

TAREDYRKING KAN VÆRE MED PÅ Å REDDE KLIMAET

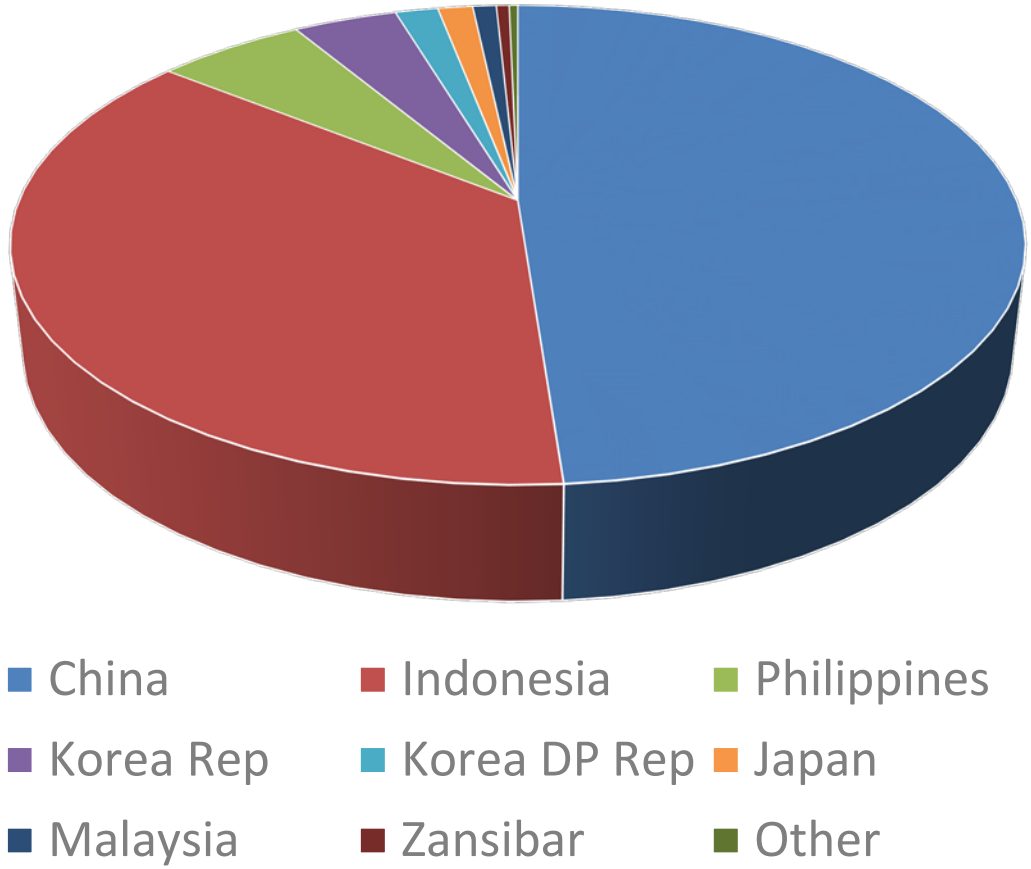
Jorunn Skjermo, Ole Jacob Broch og Aleksander Handå

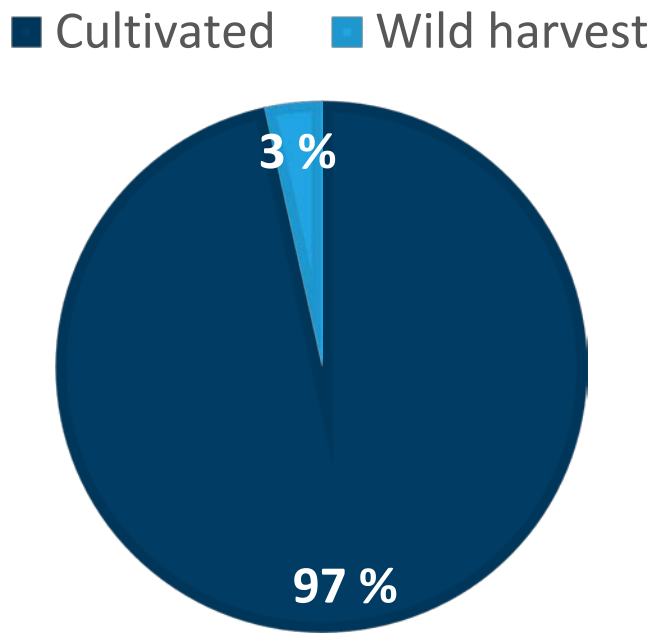
KLIMAMARIN 2018

FNs klimautvalg oktober 2018:

…det nå vil kreve nærmest overmenneskelig innsats og tusener av milliarder kroner for å unngå dramatiske klimaendringer…

Seaweeds Globally: 30.5 mill tons (FAO 2016)





- 46% of all marine aquaculture

SINTEF

Råstoff for mange produkter:





Mat og medisin



Fôr-ingredienser



Bio-kjemikalier



Gjødsel og plantevernmidler



Bioenergi

SINTEF

Biomasseproduksjonen Norge "can't resist"

- Hav, sollys og CO_2 som eneste innsatsfaktorer
- Hurtig vekst og stor produksjon



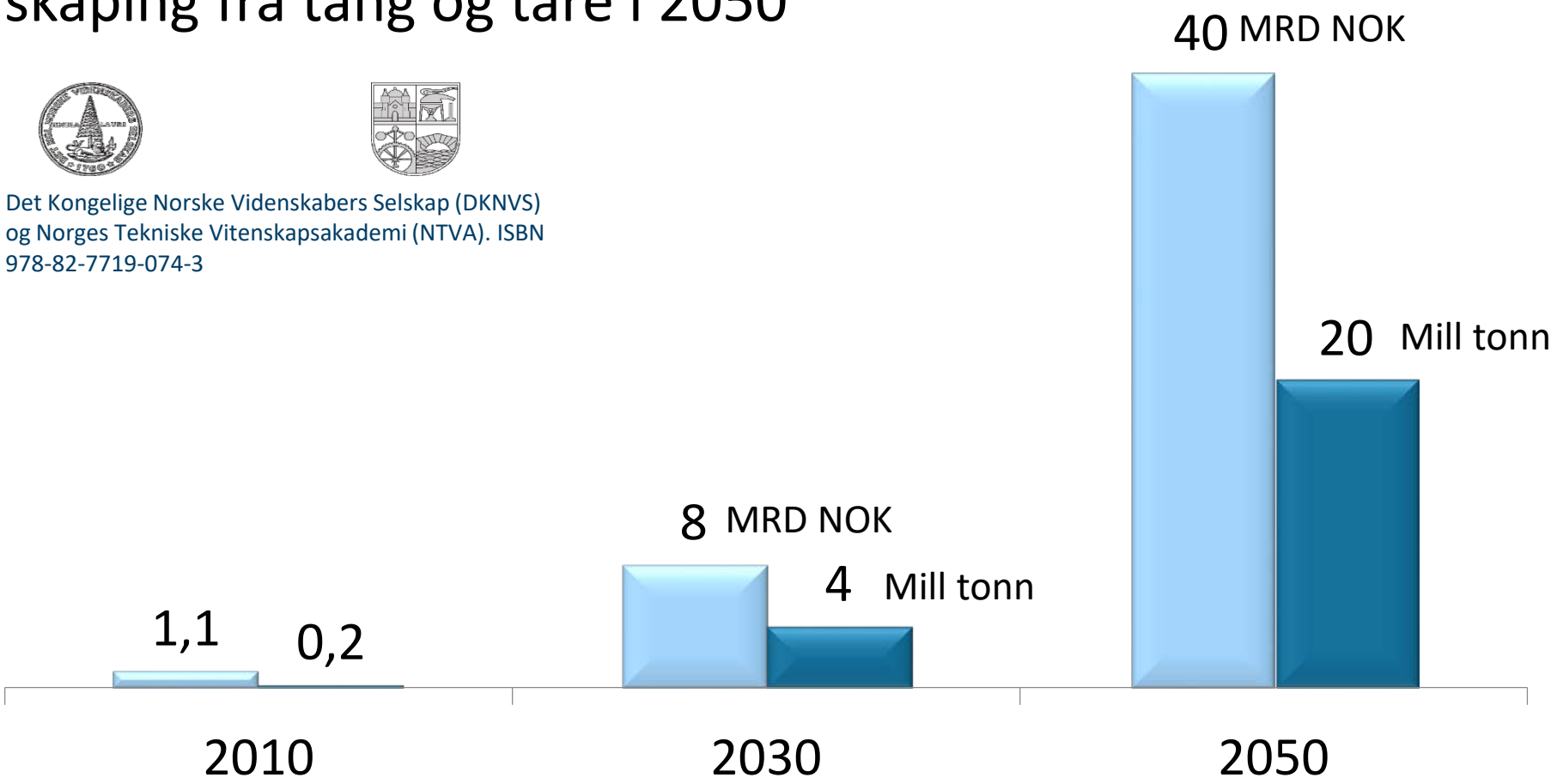




SINTEF

Verdiskaping fra tang og tare i 2050

Det Kongelige Norske Videnskabers Selskap (DKNVS) og Norges Tekniske Vitenskapsakademi (NTVA). ISBN 978-82-7719-074-3




500 kg

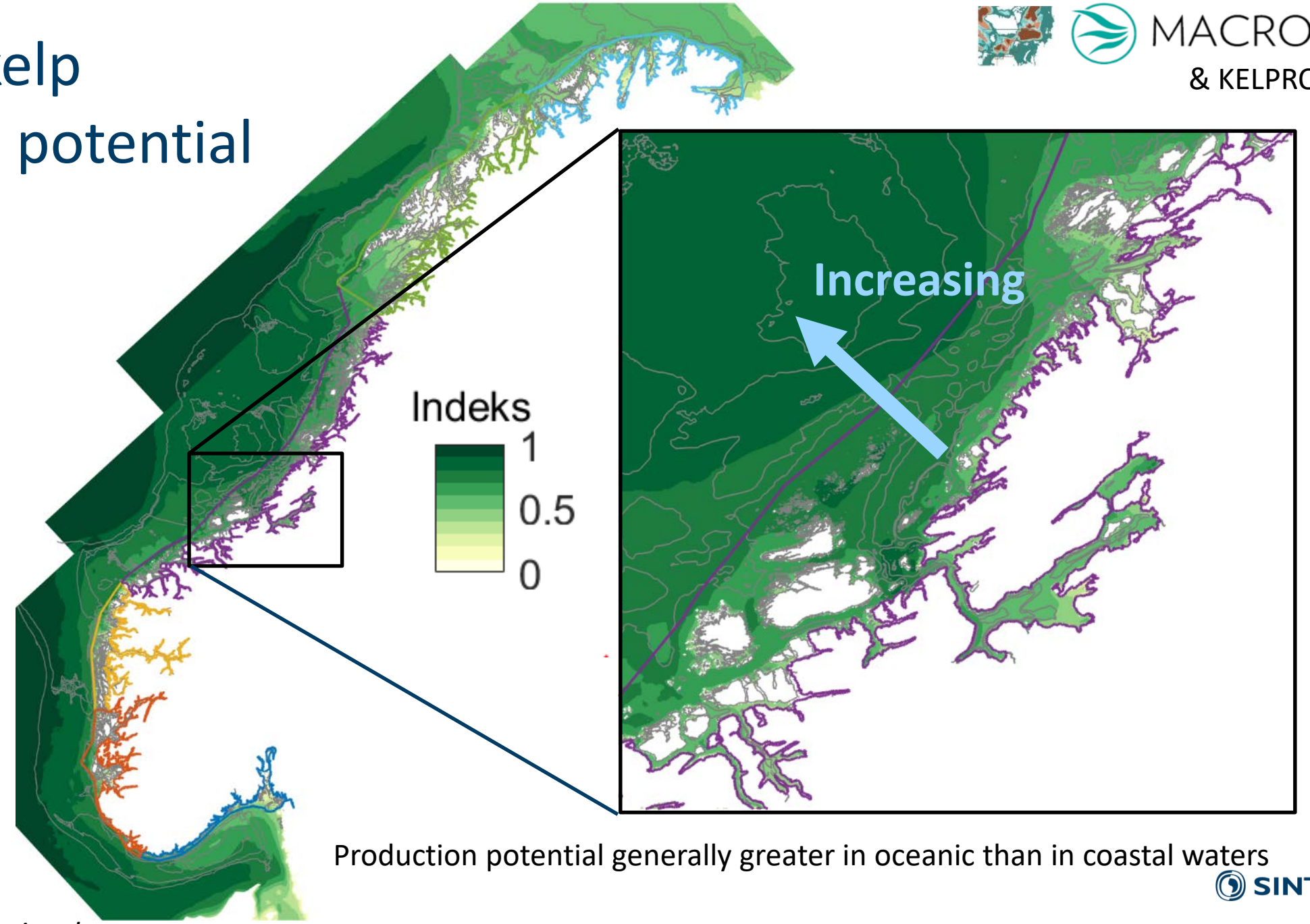


Index for kelp cultivation potential

MACROSEA & KELPRO

Offshore vs coastal

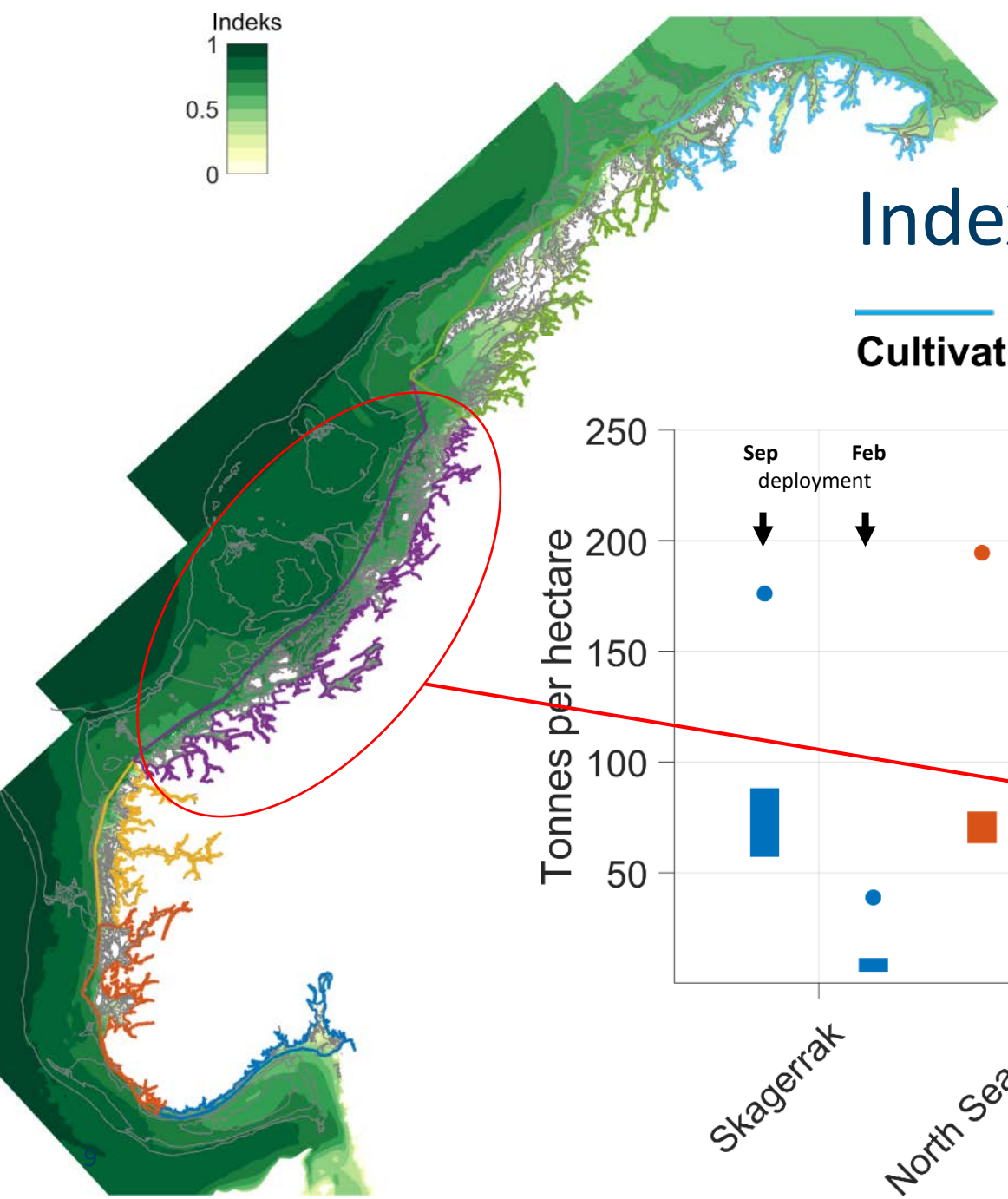
- Mixing
- Temperatures
- Light



Production potential generally greater in oceanic than in coastal waters

From: Broch et al., *submitted*

SINTEF

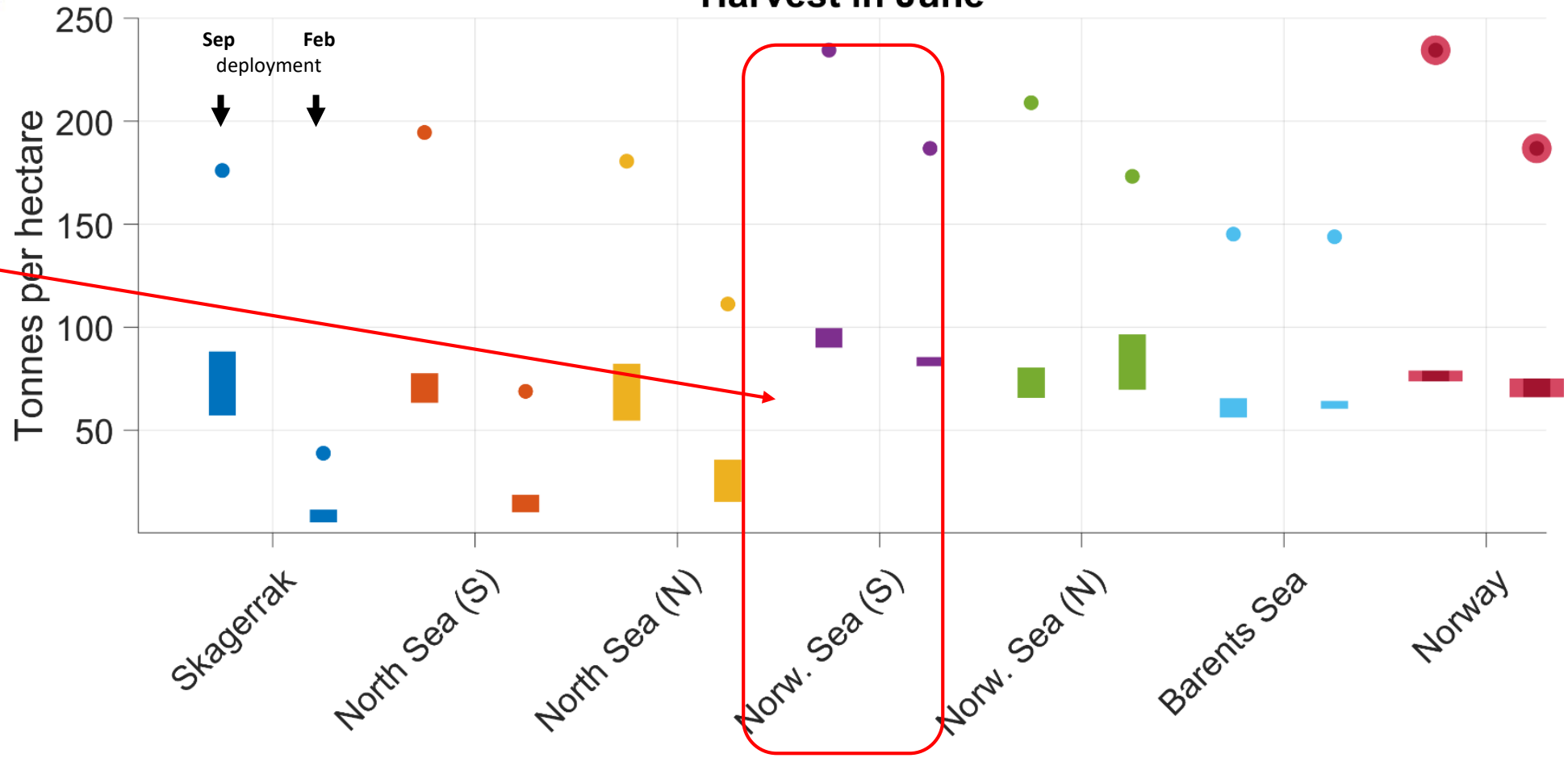


MACROSEA

& KELPPRO

Index translated into biomass

Cultivation potential within Norwegian Coastal eco regions
Harvest in June

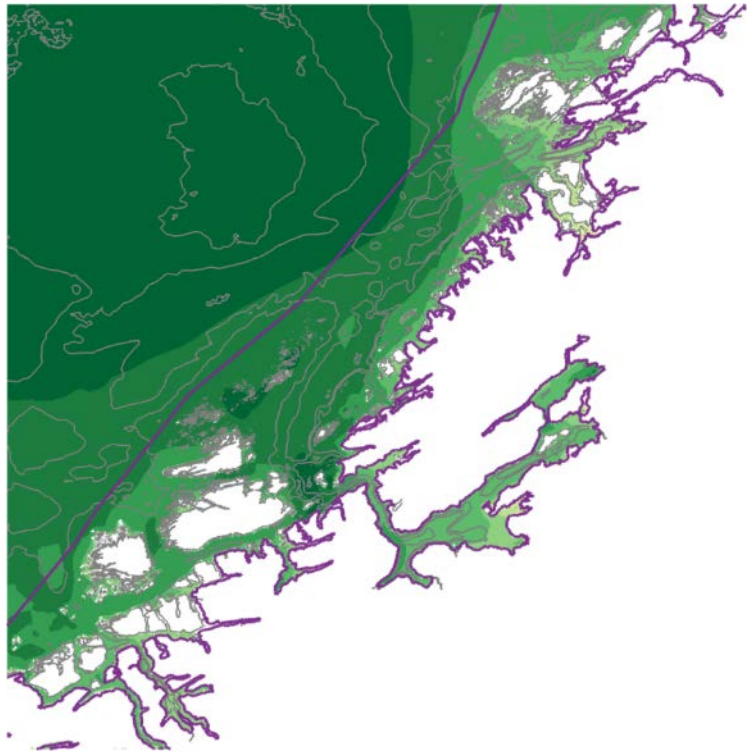


From: Broch et al., *submitted*

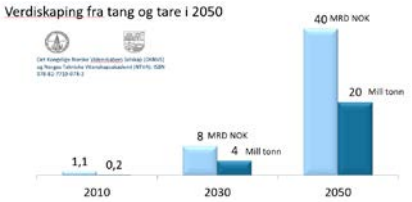
A simple GIS-analysis – Norwegian Sea (S)

& KELPPRO

Case	Average prod potential (t ha^{-1})	Available area (approx, km^2)
All water inside ecoregion	91	29,000
Excluding conflicts w/natural populations (bottom depth > 50m)	95	21,000
Excluding conflicts w/ natural populations fairway fisheries	95	16,000

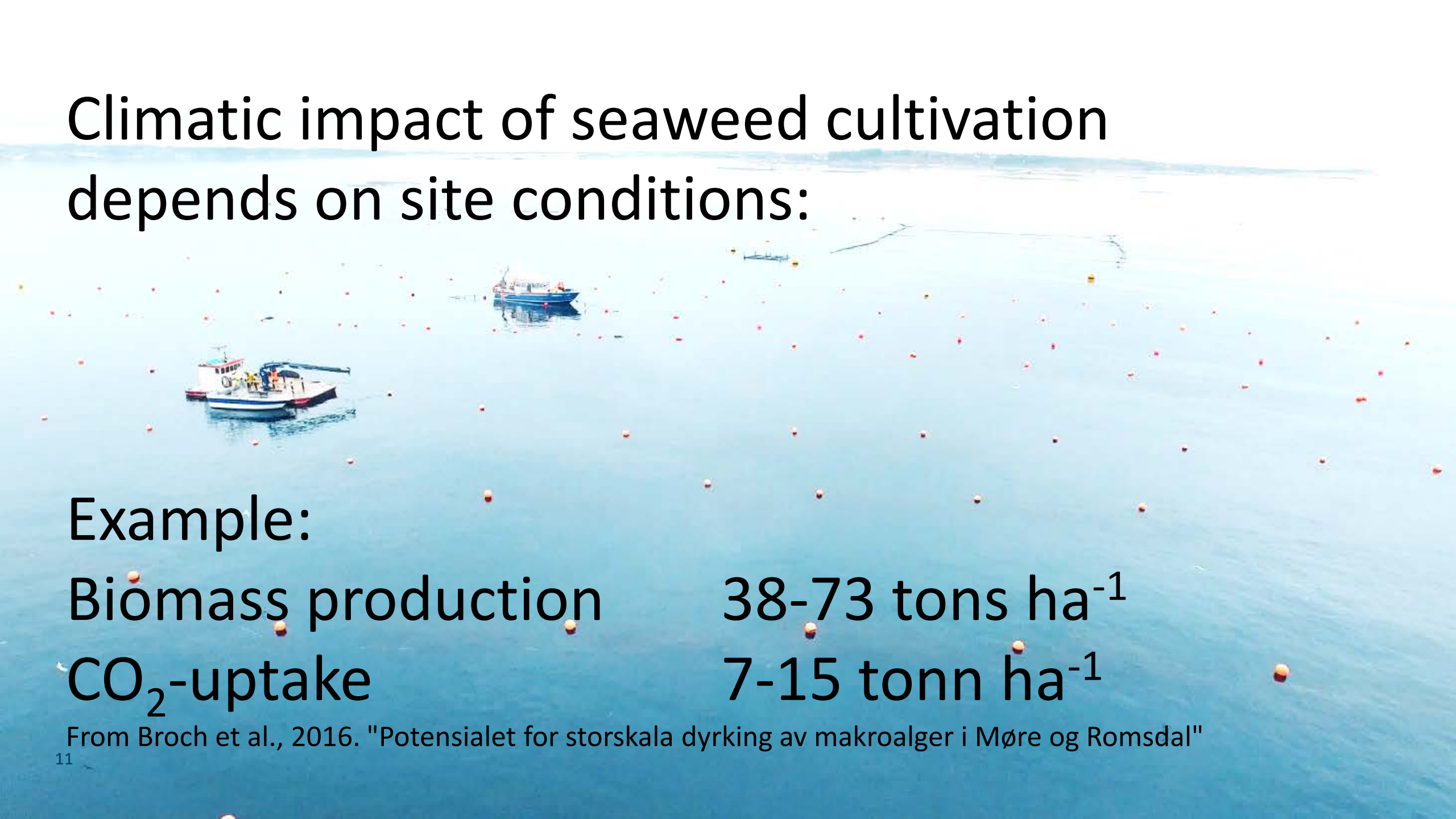


20 million tonns require areas up to 3,000 km^2



From: Broch et al., *submitted*

Climatic impact of seaweed cultivation depends on site conditions:



Example:

Biomass production	38-73 tons ha^{-1}
CO_2-uptake	7-15 tonn ha^{-1}

From Broch et al., 2016. "Potensialet for storskala dyrking av makroalger i Møre og Romsdal"

Coastal farming:

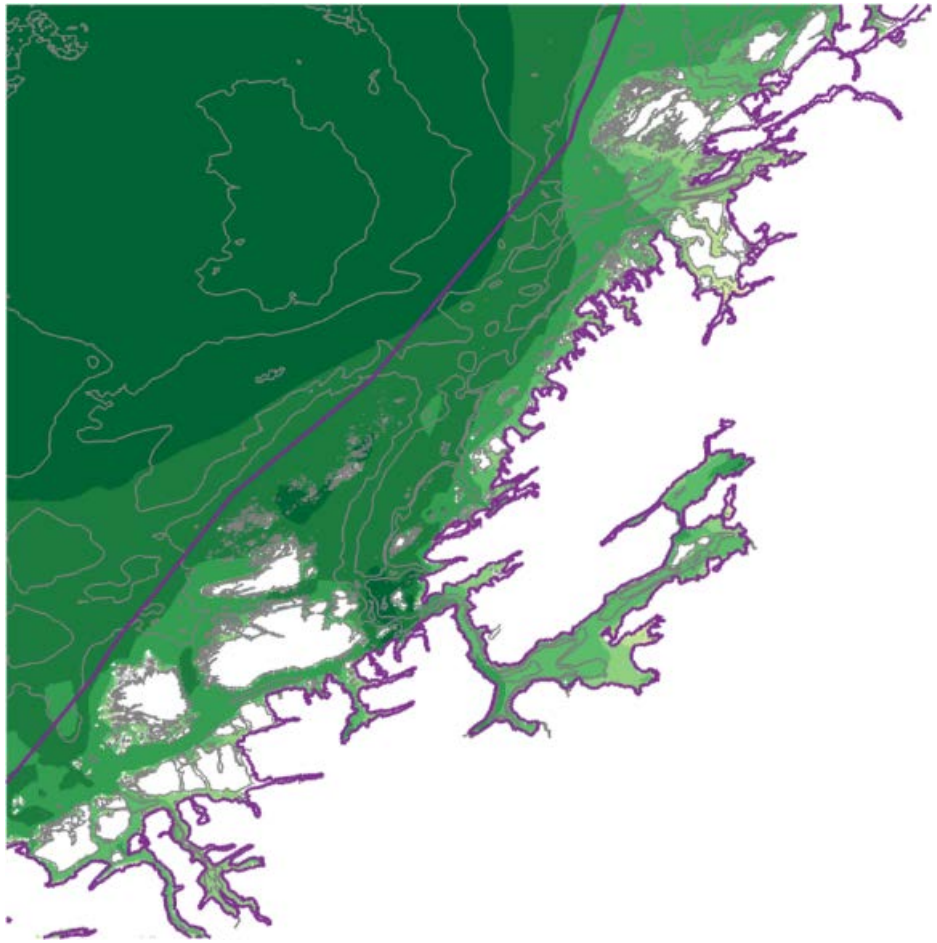
Biomass production	7500 tons pr km^2
CO_2-uptake	1500 tons pr km^2



Offshore farming:

Biomass production	20.000 tons pr km^2
CO_2-uptake	3000 tons pr km^2

[1] From Broch et al., 2016. "Potensialet for storskala dyrking av makroalger i Møre og Romsdal"



18.000 km^2

=

dyrkingsareal "offshore" for å fjerne

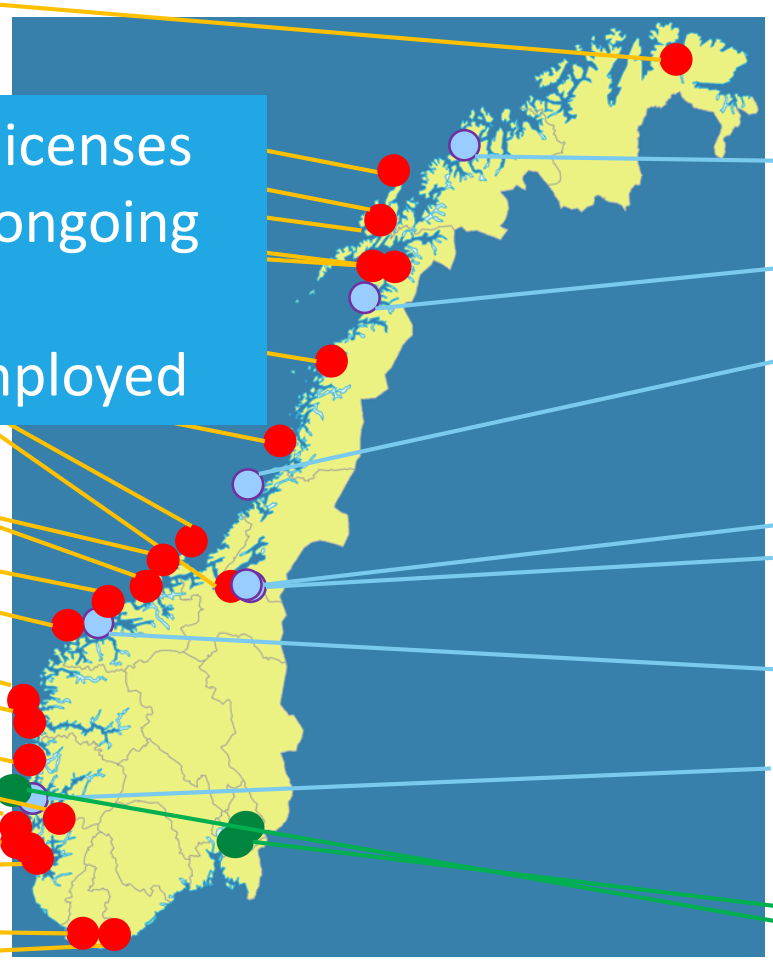
52,4 mill tonn CO_2-ekv.

Taredyrkere i Norge

- 29 companies, 264 licenses
- 15 companies with ongoing operations
- 58 persons were employed

Barents Seaweed
Arctic Seaweed
Lofoten Esca Verno
Ak
Fol
Euk
Sal
Pol
SES
Lei
Bogestilla/Algefabrikken
Seaforest
Tango Seaweed
Seaweed AS
Hortimare
Algetun
Ocean Forest
Hardanger Seaweed Farm
Austevoll Seaweed Farm

PE Reefs
Seaweed Production
Norway Seaweed



FoU-miljøer (dyrking)

Akvaplan-niva

NIBIO and GIFAS

Val Videregående Skole (opplæring)

SINTEF
NTNU

Møreforsking

Norges Vel

UiO, UiB, Niva, IMR (ecology)

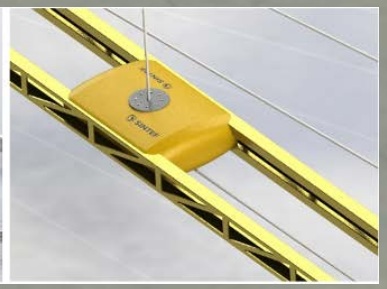
~100 tonn i 2017

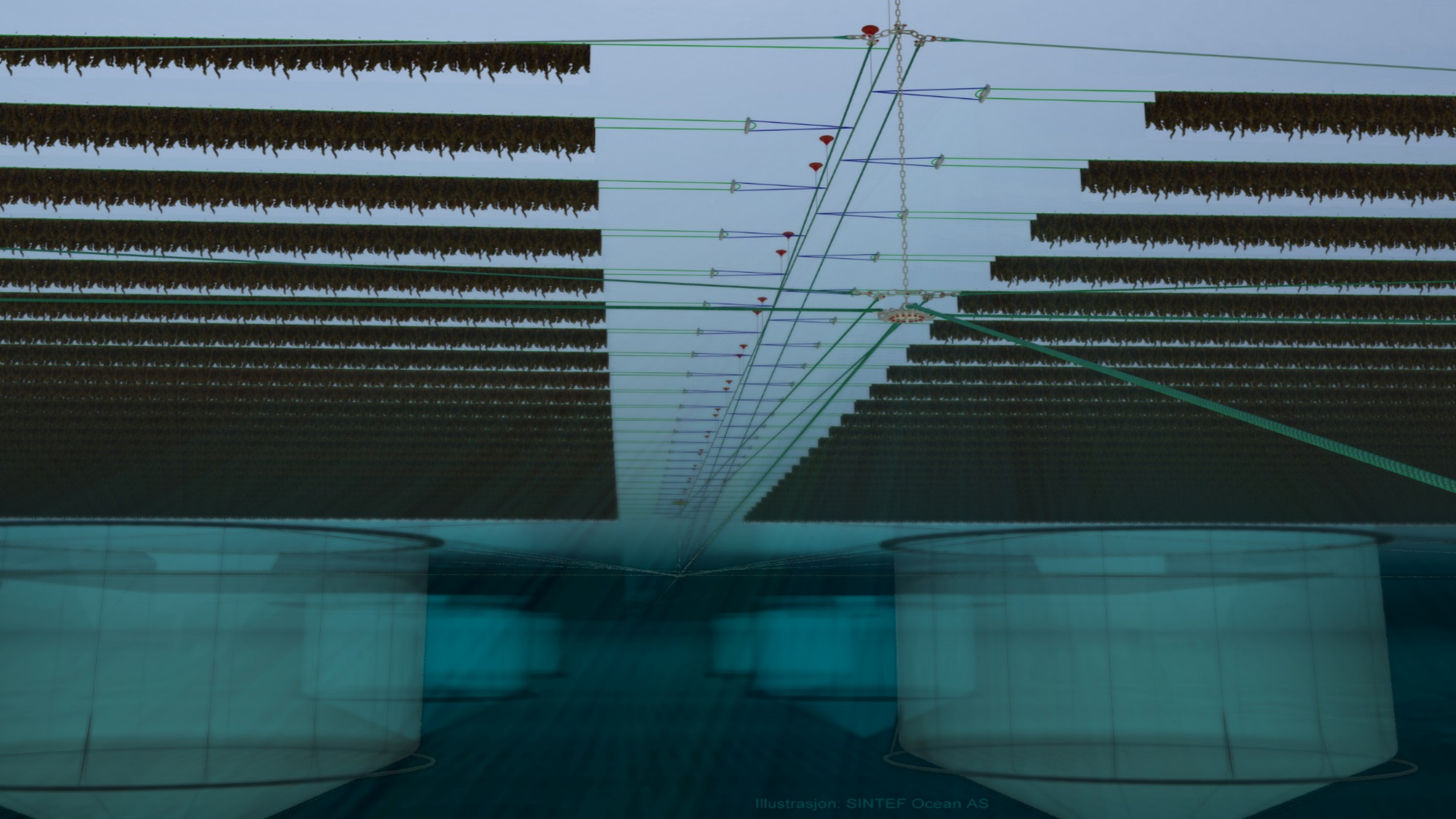
SINTEF

SPOKe



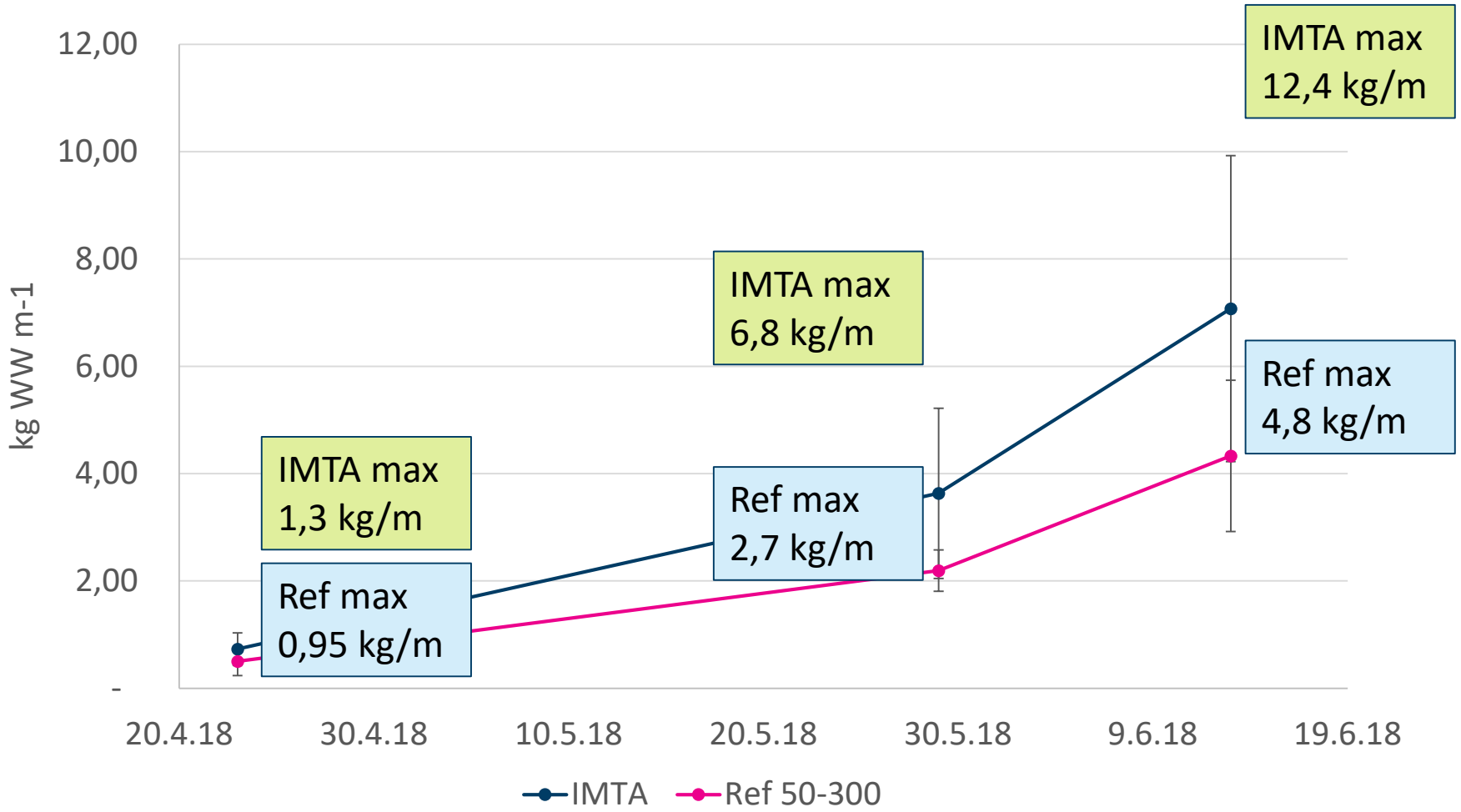






Illustrasjon: SINTEF Ocean AS

Enhaced biomass production in IMTA

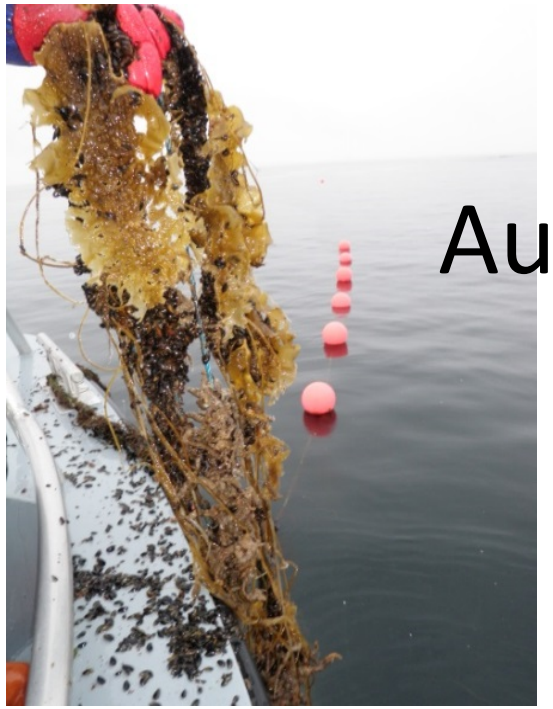






Dyrkingssesongen avrundes av begroingsorganismer





August



SINTEF

Hva gjør vi med biomassen?



- Erstatte produkter basert på fossile råstoffer
  - Biodrivstoff
  - Bioplast
- Erstatte landbasert biomasse produsert under mindre klimavennlige betingelser
  - Proteinkonsentrat (+ 1-2 høykost produkter)
- La den synke til bunns for sedimentering
- Kvoter for blått karbon fra taredyrking?

Krause-Jensen et al. 2018. Sequestration of macroalgal carbon. The elephant in the Blue Carbon room. Biology Letters.

(Skjermo, 12.11.2018 https://fiskeribladet.no/tekfisk/nyheter/?artikkel=63508)

SINTEF

Teknologi for et bedre samfunn