their options.

04:22:11 [UC] So I think there's a lot of room if the incentives are good or at least there and the there's educational Outreach to get more people to do it.

04:22:22 [UC] We've had a number of questions that have come in on a topic that really didn't get addressed by the speakers but I'll throw it out there in case somebody has something that they can say about it. But I mean it gets back to some of the questions about local bylaws and what

04:22:38 [UC] Kind of control.

04:22:38 [UC] There can be and what are the constraints on local communities? You know, for, for example, best practices are is, are there generally accepted best practices and how much flexibility is a community have to

04:22:54 [UC] Adopt best practices.

04:22:55 [UC] not so much to try to Zone solar out but just to require, you know, certain stormwater practices or other things and what is the legal landscape out there right now in terms of kg decisions or agency

04:23:10 [UC] Decisions or court court case decisions.

04:23:15 [UC] Yeah, I don't know if Ken still on and I can I can just say a few words about that I think Ken pointed out that really the major state law that regulates.

04:23:23 [UC] This is that I think it's 48 Section 3. That basically says you can't prohibit or unreasonably regulate solar except is necessary to protect the public

04:23:34 [UC] Health, welfare and safety.

04:23:36 [UC] And for a long time, there weren't a lot of court cases that addressed that.

04:23:43 [UC] And so the AG would kind of approve solar bylaws with the caveat that they would say.

04:23:50 [UC] There's not a lot of Court precedent to say, and you might want to look at your by lot and talk to Town Council about whether that whether it might interfere with that or be in violation of that law. So, it really wasn't clear, but there have been some recent court cases. There's still a lot of

04:24:04 [UC] Of open question, but one of the recent court cases was a situation where the town bylaws essentially ban large scale Solar Development on about you know two percent of the

04:24:19 [UC] Land area.

04:24:19 [UC] So it essentially been put on over 90% of the town's land area and that was considered too restrictive by the court but where did that?

04:24:28 [UC] But the court didn't go further to say, well, you know, Banning it on 30% or 40% is. Okay.

04:24:34 [UC] So I think one thing in reviewing Town bylaws is part of the planning process that I think there's time for kind of there's a good opportunity now to kind of put together some best management practices.

04:24:48 [UC] Based on what we're seeing in other Town, bylaws building off of what Ken brought up that. PV PC model by law or PV PV, C guide to.

04:24:56 [UC] So there's the model by law from doar which is very basic. It doesn't have its good, but it doesn't have a lot of detailed recommendations.

04:25:04 [UC] We've got into some more recommendations in that PV PC guide. And I think now there's probably an opportunity with those recent more recent Court decisions to at least say,

04:25:17 [UC] Here are some and also to look at the bylaws that past and say maybe there's that past agios office after those Court decisions and say okay here's some things that you could try and some things you really shouldn't try.

04:25:28 [UC] try. So I see that as something that should get put together.

04:25:37 [UC] Alright, last question for anybody who wants to try to tackle it but I think it gets to the Crux of a lot of what was talked about today. There's a real interest in trying to put as much solar on built the plans as possible

04:25:52 [UC] And a lot of the brownfields and land fills have already been developed in that way.

04:25:58 [UC] There's a lot of roof space.

04:25:59 [UC] There's a lot of parking lots but it's going to take some incentives to try to get that the solar built in the areas where we want it to be built rather than in the area's that's going to disrupt. You know, biodiversity Farmland carbon sequestration.

04:26:14 [UC] And Etc.

04:26:15 [UC] So what's it going to take in order to sort of move the solar forward?

04:26:21 [UC] But in the areas where we would like to see it be how expensive will it be? Or what kind of programs or policies are necessary for that to actually work?

04:26:37 [UC] I can jump in.

04:26:38 [UC] So I think Michelle had mentioned the solar for all application. That our team is working on with damask clean energy center to EPA. So I see that in the funds.

04:26:51 [UC] Coming through that as 11 Avenue, it's a big, a big problem, big question to tackle, but some of the funding I think 20 25 % of the

04:27:05 [UC] Sorry 20% of the financial assistance funding coming through that program is able to go towards enabling upgrades so roof Replacement Service upgrades.

04:27:17 [UC] So we're very excited about the opportunity to have some some money that we can put directly towards those sort of ancillary costs of deploying solar in the built environment.

04:27:28 [UC] So I think that's that's one Avenue but I would say, yeah.

04:27:34 [UC] Like a big issue in general is that it's not just the cost of deploying solar, it's the cost of all of the necessary upgrades that go along with it. So,

04:27:50 [UC] Yeah. Well thank you for trying to tackle. That it's sort of almost an unanswerable question. Right now, I guess it's more sort of like a this is what we need to do is we need to try to figure this out because it's one thing to say it's possible, it's another thing to try to see

04:28:05 [UC] How to chart the path from here to there.

04:28:09 [UC] So I'm going to wrap up for today.

04:28:11 [UC] I've got two slides to talk about the follow-up from this session and what to expect in the next one.

04:28:16 [UC] So hang in there. We're almost done.

04:28:27 [UC] All right. So the, the survey should already be operational so that you can already right now be filling out the survey about this session, but it also be open for another 48 hours after this.

04:28:39 [UC] So you can go ahead and do it at your leisure.

04:28:41 [UC] You'll get a follow-up email with a link to the recording and other resources, it'll be posted to the attendee Hub and to the UMass clean energy extension website.

04:28:56 [UC] questions that we were not able to answer will be shared from the with the speakers and incorporate it into the planning effort for future solar forums to try to take this work forward

04:29:11 [UC] And we encourage you to come to the session next week.

04:29:14 [UC] same day of the week, same time where we're going to be focusing on solar equity and Community benefits.

04:29:22 [UC] So this is from 12 to 3 on September 19th.

04:29:26 [UC] And here are a lot of the topics that are going to be covered by the speakers. And by the Q&A during that session, I want to thank clean energy extension for putting this program together along with the planning committee and

04:29:40 [UC] and all the movers and shakers behind the scenes.

04:29:43 [UC] It was an excellent program.

04:29:44 [UC] I want to thank all the speakers for packing, so much information into short period of time.

04:29:50 [UC] As each speaker, only got a limited amount of time to try to describe all the important work that they're doing.

04:29:56 [UC] I learned a ton and I really appreciate that.

04:29:59 [UC] And I want to thank all of you who participated in this forum.

04:30:03 [UC] It was great to see how much interest there was and how many people stuck it out right to the end. This is really a

04:30:10 [UC] important issue.

04:30:12 [UC] It's the fate of our future climate change biodiversity or two.

04:30:17 [UC] Extremely important things that we need to attend to without delay.

04:30:23 [UC] Thank you, again, for participating and I hope to see you next week.

04:30:55 [UC] Recording stopped.