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Floating Offshore Wind Project Webinar

University of Maine Alumni Association

John Diamond

Habib Dagher

The College of Our Hearts Always

Floating Offshore Wind Webinar with Dr. Habib Dagher
Recorded via Zoom on May 12, 2021
https://www.youtube.com/watch?v=a8murWyADhM
Run Time : 00:58:00

Watch Dr. Habib Dagher, executive director of UMaine's Advanced Structures and Composites Center, for a May 2021 update on UMaine's offshore wind program. UMaine is collaborating with New England Aqua Ventus LLC, a joint venture between Diamond Offshore Wind, a subsidiary of the Mitsubishi Corporation, and RWE Renewables, the second-largest company in offshore wind globally, to develop an 11-megawatt floating offshore demonstration project off the coast of Maine.

The New England Aqua Ventus offshore wind project is a critical milestone in the commercial realization of UMaine's internationally recognized offshore wind technology that was developed at the Advanced Structures and Composites Center. The project has received major funding from the U.S. Department of Energy.

Dr. Dagher was joined in the presentation by Maine State Rep. Genevieve McDonald, a UMaine alumna, lobster boat captain, and consultant on the project.

Transcript is machine generated, unedited, in English.

00:04
everyone
00:05
greetings from orono i'm john diamond
00:07
i'm the president
00:08
and ceo of the university of maine
00:10
alumni association
00:11
thanks so much for joining us today our
00:14
topic is main

00:15
and offshore wind technology developed
00:17
by university of maine researchers and
00:20
other collaborators
00:21
we've got a pretty impressive geographic
00:23
representation among our virtual
00:25
attendees today
00:26
we have black bear alumni and friends
00:29
from
00:30
16 states and the district of columbia
00:33
so pleased to have you here and it's a
00:35
big day for this topic
00:36
in augusta at the state house a hearing
00:39
is or in augusta there's a hearing going
00:41
on
00:41
about the governor's plans for
00:45
offshore wind for a 12 tower
00:49
array out off the coast of maine well
00:51
off the coast of maine
00:53
and our presenter today i'm sure we'll
00:55
mention
00:56
the details of that so art we will be
00:58
starting our session with a presentation

01:00
by dr habib dagger who is the executive
01:03
director of umaine's
01:05
advanced structures and composite
01:07
centers
01:08
both dr darger and the center are
01:10
recognized as world leaders for their
01:12
cutting edge research
01:14
it would take an hour for me to list all
01:16
of the honors the patents and the grants
01:18
that he and his colleagues at the center
01:20
have received so
01:21
i won't do that but that said you're
01:23
going to see several examples of their
01:25
work
01:27
we also anticipate being joined by
01:30
state representative genevieve mcdonald
01:33
along with her role in the legislature
01:35
representative mcdonald she did get back
01:37
to me on my emails
01:38
whoops hey somebody if you could mute
01:41
your
01:43
mutual microphone i think i picked up

01:45
somebody else there so
01:46
excuse me so let me tell you about
01:48
representative mcdonald i mentioned she
01:50
is a humane alumni
01:52
uh she's also the mother of twin girls
01:54
she's a lobster boat captain
01:56
and an advisor to the partnership that's
01:58
developing maine aqua ventus which is
02:01
the offshore wind power project
02:03
that will be the focus of today's talk
02:06
the presentation will cover
02:07
roughly two-thirds of today's webinar uh
02:10
and the remainder will be saved for your
02:12
questions and dr dodgers and
02:15
representative
02:16
mcdonald's answers so if you'd like to
02:18
submit a question
02:19
there's an easy way to do it if you're
02:21
familiar with zoom you've been probably
02:23
doing it quite a bit
02:24
if you look at the bottom of your screen
02:26
you'll see a little comic strip

02:28
speech bubble that's the chat button if
02:31
you want to submit a question just click
02:33
on that bubble
02:35
type in your question and hit return or
02:37
enter on your keyboard
02:39
we'll get to as many of your questions
02:41
as possible during the time we have
02:43
available
02:44
and so you know we're recording this
02:45
session and it will be made available
02:47
online
02:48
later probably in a day or so we'll send
02:51
out a notice about where
02:53
to everybody who registered to let them
02:54
know where they could find
02:56
the the recording of this so with that
02:59
let's get started i'll turn it over to
03:01
dr habib dagger
03:02
thank you
03:05
thank you very much john and
03:09
looking forward to the presentation
03:10
today i'm going to go ahead and

03:12
go to full screen
03:16
and i'm going to talk about offshore
03:18
wind today
03:20
and particularly floating offshore wind
03:22
um
03:24
i'll talk a little bit about the center
03:26
then i'll talk about
03:27
floating wind turbines why here what do
03:30
they look like
03:32
i'll talk about humane research on
03:33
flowing turbines starting about 12 years
03:36
ago
03:37
and then talk about next steps
03:39
particularly new england aquaventus
03:43
this is our research center at the
03:44
university of maine i've been a faculty
03:46
at the university of maine
03:47
for 35 years i'm looking forward for 35
03:50
more
03:52
the research center was established 25
03:54
years ago
03:55
and it's the largest university-based

03:57
research center in the state of maine
03:58
today
04:00
we sponsored over 2 500 students
04:03
financially from 35 majors and the
04:05
students come and work in the lab
04:07
and get paid to do so if you're an
04:08
undergrad you can work
04:10
up to 30 hours a week and get paid to do
04:13
that and of course
04:14
if you're grad students you live in in
04:15
the center uh
04:17
and um we've had we have today um about
04:20
260 faculty staff and students that work
04:22
in the lab
04:23
it's about 100 000 square feet we've had
04:25
a number of spin-off companies in the
04:27
lab
04:28
from the research developed in the lab
04:30
over 25 000 visitors have have been to
04:32
the laboratory
04:34
these are our partners and clients from
04:35
across the globe

04:37
we have over 500 research partners
04:40
or clients that work with us a lot of
04:43
them send their money to maine to do
04:44
research and development in maine for
04:46
them
04:46
we focus our goal is to develop new
04:49
materials
04:50
for construction that are more
04:51
environmentally friendly
04:53
they have a lower environmental
04:54
footprint and
04:56
to to focus on developing what we call
04:58
gem or strategic plans called gem
05:00
for green energy and green materials for
05:02
society
05:06
to give you a sense of what it looks
05:08
like inside our lab this is an example
05:10
of our wind blade test facility and
05:12
we're testing right here 165 foot long
05:16
wind blades under fatigue loading to
05:18
simulate 20 to 25 years of life
05:21
in a very short period of time in our

05:23
lab and notice there's one actuator at
05:24
the bottom
05:25
moving it up and down and it's being
05:28
fatigued at the resonant frequency of
05:30
the blade that's how we could move it so
05:31
easily with one actuator
05:34
this is our wave wind facility we call
05:36
it w square wave wind facility
05:39
and what we do here is we can simulate
05:41
ocean environments
05:43
by by both simultaneously creating a
05:46
wave environment
05:47
as well as a wind environment on top of
05:49
it it's the only facility of its kind in
05:51
the united states
05:52
um and right below you is a wave basin
05:56
and above you is a wind tunnel
05:57
uh it's an open jet wind tunnel what you
05:59
see in the foreground
06:00
is a floating wind turbine being tested
06:03
at 150 scale
06:04
so basically shrinking the size to about

06:06
1 50th
06:07
and testing it in this environment to
06:10
figure out how the bigger units
06:11
will perform offshore
06:15
this is an example of how we we test
06:19
structures that float in the water
06:20
whether it's a boat or
06:22
or testing a a
06:25
a way to protect cities from from
06:28
extreme
06:29
storms but you can see here we can
06:31
create waves of different heights and
06:33
different frequencies
06:35
in uh different directions we can make
06:37
the waves come from different angles
06:38
and then on top of that we create a
06:40
windstorm and the wind
06:42
will change with height just like it
06:44
does offshore so we can change
06:46
the speed of the wind as you rise above
06:47
the water we can change the wind
06:49
turbulence intensity

06:50
so almost recreate if you wish an
06:53
offshore environment in our laboratory
06:55
to test new technologies that we want to
06:56
deploy offshore
06:58
so if you're ever back in maine we'd
07:00
love to show you show you that
07:02
that facility this is a 150 scale
07:04
version
07:05
of a six megawatt floating turbine and
07:08
being subjected to almost a 50-year
07:10
storm right here
07:11
to put things in perspective a 50-year
07:13
storm has about a
07:15
60 foot high way high waves from peak to
07:18
trough
07:20
uh now let's talk about offshore wind
07:23
offshore wind is is is a technology
07:28
that the world is is embracing in europe
07:31
in the united states and southeast asia
07:33
to to help develop clean energy for
07:36
coastal cities and coastal environments
07:38
the majority of the world

07:41
big cities are on the coast and there's
07:43
a good opportunity here
07:45
to provide clean energy through offshore
07:47
winds to give you
07:48
a an idea a general idea here
07:51
within 50 miles of the us coast there's
07:54
enough offshore wind capacity
07:56
to power the country twice two two times
07:59
over
07:59
in the gulf of maine there's there's 156
08:02
gigawatts of offshore wind capacity
08:05
and it takes less than five gigawatts to
08:07
power the state of maine
08:08
that's that's how much offshore wind
08:10
capacity that we have
08:12
the the big issue in maine is that we
08:14
have deep waters off of our coast
08:16
in europe the first offshore wind farm
08:18
was erected
08:20
close to 30 years ago there's over 5 500
08:24
turbines in europe but they're all fixed
08:26
to the seabed because they build them in

08:27
shallow waters
08:29
maine has deep waters and anytime you're
08:31
over 150 feet of water
08:32
you can't cost effectively fix the
08:35
turbines to the seabed
08:36
you have to float them and in back back
08:39
25
08:40
back in in almost 12 years ago we
08:43
developed the first floating offshore
08:45
wind research team in the country
08:47
at the university of maine i'll tell you
08:48
more about that later
08:50
but in the meantime south of us there's
08:53
been a revolution
08:54
going on in offshore wind there's as you
08:56
see right south of us
08:57
uh the states have developed very very
09:00
ambitious plans for offshore wind
09:03
um massachusetts for example has uh
09:06
5 600 megawatt plans to put that in
09:09
perspective
09:10
if you recall main yankee in maine made

09:13
the
09:13
nuclear power plant was 800 megawatts uh
09:16
so so massachusetts essentially wants to
09:18
be to build the equivalent of seven main
09:21
yankees
09:22
worth of offshore wind and they're
09:24
already on their way
09:25
they've they put out just uh
09:28
over the last few days a 1600 megawatt
09:31
solicitation
09:33
they've approved two projects each at
09:35
800 megawatts already but they're all
09:36
fixed to the seabound
09:37
because they have shallower waters new
09:39
york has a 9 000 megawatt plan
09:42
rhode island 430 connecticut 2000 new
09:45
jersey 7500
09:47
maryland almost 1500 megawatts virginia
09:49
over 5000 megawatts
09:51
uh so so so there's a revolution going
09:54
on president biden
09:56
last month announced a plan of 30

09:59
gigawatts of offshore wind by 2030.
10:02
that's more than 30 that's more than 30
10:05
main yankees okay that's that's what
10:07
we're talking about
10:07
more than 30 nuclear power plants worth
10:09
of wind offshore winds
10:11
between now and 2030 which will attract
10:14
100 billion dollars of investment
10:16
in 44 000 jobs so in maine we have deep
10:19
waters who are focusing on floating
10:21
winds
10:22
we're focusing on leading the the
10:24
country in in the floating wind space
10:27
so this is a map of the us showing where
10:30
where waters is deep and what it
10:32
requires floating turbines the dark blue
10:34
areas require floating turbines because
10:36
the water's too deep
10:38
the light blue areas near the coast can
10:40
be can
10:41
can have fixed bottom turbines because
10:42
they have shallower waters

10:44
if you look at the gulf of maine it's
10:45
all dark blue so the only option for
10:47
maine
10:48
to have offshore wind is to actually do
10:50
floating turbines
10:53
now south of us in massachusetts uh
10:56
they're they have very light blue areas
10:58
here so so the projects of mass and
10:59
suture scopes i've talked about
11:01
are all fixed bottom in shallower waters
11:03
however massachusetts
11:05
is going to saturate those areas it's
11:07
going to go beyond that to floating
11:09
at some point in time if you look at the
11:11
west coast it's our dark blue
11:13
california is it has major plans for
11:16
floating offshore wind right now
11:18
because that's the only option they have
11:20
now around the world there's a race
11:22
to develop floating offshore wind
11:24
technologies and offshore wind
11:26
it is anticipated to become more than a

11:28
trillion dollar industry
11:29
over the next two decades
11:32
so let's go back to maine a little bit
11:35
we started working on offshore wind
11:37
when when gasoline prices heating oil
11:39
prices in maine went up to four dollars
11:41
a gallon back
11:42
in in the late to the first decade
11:46
here of this uh this millennium and um
11:49
in maine essentially spends close to
11:54
3.6 to 5.8 billion dollars per year on
11:57
fossil fuels
11:58
that's heating oil that's gasoline
11:59
that's natural gas
12:01
most of this money leaves the state of
12:02
maine because we don't have those
12:04
resources in maine
12:05
so we're shipping away every year close
12:07
to four billion dollars four to five
12:09
billion dollars a year
12:11
and that leaves the state of maine uh
12:13
think about if we can keep some of those

12:14
dollars in maine and put them to good
12:16
use
12:16
by developing our own uh renewable
12:18
energy resources
12:20
what we found is offshore wind is the
12:22
biggest opportunity that the state of
12:23
maine has not only the only opportunity
12:25
but the biggest opportunity
12:27
and um if what we what we calculated
12:30
that if we
12:31
harnessed only three percent of the gulf
12:34
of maine area just three percent
12:36
within 50 miles of the gulf of maine we
12:39
can heat every home and drive every car
12:41
so the question really is where do we
12:43
pick that three percent
12:46
so we can electrify heating and
12:47
transportation in our states
12:51
um how do we float wind turbines there
12:53
are three major
12:54
categories of floating winter turbines
12:56
and they're all the designs are all

12:58
borrowed
12:59
from the oil and gas industry so we've
13:01
taken oil and gas
13:02
rigs which have been built for decades
13:04
floating rigs and
13:05
and figured out how to turn them into
13:07
floating wind turbines so the first
13:09
family it designs is called the spar the
13:11
second is a semi-submersible and the
13:13
third is attention-like platform
13:15
the spire design is a very long tube
13:19
that has a mass at the bottom it's full
13:21
of air essentially think about a tube
13:23
that's 300 feet long 25 feet in diameter
13:27
and has a big mass near the bottom to
13:30
keep it straight up
13:31
think of it as if you took a a water
13:34
bottle
13:35
empty date of water put a bunch of sand
13:37
at the bottom and put it in your bathtub
13:39
it will stand vertically up and the more
13:41
sand you put in the more actually it

13:42
will
13:43
ballast it down but that's exactly
13:46
exactly essentially where the spar
13:47
is except a lot bigger now now notice
13:50
that the spar
13:51
has three mooring lines on it because
13:53
you have to keep it on station
13:55
uh and that's what the three mooring
13:56
lines do and they're mooring lights just
13:58
like you would have on a boat
14:00
they're typically made out of steel
14:01
chain even though we're looking at
14:03
synthetic mooring lines as well right
14:04
now
14:05
the second family of designs is called
14:07
semi submersibles
14:09
the the advantage there is they're a lot
14:11
shallower they have a much shallower
14:12
draft
14:13
so you can actually make them dark side
14:16
and tomorrow to see these designs
14:19
will have about 25 to 30 foot draft and

14:22
and that's the design we've actually
14:24
focusing on in the state of maine and
14:25
would like to make it out of concrete
14:27
because maine has the ability to produce
14:29
concrete locally
14:31
and and concrete will stand up better in
14:33
the environment than steel offshore
14:35
and we can actually get over 100 year
14:37
life on a hull
14:39
versus 20 to 30 years on a steel hole so
14:42
that would reduce the environmental
14:43
footprint
14:44
of a construct of construction the
14:46
semi-submersible
14:48
works like a boat essentially if you if
14:50
you've sailed the catamaran the
14:51
catamaran has two hulls
14:54
and and the way the camera catamaran
14:56
stays stable
14:57
is by by having the hulls apart and by
14:59
having bigger holes
15:00
so in our case this design is the

15:03
trimaran it's got one
15:04
two and three holes and these three
15:06
hulls keep it stable
15:08
and basically they're made out of
15:09
concrete in our case and are filled with
15:11
air
15:11
they're like three big concrete air
15:13
tubes air cans
15:15
and the towers sitting in the center the
15:17
last design is called attention-like
15:19
platform
15:20
what it is it's got a big buoyancy
15:22
module like a big air
15:24
buoy here and that buoy wants to pop out
15:26
of the water
15:27
and you keep it from popping out of the
15:28
water by putting tension legs to the
15:30
seabed
15:31
the disadvantage of that is you need
15:32
very expensive mornings
15:34
and the unit is not stable on its own
15:36
you have to you have to actually hold it

15:38
up as you take it
15:39
from port to its final location whereas
15:41
both the semi
15:42
and the spar are are
15:47
float can can be towed out to sea on
15:49
their own i'll show you that in a minute
15:51
there's there's a there's essentially a
15:53
gold rush right now to build floating
15:54
turbines to design and build floating
15:56
turbines across the world
15:58
there's over 40 designs out there and
16:00
they're all competing
16:02
for a position in this growing industry
16:04
there are
16:05
countries can competing with other
16:08
countries
16:09
to get floating turbines out there first
16:11
right now and in the un united states
16:13
the university of maine and the state of
16:15
maine
16:15
are likely to build the very first
16:17
commercial scale floating turbine

16:19
and lead the country in that direction
16:23
we started our program wow we started
16:26
our program
16:27
about um a decade ago but
16:30
back in may 2013 you main made history
16:33
and you main main history
16:35
because we built and deployed the first
16:37
grid connected offshore wind turbine in
16:39
the united states
16:40
people don't remember don't know that
16:42
but we did we built the first one
16:44
so in may 2013 we we put this unit in
16:47
the water
16:48
it was made at umaine in our lab taken
16:51
on three trucks to broader maine
16:53
assembled in brewer maine by trimboro
16:55
put in the penobscot river and towed out
16:56
to sea
16:57
and this is how we towed it down the
16:59
penobscot river you can see here we have
17:01
three flotation columns one two and
17:03
three in each corner

17:05
that's how it works like a trimaran and
17:07
this is a one to eight scale version of
17:09
the bigger unit
17:10
so that's how we thought it out to see
17:12
and then we got it to the casting
17:15
and moored it to the c band when we got
17:16
to castine we had already pre-installed
17:19
three mooring anchors three morning
17:22
lines
17:22
and tied it to each corner of of of of
17:25
the hull
17:26
and we had a pre-installed under c cable
17:29
that brought the power back to shore
17:31
we hooked that up and we ran that for a
17:33
year and a half
17:34
and because it's a one to eight scale it
17:36
saw very extreme environments in a very
17:38
short time
17:39
relative to its size and um and we had
17:42
over 50 sensors on board to and the
17:45
purpose of that was to figure out if we
17:47
can design a hull

17:48
that would last 500 years in the gulf of
17:50
maine and the good news is
17:52
is uh is is we've proven that we can and
17:55
um this is an example of
17:57
one of the first terms we encountered in
17:59
december 2013
18:01
it was called winter storm electra so
18:03
what you see blowing across here
18:05
is actually snow these are this is a
18:07
snowstorm blowing across
18:09
and you can see the size of the waves
18:11
and the white caps relative to the size
18:13
of the hull
18:14
remember this is a 1 to 8 scale version
18:16
of the bigger unit
18:18
relative to the size of the hull these
18:20
were 60 foot waves relative to the size
18:22
notice the white gaps and notice that
18:24
the hull isn't even moving you can't
18:26
even see it move
18:27
in a 50-year storm and that was the aha
18:30
moment that our designs work

18:31
our computer models work and because of
18:34
that
18:35
the us department of energy decided to
18:37
invest in us 50 million dollars
18:38
to build the bigger one so we won a
18:41
national competition
18:42
to build the bigger one just to give you
18:44
a sense of what happened
18:46
during that year and a half deployment
18:48
of castine
18:49
that unit saw 50 to 500 year storms
18:52
about 40 storms like that and the
18:55
maximum
18:57
the cell acceleration was less than
18:59
two-tenth of a g
19:00
and then the maximum heal angle was
19:02
seven degrees so the
19:03
the tower moved off vertical only seven
19:05
degrees in
19:06
five hundred year storms and what you
19:08
see in blue and red
19:10
are our computer models versus the

19:12
actual measurements
19:13
of the motions of the hull we're right
19:15
essentially we know how to predict the
19:17
motions of these hulls
19:18
in these 500-year nor'easters
19:22
so so the next step now the project is
19:24
to build a bigger one so we're going to
19:25
build one unit just one hull
19:27
but it's not just one hole it's an 11
19:29
megawatt unit it'll be the biggest
19:30
floating turbine in the world
19:33
and um and the units will have each
19:35
blade in that unit
19:37
will be the size of a football field so
19:40
it's a big unit
19:41
and that unit would be capable of
19:43
providing enough electricity
19:45
for close to five to six thousand main
19:48
homes main households
19:49
umaine has over 60 patents to date on
19:52
this technology
19:54
and it was designed so we can fabricate

19:56
it here in maine our goal is to start
19:57
construction next year
19:59
and to have it off mount vegan island to
20:01
be tested
20:02
starting in 2023 under 23 beginning at
20:04
24.
20:06
the good news is is the national
20:07
renewable energy lab
20:09
did a study which they published last
20:11
year and that showed that this
20:13
technology the humane technology
20:15
when scaled up to full scale farms when
20:17
we're cranking these things up
20:19
we can get down below six cents a
20:20
kilowatt hour so it's a very competitive
20:22
energy resource
20:24
because of all of that uh the we we were
20:27
joined by two major
20:28
corporations that are invested in the
20:30
technology each has invested 50 million
20:32
dollars
20:33
committed to invest 50 million dollars

20:35
one company is called rwe
20:37
and the other one is the mitsubishi
20:38
corporation through its
20:40
subsidiary in the us called the diamond
20:42
generating corporation and diamond
20:44
offshore wind
20:46
these two companies are are some of the
20:48
best in the world in their field
20:50
rwe is the second largest offshore wind
20:52
developer in the world
20:53
they're a german company and both of
20:56
them are investing in maine to help us
20:58
build this hull
20:59
and um notice the hull has three morning
21:02
lines i'll describe a bit
21:03
how it works we have three mooring lines
21:06
one
21:06
two and three it floats in the water
21:08
just like a boat would float
21:10
instead of having one hole or two holes
21:12
it has three holes one on each corner
21:14
one

21:14
two and three under the water the three
21:17
holes are tied together
21:19
by rectangular beams the whole hull's
21:22
made out of concrete
21:23
you might ask well how can concrete
21:25
float well it's not concrete that floats
21:27
this this is essentially a big concrete
21:29
air can
21:30
so each one of these floatation columns
21:33
on each corner
21:34
are about 120 feet long about 40 feet
21:37
wide
21:37
and they're full of air it's basically a
21:39
big concrete air cans
21:41
and then the center column is also
21:42
another concrete air can
21:44
and under the water that tied together
21:46
with concrete
21:47
rectangular air cans as well
21:51
now the hull is very unique
21:54
and i'll describe it in just a short
21:56
while its design is unique but the

21:58
project
21:59
is off monhegan island about two miles
22:01
south of monhegan
22:04
and that's what the site looks like it's
22:06
got 300 feet of water
22:08
that's monhegan island you can see in
22:10
red mountain island up here where it is
22:12
in the state of maine and and the the
22:14
area where
22:15
the test area we're going to go ahead
22:17
and test it out is about two square
22:19
miles
22:20
the state of maine provided that test
22:22
area to the university of maine
22:24
as a research site to do this kind of
22:26
work back in 2010
22:28
through an act by the legislature
22:32
the this is what's unique about our
22:34
technology is is that we can make it
22:35
locally
22:36
and it can be built like a bridge like a
22:39
concrete bridge

22:40
if you've seen a segmental concrete
22:42
bridge being built
22:43
uh essentially this is how we're going
22:45
to build this so rather than try to
22:47
develop a technology
22:48
and figure out how to how to
22:49
industrialize it later we started with
22:52
an industrialized
22:54
concrete construction method for bridges
22:56
and applied it to a hull
22:57
so we have an industrialized technology
23:00
right off the bat
23:01
so to give more examples here is
23:04
let us this is on the left hand side is
23:07
is like a
23:08
three roadways coming together over the
23:10
water
23:11
you get one and two and three roadways
23:13
and they're supported by peers
23:15
and four piers now in this case the
23:19
piers are made out of concrete
23:20
cans that are hollow they're cast near

23:23
the bridge site
23:24
and stacked on top one another with an
23:26
epoxy in between and squeezed together
23:29
each one of these cans could be 30 to 40
23:31
feet in diameter
23:32
and 15 feet high and then you squeeze
23:35
them together vertically with
23:36
with like long bolts they're called
23:38
post-tensioning tendons to make one big
23:40
unit
23:41
and then uh the the the superstructure
23:43
of the bridge
23:44
the roadway itself is made with
23:46
rectangular boxes
23:47
that are filled with air as well and
23:50
they're made near the side
23:52
set that's put up there and squeezed
23:54
together
23:56
now if you take that bridge and flip it
23:58
upside down
23:59
you've got our hull so the idea here is
24:02
to turn bridge builders into hull

24:03
builders
24:04
and be able to make it right here in
24:05
maine
24:07
so the only difference is a lot easier
24:09
to build this than to build a bridge
24:10
because you're starting
24:11
on the ground and build it from the
24:13
ground up then put the whole hole in the
24:14
water
24:15
and throw it out to sea this is an
24:17
example of
24:18
of the sarah long bridge that was built
24:21
by chimbro between maine and new
24:22
hampshire
24:24
and this is when it was being built a
24:26
few years ago
24:27
and notice here the concrete boxes these
24:31
concrete boxes
24:32
were made right at the site many of them
24:35
half of them were made near the site
24:36
and half of them were brought in and
24:38
they were

24:39
brought in on a barge and lifted with a
24:42
crane and stacked on top of one another
24:44
like big
24:45
huge legos and and between each layer
24:48
between each can there's essentially an
24:50
epoxy
24:52
and and then there's steel
24:54
post-tensioning tendons like big
24:57
big bolts if you wish they are squeezed
25:00
vertically to tie
25:01
the whole thing together that's how
25:03
strong these are when you make bridges
25:05
out of them
25:06
but think about using the same
25:07
technology to build hulls that's that's
25:09
that's the invention that umaine has
25:10
developed now
25:12
the goal here is to try to make some of
25:14
these in brewers these
25:15
these boxes and cans in brewer or make
25:18
them
25:18
in searsport and we're also looking

25:20
potentially at eastport as one of the
25:22
facilities to
25:23
to to uh to assemble in searsport the
25:26
goal is to assemble the hull and throw
25:28
it out to sea
25:29
now how do we moor it to the seabed we
25:32
can moor it with steel chains or with
25:34
synthetic mooring lines
25:36
but at the very end there's an anchor
25:38
into the seabed
25:40
we're likely to be using what we call a
25:41
drag anchor this is what it looks like
25:43
looks like a big plow essentially
25:46
and you tow it along in along the mud
25:49
with the tugboat and as you towed along
25:50
the mud
25:51
it embeds itself into the mud and sets
25:53
itself in it could be embedded 40 feet
25:55
or so
25:56
until you have enough tension on the
25:58
tugboat to
25:59
to hold up the turbine so you test it

26:02
out to the tension that you need
26:04
and then you hook it up to the turbine
26:06
each turbine will have three mooring
26:07
lines like that on it
26:10
over the last decade the university of
26:12
maine has been busy
26:14
uh collecting data on the environment in
26:16
the test site off monegan island
26:18
we had bird biologists and fish
26:19
biologists uh
26:21
and marine mammal biologists
26:24
um study who lives under the water above
26:27
the water
26:27
we've taken tags and put them on on
26:30
marine mammals so
26:31
to see where they move around how they
26:33
move around uh we've had um
26:35
the new jersey audubon worked with us
26:39
and put a
26:40
radar on on monegan island and scanned
26:43
the skies
26:44
for over a year to look for birds and

26:46
bats
26:47
and identify how they fly and where they
26:49
fly we also had
26:51
bird biologists go out there and and
26:53
count the birds and the types of birds
26:55
that would fly over over the test site
26:58
so this was the most
26:59
studied test sites from the
27:00
environmental perspective in the gulf of
27:02
maine that we know of
27:04
after all this data has been collected
27:05
now we're going to take a single hull
27:07
put it put it off off monegan island and
27:10
see how that impacts its environment
27:12
we're going to see how the birds
27:14
behavior changes we're going to learn
27:15
over five years afterwards how the fish
27:18
behavior may change
27:19
what the impact might be on the lobster
27:21
industry so these are the kinds of
27:23
studies we're going to be doing under
27:24
that one turbine so we can develop the

27:26
scientific and engineering basis for
27:28
going the next step
27:31
and to show you the kind of numerical
27:33
tools we use to design these hulls and
27:35
how we design these halls
27:37
um we we used computer models
27:40
developed at the university of maine or
27:42
advanced at the university in maine
27:43
to figure out how the hull actually
27:45
moves with the winds and the waves
27:47
and these numerical tools are visualized
27:49
right here on the top
27:50
on the top you see a 50-year storm
27:52
50-year waves
27:53
60 feet high coming at the hull and you
27:56
can see how the hull moves
27:57
under these waves now this is
27:59
exaggerated so you can see it doesn't
28:00
move that much
28:02
what you see below that are the stresses
28:04
as the as the waves go through it the
28:07
the stresses are color-coded to show us

28:09
where the maximum stresses in the hull
28:10
are
28:11
to figure out how strong we get we have
28:12
to make the hull to give you a sense
28:15
of what it takes to engineer a hull we
28:17
run
28:18
over 80 000 simulations like this
28:22
to represent different wind wave
28:25
current environments icing environments
28:28
snow environments and so on and so forth
28:30
to make sure the hull is designed
28:32
properly to survive
28:33
500 years out in the gulf of maine
28:37
how how how do the electric cables come
28:40
to shore
28:41
now typically if you have a big farm and
28:43
hopefully in the 2030s in maine will
28:45
have those
28:46
a big farm might have 50 turbines in it
28:48
about a mile apart
28:50
what you do is you put them in rows of
28:52
say 10 turbines and

28:54
or so and each row would have each
28:56
turbine would have a cable coming out of
28:58
it but
28:58
each each row would have would have one
29:02
collection point
29:03
and then each row of 10 turbines then or
29:06
each collection point from each row
29:08
comes together to a
29:10
collection point offshore and you have
29:12
one cable coming back to shore now you
29:14
try to bury the cable into the c-bound
29:17
to the extent that you can now with from
29:20
each turbine
29:21
the cable comes down through what we
29:23
call a j-tube
29:24
and it goes and it makes a lazy wave and
29:28
back into the seabed
29:30
uh it's tied to the seabed with the
29:31
tether in an anchor and then we try to
29:33
bury it
29:34
bury the export cable for the money line
29:36
we have about a 24 mile

29:38
export cable from the monahan projects
29:40
which we plan to bury to the extent that
29:42
we can
29:43
um
29:47
notice what the cables look like there's
29:48
a lot of questions that we got asked
29:50
why would these cables kill the fish and
29:52
would they have emfs on them and so on
29:55
and so forth
29:56
well the good news is we've been using
29:57
these kinds of cables in the gulf of
29:58
maine for decades now
30:00
give you an example how do we power the
30:02
islands off the coast of maine
30:04
actually we run cables from the mainland
30:06
to the islands many islands to power
30:08
them and these are similar to the cables
30:10
we'll be using
30:11
for example in ielts borough
30:14
the iceborough has had a subsea cable
30:17
connecting
30:17
it to northport since 19 since since

30:21
1995
30:23
for over 60 years and and the cable was
30:26
replaced
30:27
in 2015 it's a four inch diameter cable
30:30
and it's buried about six feet in the
30:31
mud
30:33
now our cable will be a bit bigger it'll
30:35
be six to eight inches in diameter you
30:36
can see it here on the right hand side
30:38
and our goal is to also bury it in the
30:40
mud to the extent that we can
30:42
as you know in the gulf of maine the
30:43
seabed has rock outcrops that might
30:45
prevent us from burying it
30:47
in certain locations now how do we know
30:50
how to run the cable and way to run it
30:51
and how to bury it
30:52
you do offshore surveys so on the right
30:55
hand side
30:56
is is our proposed cable route from the
30:59
monhegan island test site
31:02
to boothbay harbor we plan to take the

31:04
cable to boot bank
31:06
and and the question is is is how can we
31:09
find mud pockets
31:10
to do it now we've done some studies to
31:12
figure out where we think about the
31:13
pocket
31:14
pockets are then we send ships out there
31:16
uh sites that have
31:17
that send seismic waves to the seabed
31:19
and help us figure out where the mud
31:21
pockets are
31:22
and on the left hand side is is the
31:25
cable
31:26
from isboro to northport that's been
31:29
around for decades
31:30
our cable on the right-hand side and the
31:32
cable on the left-hand side are
31:33
essentially the same
31:35
they're both going to be buried the same
31:37
neither neither the left cable nor the
31:38
rack cable
31:39
is going to have

31:43
have any bigger impact on the fish or
31:45
the wildlife people fish over that cable
31:47
right now off
31:48
islesboro and have been for decades
31:51
now how do we know again where if we can
31:54
bury the cable as i said we did a
31:56
fishing survey we did a survey
31:59
uh we ran boats that vessels specialized
32:02
vessels
32:03
that send seismic waves and other types
32:05
of waves to the seabed
32:07
to figure out what the seabed looks like
32:09
and we did that
32:10
last month in april and we're analyzing
32:13
this data as we speak so real time
32:15
this is just a snapshot of the data that
32:17
we've collected to give you a sense of
32:18
the resolution of the data
32:20
that what you see in in brown and in
32:23
yellow and green
32:24
are outcrops where you have rocks what
32:26
you see in purple

32:28
are essentially deposits of of sand and
32:31
mud
32:32
and initially we plant we plan to have
32:34
the survey
32:36
along the line that's that's uh dotted
32:39
and after we've started running we've
32:42
run the survey
32:43
we we're going to try to move the line
32:45
to the green location if you wish
32:47
where there are mud pockets so we can
32:49
bury the cable six feet and allow most
32:51
fishing
32:51
to take place normally there
32:55
what does a what does that the mooring
32:58
line look like
32:59
and how big is it and is it going to
33:01
impact the whales
33:02
well here's what it looks like actually
33:04
to scale next to a six-foot person
33:06
uh there are two types of mooring lines
33:07
that we're looking at one of them is a
33:09
steel chain

33:10
mooring line and that's one chain in the
33:12
link one link in the chain if you wish
33:14
and on the left hand side here in the
33:16
middle you have an eight inch diameter
33:18
synthetic mooring line it's a polyester
33:22
type cable or some other synthetic
33:24
mooring lines
33:25
um notice that these are big big units
33:28
so so so these are very big
33:29
and they're tensioned to hold up the
33:31
hull and therefore they're not going to
33:33
move around
33:33
you're not going to have a whale or a
33:35
marine mammal getting tangled up in that
33:37
it's not like a very small
33:39
fishing line and so forth so there's a
33:41
lot of tension in it it's very big
33:43
and experienced has shown us over
33:45
decades in the oil and gas industry
33:46
who's used these kinds of
33:48
mooring systems that the marine mammals
33:50
and the whales go around them they don't

33:51
run into them we have videos of whales
33:53
going around these
33:54
for in the oil and gas industry
33:58
now this with a long history in the
34:00
state of maine this has not just
34:01
happened overnight
34:03
i've been at it for 12 years and i'm i'm
34:05
the old person in the room right now
34:07
an offshore wind in me but back in 2008
34:11
the governor governor baldacci at the
34:14
time
34:14
put together an ocean energy task force
34:16
with some which i served on
34:18
with angus king and many others it was a
34:20
bipartisan task force they put a report
34:22
together
34:23
that recommended five gigawatts of
34:25
offshore wind in the gulf of maine
34:27
to electrify heating and transportation
34:29
it was it was not uh
34:31
it was not it was not easy to explain to
34:34
people

34:35
10 years ago they will have electric
34:36
cars but we have them today it's easy to
34:38
explain today that we could have
34:39
electric cars and they do work
34:42
in in 2009 the state of maine passed a
34:46
billion animously
34:47
1465 in the legislature imagine demand
34:50
unanimously
34:51
with one extension to provide to assign
34:54
the test site for the university maine
34:56
to do research
34:56
following that in 2010 maine voters
34:59
actually voted
35:01
to provide the university 11 million
35:02
dollars to get going and design some
35:05
technologies and do the demonstration
35:06
projects so we are under a mandate
35:09
unanimous mandate by the legislature and
35:12
a vote by the people of maine to do this
35:14
so we're doing what the people in maine
35:16
have asked us to do for the last 10
35:17
years

35:20
and today governor this last couple
35:22
years governor
35:23
mills have put some ambitious targets to
35:26
achieve state carbon neutrality by 2045.
35:29
to do that we need offshore wind we also
35:31
need other forms of renewable energy to
35:33
work together but offshore wind is key
35:35
to get there
35:38
so what's the state of maine plan the
35:39
state of maine is developing an offshore
35:41
wind plan right now by working with
35:43
constituents across
35:44
across the state and all users of the of
35:47
the sea
35:48
and um and the plan calls for crawl
35:52
before you walk walk before you run do
35:54
it right
35:55
back in 2013 i told you we did a one to
35:57
eight scale that was crawling
35:59
in 2023 we we hope to put a full scale
36:02
11 megawatt unit
36:04
that's walking slowly in 2025

36:07
the state of maine is proposing a
36:09
turbine called a research array of up to
36:11
12 turbines
36:12
about a mile apart each to to further
36:15
scale up the technology you need that
36:17
you can't go from a single turbine to an
36:19
industry you gotta you gotta have a step
36:21
in the middle
36:21
or we can potentially make some major
36:23
mistakes so the 2025
36:25
project the research array actually
36:28
there's a bill in there today
36:29
that's being heard by the legislature as
36:31
we speak today so
36:32
so if you're interested in this email
36:34
the eut committee to vote on this on
36:36
this bill
36:37
i'm not telling you how to vote i'm just
36:39
subliminally telling you you might you
36:40
can't do that
36:42
and um and then the idea is is is um
36:45
these turbines this this uh research

36:47
array
36:48
would be over uh between 20 and 30 miles
36:50
offshore
36:51
and and would be would be in an area
36:53
that would minimize impact on the
36:55
environment and minimize
36:56
impacts on fishing and so on and so
36:58
forth and one goal of the research array
37:00
is to work with fishermen
37:02
to figure out how to fish inside that
37:03
farm as well
37:05
so this is what the research array may
37:07
look like notice
37:09
the turbines they're about a mile apart
37:12
in groups of four and in between them
37:15
we're going to leave large areas so
37:16
vessels can easily go through them
37:18
that's one one potential opportunity
37:21
it'll be 16 square miles
37:22
you'll have 12 turbines and notice
37:26
that one of our goals is to be able to
37:28
see how to fish inside the farm as well

37:30
the the circles that you see in white
37:32
are the areas where it would be
37:34
difficult to fish because of the morning
37:35
lines and anchors
37:36
but you can still fish right inside the
37:38
farm where my cursor is
37:39
and that's what we're going to be
37:40
studying is how to do that working with
37:43
that's part of the research that the
37:44
research area will be doing
37:48
the other opportunity i'd like to talk
37:50
about is is the opportunity
37:52
beyond offshore wind the as we build an
37:55
industry like that
37:56
and potentially bring billions of
37:58
dollars to the state of maine
38:00
we're also going to impact other
38:01
industries one industry we're going to
38:03
impact is our boat building industry
38:05
there's an opportunity to build fleets
38:07
of vessels
38:08
to build these offshore wind farms and

38:10
to maintain them
38:12
this is a 3d printed boat that we
38:13
printed in our lab the first
38:15
of its kind in the world which we won a
38:17
uh
38:18
guinness world record for it was a 25
38:20
foot 5 000 pound vessel that we printed
38:23
in three days
38:24
but this particular vessel is is a
38:26
potential
38:27
for us to actually in the future to be
38:29
potentially printing some of these boats
38:31
we are actually studying right now the
38:33
opportunity to print to to to build
38:36
a 60 to 70 foot uh vessel
38:39
uh it's it's called the crew transfer
38:41
vessel to go out
38:42
to the monhegan project and um and and
38:45
maintain it
38:46
and that vessel will be built built in
38:48
main and we're hoping to 3d print the
38:50
mold

38:50
that we use to fabricate the composite
38:53
vessel
38:54
so to summarize here um for us
38:58
we've been on a journey over the last 12
39:01
years
39:02
the next part of that journey is to
39:03
build a single turbine off monegan
39:05
island
39:06
our goal is to to help decarbonize the
39:09
state of maine
39:10
and create thousands of of clean energy
39:12
jobs
39:13
in the state keep our energy dollars in
39:15
maine and keep our
39:16
youth in maine at the university of
39:19
maine advanced structures and composite
39:21
center
39:21
we have now close to 20 engineers
39:24
working only floating offshore wind many
39:26
of them
39:27
came back to maine there were mainers
39:29
that left maine and heard about our

39:30
project wanted to come back to maine to
39:31
be part of this future
39:32
and helped create this future many of
39:34
them are in the lab today
39:36
some of them testified to legislature
39:38
today about why they came back to maine
39:40
so we hope to bring a lot more people
39:41
back to me and young people to build
39:43
this next generation industry
39:44
electrify heating and transportation in
39:47
the states
39:48
thank you very much for listening i'm
39:49
happy to take some questions
39:53
very good thank you dr dogger and we
39:57
also have as i mentioned earlier we have
39:59
representative
40:00
genevieve mcdonald here to answer
40:03
questions as well
40:04
if you have uh if you are interested in
40:07
posing a question please go to the chat
40:10
function on the bottom of your screen
40:13
and just click on that type in your

40:16
question and hit
40:17
enter and we have a few questions now
40:20
and
40:20
let me get to those uh
40:25
question is is there any practical
40:27
application
40:28
for integrating a submerged turbine
40:31
suspended below the floating
40:33
platform for example a two power
40:37
to have two power generating devices on
40:39
the same platform
40:41
very good question actually thanks for
40:43
asking that we've looked at that
40:44
actually we've looked at to see if we
40:45
can locate
40:46
wave energy devices and tidal energy
40:48
devices or
40:50
current energy devices on this you can
40:53
but
40:53
it's not quite clear that it's cost
40:55
effective i think
40:56
the more energy generation devices you

40:58
have
40:59
the more complex the system is the more
41:02
o m you have to
41:03
you have to um you have to do but it's
41:05
certainly worthwhile studying further
41:08
it's on our radar screen thanks for
41:10
asking the question
41:11
very good um
41:14
question uh and you you've addressed
41:17
this a little bit but could you
41:19
elaborate a little bit
41:20
more on the uh
41:23
the uh concerns of some in the fishing
41:25
industry
41:26
about uh this project specifically the
41:29
one
41:30
the researcher ray could you talk about
41:32
not only
41:33
what those concerns are but also explain
41:36
more about
41:37
what the university is working on to
41:41
help the fishing industry navigate in

41:44
and around the research array
41:47
sure i'll i'll take a first crack at it
41:49
and i'll hand it over to genevieve
41:50
because genevieve
41:51
lives and breathes the fishing industry
41:53
so representative genevieve mcdonald and
41:56
had a great pleasure to work with her
41:58
and she's brought a lot of the concerns
41:59
from the fishing industry to us
42:01
so at a high level just to give you a
42:04
sense remember i said if we
42:06
if we if we harness just three percent
42:08
of the area of the gulf of maine
42:10
we can heat every home in maine and
42:11
drive every car three percent
42:14
and that's three percent within 50 miles
42:16
of the coast so the question is
42:19
in a worst case scenario we need three
42:20
percent i'm not suggesting that we do we
42:22
have three percent but
42:23
the worst case scenario we need three
42:25
percent and the question really is

42:27
is which three percent of the area
42:29
within 50 miles minimizes impacts on the
42:32
fisheries
42:32
that's what we're trying to figure out
42:34
in in the long run that's the goal
42:37
so so as you might imagine 97 percent of
42:40
the gulf remain within 50 miles would be
42:42
completely open with
42:43
to the fisheries even if we go ahead and
42:45
did three percent
42:47
and so that that as you know uh would
42:50
would have a minimal impact on the
42:52
industry the other thing we're trying to
42:53
do
42:54
is figure out how to fish inside one of
42:55
these farms as well was trying to study
42:57
that
42:58
by having the right people in the room
42:59
by working with the fishing industry and
43:00
figure out
43:01
within that three percent if you wish
43:03
how to go fish inside of it

43:04
so the purpose of the research array is
43:06
to answer those questions
43:07
actually build an array and work with it
43:10
with the fishing industry actually work
43:12
with a
43:12
to go out there and and figure out how
43:14
to fish inside the farm figure out what
43:16
the challenges may or may not be
43:17
and we're confident that we could find
43:19
solutions to fishing even within that
43:21
three percent
43:22
that this industry can potentially take
43:24
i'm going to head it back to genevieve
43:26
thank you doctor oh sorry thank you dr
43:28
daugher and thank you for having me here
43:30
today it's a pleasure to see everyone
43:32
so i'm happy to discuss the concerns of
43:33
the fishing industry and there are
43:35
really two primary concerns
43:36
one is environmental concerns what
43:38
impact will the research array will wind
43:41
development in the gulf of maine have on

43:42
the marine ecosystem and the other
43:44
is displacement fishermen are concerned
43:46
about losing fishing bottom this is a
43:48
heritage industry and fishermen are
43:50
generally resistant to change
43:52
so to the environmental impacts um there
43:54
is a nepa process there is an
43:56
environmental review and assessment that
43:58
is part of the permitting process and so
43:59
i think a lot of those questions will
44:01
get answered
44:02
as this process moves along both for
44:04
montegan and for the research array
44:06
and then to speak to displacement um the
44:08
fishing industry is really concerned
44:10
about
44:10
the development that we've seen in
44:12
southern new england and in the
44:13
mid-atlantic these are really big
44:15
commercial scale leases
44:16
and they have displaced fishermen in
44:18
those areas and so i would say that the

44:20
scale that maine is working at to start
44:22
with a single turbine
44:24
and you know test the feasibility how
44:26
close can fishermen feasibly operate
44:28
and then expanding that to a 12 turbine
44:31
research array
44:32
still taking in those um considerations
44:34
into conversations into dialogue into
44:37
stakeholder engagement
44:38
and really seeing how we can co-exist is
44:41
the right path forward
44:45
thank you representative mcdonald
44:48
thank you for your leadership and
44:50
legislature on this issue as well
44:52
thank you i'm going to go back and
44:53
listen to the rest of that hearing when
44:55
we uh finish here
44:56
yeah i need to get back and give my
44:57
testimony oh
44:59
right uh i'll run through these other
45:02
questions than to
45:03
uh question about the the choice of the

45:06
monhegan site what led you to choose
45:09
that site
45:10
and what role will the monhegan site
45:12
play
45:13
in the the development of the research
45:16
array thank you
45:18
excellent question the monhegan site was
45:20
selected in the state to a process
45:23
that was put together by the state of
45:24
maine where
45:26
they've looked at over 10 different
45:28
sites
45:30
in state waters where we can do research
45:32
testing uh they've talked to fishermen
45:34
they've talked to local
45:37
fishing communities and and
45:39
environmental
45:40
interests and had dozens of meetings
45:43
along the coast
45:44
to figure out where we can do a
45:46
demonstration project
45:48
and the state then identified monhegan

45:51
as
45:51
as an area that they they assigned to
45:53
the university of maine to do this work
45:54
but it took a long process
45:56
to to figure out where we can do a test
45:58
that's month
46:00
the next part of the question is what do
46:02
we learn from monhegan
46:03
and and then to take to the research
46:05
array the mohegan is a single project
46:07
single turbine project and its impact is
46:10
based on a single turbine
46:11
we're going to learn a lot about how
46:13
this unit can be built single turbine
46:15
can be built
46:15
we're going to learn its impact on the
46:17
environment around it we're going to
46:18
learn how to fish around the single unit
46:21
but that's not going to tell us how to
46:22
build an industry how to build the farm
46:25
and so the research what we learned in
46:26
monhegan is going to be taking the

46:28
research array
46:29
and in the research area we'll learn how
46:31
to build more than one how to scale up
46:33
manufacturing how to industrialize
46:35
manufacturing
46:36
which sports facilities can we use in
46:37
maine what upgrades do we need to have
46:39
to our port facilities how do we store
46:41
them how do we deploy them
46:42
how do we maintain these turbines and
46:44
then more
46:45
more important than not what is the
46:47
impact on the environment and the
46:48
fisheries
46:49
uh so what we learned in monique and
46:50
we're gonna go out and apply on an array
46:52
and say okay
46:53
we figured out how to fish around one
46:54
turbine how do we figure out how to fish
46:56
around 12 turbines
46:57
okay and and how do we space them
47:01
apart and um what kind of mooring lines

47:03
do we use
47:04
we're looking at both synthetic mooring
47:07
lines as well as chain mooring mines
47:09
the synthetics are actually have a
47:11
smaller footprint on the seabed
47:13
but could we use those and reduce the
47:14
impact on the fisheries um
47:16
so those are some of the things we would
47:18
be would be learning and
47:20
and you know building an industry like
47:22
this
47:23
is like running a big marathon and you
47:26
don't just go out there
47:27
in the morning and decide to run 26
47:29
miles okay
47:30
and what we're trying to do here is uh
47:32
crawl before we walk walk before we we
47:34
run the
47:35
marathon and and we've been crawling
47:37
we've been walking slowly
47:38
uh and the research array is part of
47:40
walking walking diligently

47:42
uh before we go out and build anything
47:44
bigger in the gulf of maine so it's the
47:45
right approach that the state's taking
47:47
we we certainly i applaud the state and
47:49
uh for moving in that direction
47:51
and being so open and holding all these
47:53
meetings to
47:54
to locate the research array so does
47:56
that answer the question
47:59
i believe so another question was asking
48:03
about it says why would you
48:04
not get the data from this project
48:06
before moving on to the research array
48:09
of 12
48:09
turbines that's essentially going to
48:12
happen
48:13
if you look at how long it will take to
48:14
get to the 12 turbine array
48:16
these processes can take five to six
48:18
seven or eight years before it finally
48:20
comes to future fruition
48:21
so essentially we're just at the very

48:24
beginning of a long
48:25
process to get to the research array so
48:27
if all goes well
48:29
we should start construction of this
48:31
first unit
48:32
next year and we'll learn a lot about
48:35
what it takes to build it starting next
48:36
year and the year after we're already
48:37
learning a lot what it takes to where we
48:39
can build them
48:40
and that information is going to be fed
48:42
into the research array process
48:44
similarly if this unit
48:47
gets into the if this unit is in the
48:49
water at the end of 23 beginning 24
48:51
we're going to learn a lot what it takes
48:53
to take it out there how to fish around
48:55
it and so on and so forth which will
48:56
help plan if you wish
48:57
what we do with the research array so so
49:00
the timing is actually perfect to get
49:01
the monhegan project done

49:03
and then start planning a you know five
49:05
to seven or eight year process for the
49:07
research array today so
49:09
we're at the very beginning of a long
49:10
road with the research array
49:12
very good we have a question that asks
49:15
uh
49:16
about uh the any resistance expressed so
49:19
far by the public for the effect
49:21
on beach views by placing these uh
49:25
uh wind turbines offshore in maine
49:28
very very good question and um the
49:30
beauty of of floating offshore wind
49:33
is that you can you can place them
49:35
farther out because they float you don't
49:36
have to have them fixed to the seabot
49:38
that gives us an opportunity to pick
49:40
sites that
49:42
provide a minimized impact on on view
49:44
shots
49:45
uh we've done a lot of studies at the
49:47
university of maine to look at view

49:49
sheds from different beach areas
49:51
as well as from from the tops and
49:53
mountains uh in in maine
49:56
and and based on that um we we uh
50:00
the state of maine is going to help to
50:01
identify where to put these farms to
50:02
give you a sense
50:04
if you're about 25 25 miles offshore
50:08
uh and you're standing if the farm is 25
50:10
miles off shore you're standing on the
50:11
beach
50:12
you're not going to see pretty much
50:14
anything from the beach
50:16
um the hub of the turbine would be below
50:18
the horizon
50:19
and and uh and you'll be too far for
50:21
your eye to even see see the blade maybe
50:23
come
50:23
come come across the horizon on the top
50:26
uh if you're at 30 miles offshore
50:28
uh you're you're basically not going to
50:30
see even the tips of the blades based of

50:32
course on
50:33
what the size of the of the rotor is so
50:36
the beauty of floating is
50:38
is is that you can put them farther
50:40
further out to sea if you had the queen
50:41
elizabeth
50:42
parked in portland moored in portland
50:44
you're going to see a big queen
50:45
elizabeth as the queen isn't the sales
50:47
sails to the ocean it's eventually going
50:49
to fall off the horizon you're not going
50:50
to see it anymore
50:52
and floating turbines are the same way
50:53
by getting them far far enough apart
50:55
away from us
50:56
we're not going to see them anymore and
50:58
that's an advantage
50:59
compared to what they're doing in new
51:01
jersey and in massachusetts and
51:03
and and so forth thank you that answered
51:06
the question
51:08
i i believe so it did for me uh

51:12
another question deals with the
51:13
commercialization of the patents how
51:16
will the university
51:17
and or the state capitalize on the
51:19
commercialization of the patents
51:21
in particular and will the patents be
51:23
licensed to private companies
51:25
and another part of that question is are
51:28
your patents completely owned by the
51:30
university
51:31
or by some of your partner companies uh
51:34
yeah the
51:35
the answer is oh we have over 50 uh
51:38
actually over 60 patents as of today
51:40
and they're all owned by the university
51:42
and they will be licensed
51:44
uh to to developers um and and then you
51:46
may would
51:47
derive a revenue back from from these
51:50
developments
51:51
so and that process has been going on
51:53
for a long time

51:54
jake ward the vice president for
51:57
economic development and innovation at
51:58
the university of maine has led this
52:00
effort and done a tremendous job
52:02
at putting put laying down if you wish
52:06
contractual vehicles to allow us to to
52:09
allow the state of maine and university
52:10
in maine to benefit from these patents
52:13
thank you what is the expected life of
52:16
the rotating parts of the wind turbine
52:19
considering the long expected life or
52:22
the
52:23
expected long life of the float itself
52:25
how will this design
52:26
impact the repair and replace or upgrade
52:29
of the wind turbine itself
52:31
excellent question typical offshore wind
52:33
farms in europe
52:34
that were built 30 years ago they were
52:37
designed initially for 20 years
52:38
of life and after which they would
52:40
basically repower them

52:42
um now the our whole we've designed our
52:45
hull
52:46
for close to 100 years of life because
52:48
it's made out of concrete and we've
52:49
designed it in such a way to do that
52:51
so the opportunity here every every 20
52:53
to 30 years
52:54
to go back and throw the hull back to
52:56
shore and put a new turbine onto and
52:58
back out
52:58
so so the opportunity here by doing so
53:01
we reduce the costs for the next
53:03
generation uh
53:04
uh deployments and reduce the
53:06
environmental impact of this technology
53:09
on the world around it so so we're very
53:12
excited about the opportunity to do it
53:13
that way
53:14
and we're the first to actually propose
53:16
offshore wind hulls of floating hulls
53:18
that would last a hundred years so that
53:20
we can repower them every every every 25

53:23
years so our great children and
53:24
grandchildren
53:25
would be repowering these just like just
53:27
like the hoover dam the hoover dam was
53:28
built by humane alumni actually
53:30
but francis crowe was humane alumni was
53:32
in charge of the hoover dam
53:33
and the hoover dam has been around
53:34
because a big chunk of concrete in the
53:36
water essentially
53:37
and the only thing we replace are the
53:39
moving parts and think of this as a
53:41
hoover dam
53:42
as well where we would replace the
53:44
moving part every 20 to 30 years
53:48
answer the question yes thank you
53:51
uh how are the possible assembly sites
53:53
that you mentioned such as searsport
53:55
eastport
53:56
brewer how are they being assessed and
53:59
what is the timeline for those decisions
54:02
um we're looking at a lot of different

54:04
things one is how to build the first one
54:06
then the next question is how do you
54:07
build 12 of them and then how do you
54:09
build 50 of them
54:10
in the future and all those are
54:11
different questions the state of maine
54:14
has actually hired a private company
54:18
moffett and nichols who's whose
54:20
expertise is important port facilities
54:23
to actually look at that that question
54:25
and and those this company
54:27
has to work with us and others on how to
54:30
identify uh port facilities um
54:33
the the partners we have at the rwe and
54:37
and the mitsubishi diamond
54:40
corporation are also looking at that for
54:42
the single unit for 12 units and in four
54:44
more so it's a teamwork effort
54:46
uh to figure out what these facilities
54:48
do and and and the
54:49
prime suspects of course are are sea
54:52
sports um right now and eastport is an

54:56
opportunity because of the deep
54:57
deep draft at eastport uh and um and
55:00
there's
55:00
fabrication sites across the state of
55:02
maine that could be used to actually
55:03
assemble these halls
55:04
so um so there's a the process over the
55:08
next many years will help identify
55:10
and answer fully these questions thank
55:13
you
55:14
uh question about uh the concrete
55:17
sections
55:17
and uh could you explain a little bit
55:20
more
55:20
how you uh can create them in a way that
55:25
retains the air
55:28
do you add air i mean are they
55:30
pressurized could you
55:31
explain a little bit more for those of
55:33
us who are not uh
55:35
engineers okay let's take let's take a
55:38
wine barrel

55:39
okay or a beer keg uh uh you know and
55:42
empty it out
55:43
and toss it in the water it's gonna
55:45
float right if it's sealed
55:47
and think of these floatation columns
55:49
that we have are essentially a beer keg
55:51
made out of concrete instead
55:52
instead of being you know three feet so
55:55
and so forth
55:56
it's it's 120 feet long and so forth so
55:59
basically it's a
56:00
it's a skin of concrete that contains
56:02
the air in it we don't fill it with air
56:04
when you cast the concrete the air just
56:06
comes into it and and we see on the top
56:08
so in the thickness of the the walls of
56:12
the
56:12
the concrete sections yeah they're they
56:15
vary from
56:16
from a minimum of a foot to and they
56:18
could beat a foot and a half in some
56:19
places

56:20
so very good and in some places they
56:23
reach actually two feet near the bottom
56:24
of the hole
56:27
and this will probably be our final
56:28
question because both you and
56:30
uh representative mcdonald have to get
56:32
back to the hearing but the question is
56:34
who is it expected to buy power from the
56:37
first
56:38
uh from the monhegan turbine once it's
56:41
uh once it's ready well the it's going
56:43
to actually be fed into the cmp grid
56:45
right now and uh
56:47
and the goal is to uh to uh have it fed
56:49
through in the booth bay area
56:51
so so so basically um people who get
56:55
their power from cmp
56:56
would would get the power from that
56:58
project
57:00
very good well dr daugher
57:03
and representative mcdonald thank you
57:05
both so much for

57:07
your presentation today this was
57:09
wonderful and as i mentioned folks we
57:11
will be posting this
57:12
on the university of maine alumni
57:14
association website but we'll also be
57:16
sending everybody who registered for
57:18
today's webinar
57:19
a link to that website so that you can
57:21
watch it again
57:22
so you can share it with others and we
57:24
do encourage you to pay attention to
57:26
what's going on now both in augusta with
57:28
the
57:29
hearings on this legislation and on
57:32
other topics related to the remarkable
57:34
work being done at the university
57:36
through
57:37
dr dugger's center and and among his
57:40
colleagues
57:41
so again on behalf of the alumni
57:43
association we thank you dr daugher and
57:45
representative mcdonald

57:47
and uh for all of you who are able to
57:49
join us thank you so much for your time
57:51
take care and enjoy the rest of your
57:53
week
57:55
bye bye take care go black bears

The University of Maine in Orono is the flagship campus of the University of Maine System, where efforts toward racial equity are ongoing, as is the commitment to facing a complicated and not always just institutional history. The University recognizes that it is located on Marsh Island in the homeland of the Penobscot nation, where issues of water and its territorial rights, and encroachment upon sacred sites, are ongoing. Penobscot homeland is connected to the other Wabanaki Tribal Nations — the Passamaquoddy, Maliseet, and Micmac — through kinship, alliances, and diplomacy. The university also recognizes that the Penobscot Nation and the other Wabanaki Tribal Nations are distinct, sovereign, legal and political entities with their own powers of self-governance and self-determination.