

# THE SECOND SWISS WIND ENERGY R&D FORUM - ONLINE

Introduction

Dr. Sarah Barber

President, The Swiss Wind Energy R&D Network

16.09.2020



SWISS WIND ENERGY  
R&D NETWORK



OST  
Eastern Switzerland  
University of Applied Sciences

EPFL



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

Bundesamt für Energie BFE



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra  
Swiss Confederation

Innosuisse – Swiss Innovation Agency

# Agenda

09:00-09:15 Introduction

## **Part 1: Inspiration (Main Room 1: link in email)**

09:15-09:25 Key-note interview topic 1: smart measurement technology

*Mattia Boccolini, DNV GL*

09:25-09:45 Podium and audience discussion topic 1: smart measurement technology

*Mattia Boccolini, DNV GL; Prof. Eleni Chatzi, ETHZ; Dr. Michele Magno, ETHZ; Dr. Andrin Landolt, streamwise gmbh, Dr. Martin Fengler, Meteomatics*

09:45-09:55 Key-note interview topic 2: machine learning and AI

*Anton Kaifel, ZSW*

09:55-10:15 Podium and audience discussion topic 2: machine learning and AI

*Anton Kaifel, ZSW; Prof. Guido Schuster, OST; Bernhard Brodbeck, WinJi AG; Dr. Imad Abdallah, ETHZ; Dr. Angela Meyer, ZHAW.*

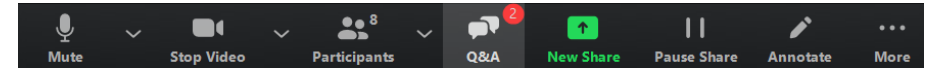
## **Part 2: Innovation (Main Room 2: link in email)**

- 10:30-10:45 Break-out discussions with Google Forms round 1: "Challenges in the wind energy industry"
- 10:45-11:00 Break-out discussions with Google Forms round 2: "Smart technology solutions"
- 11:00-11:15 Break-out discussions with Google Forms round 3: "Machine learning and AI solutions"
- 11:15-11:30 Break-out discussions with Google Forms round 4: "How can Swiss innovators break into the international wind energy industry?"
- 11:30-11:45 Networking break
- Time for participants to chat to other participants and the panel members / key-note speakers.*
- Please also fill out an online feedback form (see email)!*
- 11:45-12:00 Summary of discussion results and closing

# Introduction

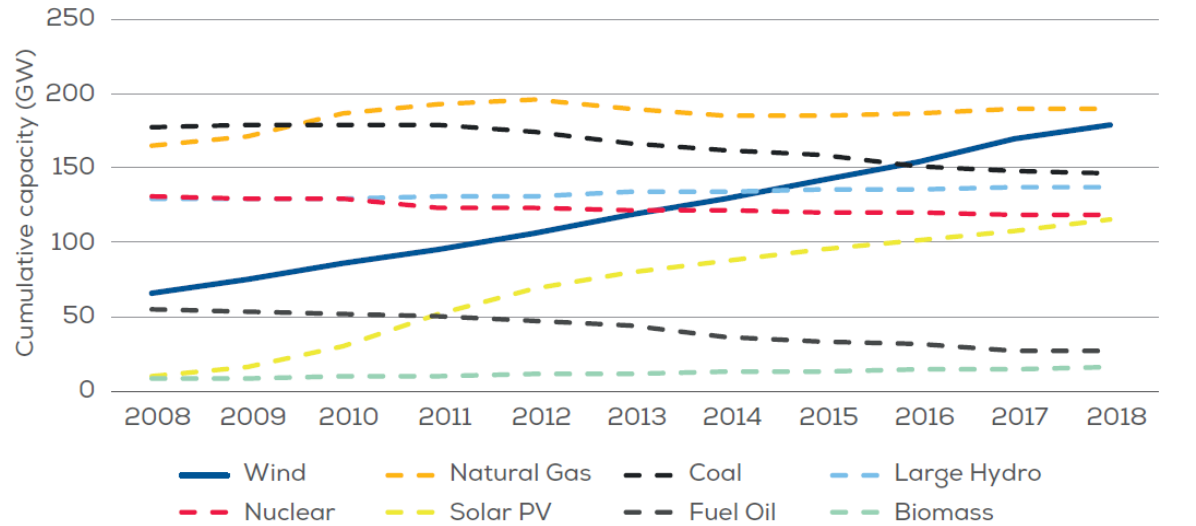
- **Administration**
- **Why wind energy?**
- **The Swiss Wind Energy R&D Network**
- **The topics of this event: smart measurement technology and machine learning**

- **All the links you need are provided in the registration email.**
- **Part 1, Main Room 1:**
  - You are now in Main Room 1.
  - Asking questions in Main Room 1: please use the Q&A function.
  - Any questions we do not get time to answer will be answered later on our website.
- **Part 2, Main Room 2:**
  - For the interactive session, please leave this room and join Main Room 2 via the link provided in the email.
  - Please fill out one Google Form per break-out round per group!
  - Chatting to other participants at any time (text): use the chat function and select the participant you want to chat to.
- **Other:**
  - This event is not being recorded. Please do not take screen shots or take external videos. The presentations and results of the break-out sessions will be provided after the event.



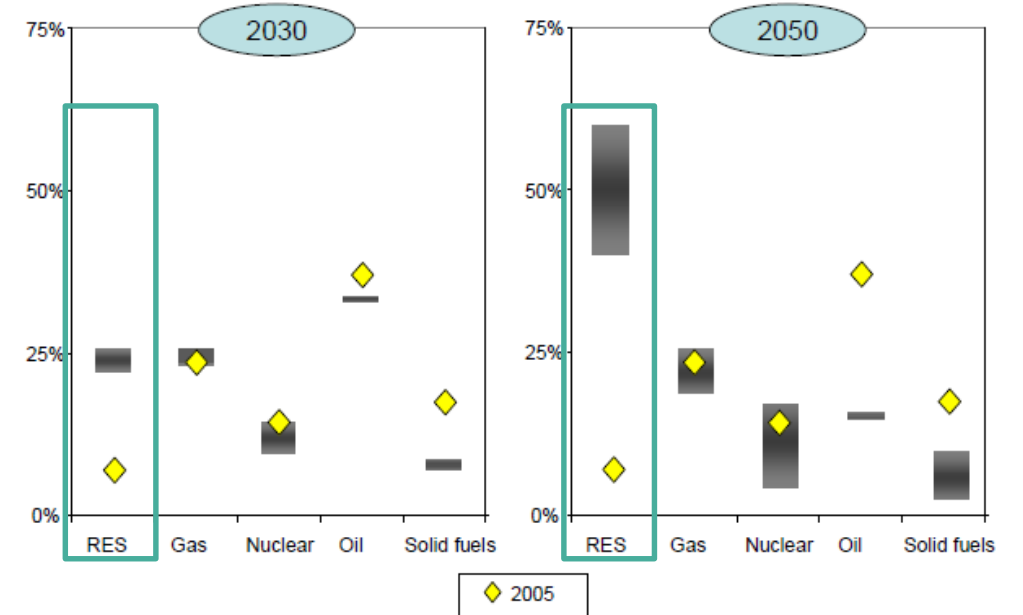
# Wind energy is key for decarbonisation and the energy transition

Today: 15% of Europe's electricity



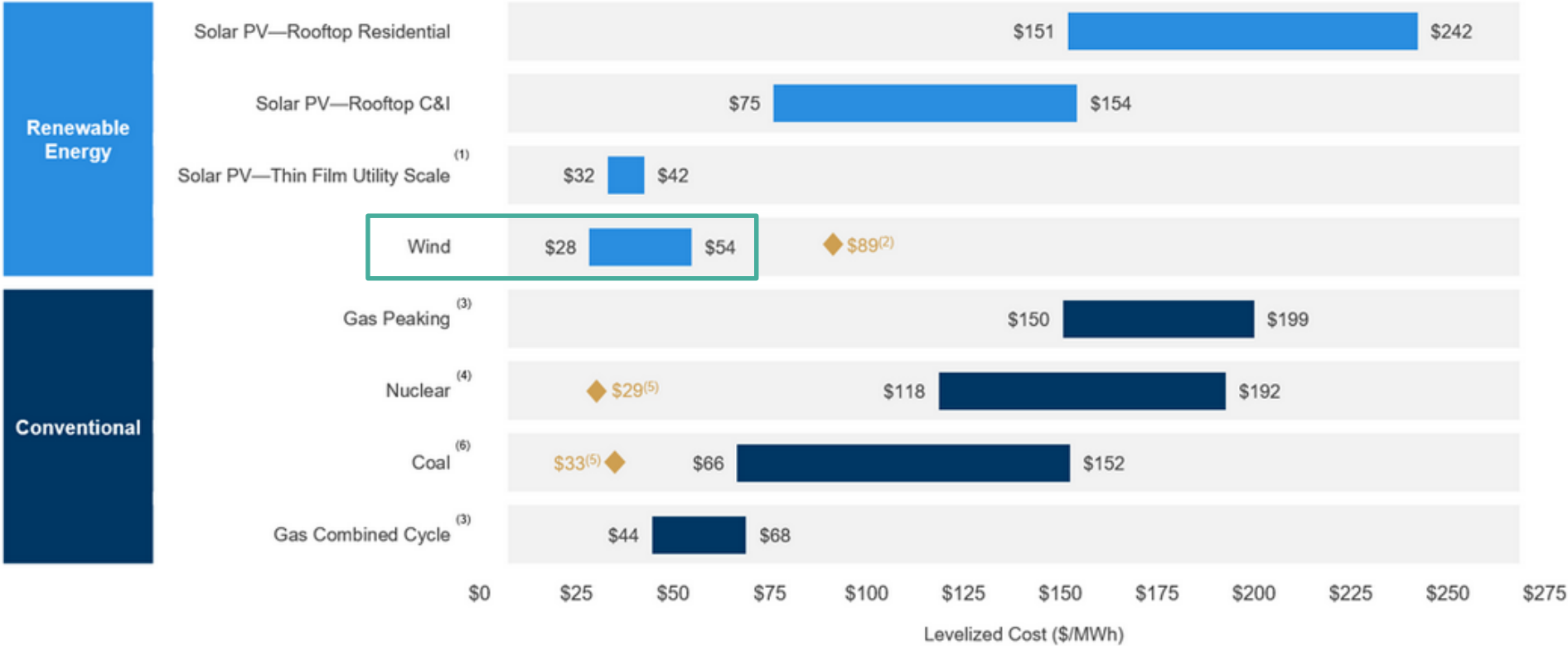
Source: WindEurope

EU Energy Strategies 2030 and 2050



# Wind energy is cheap

Selected renewable energy generation technologies are cost-competitive with conventional generation technologies under certain circumstances

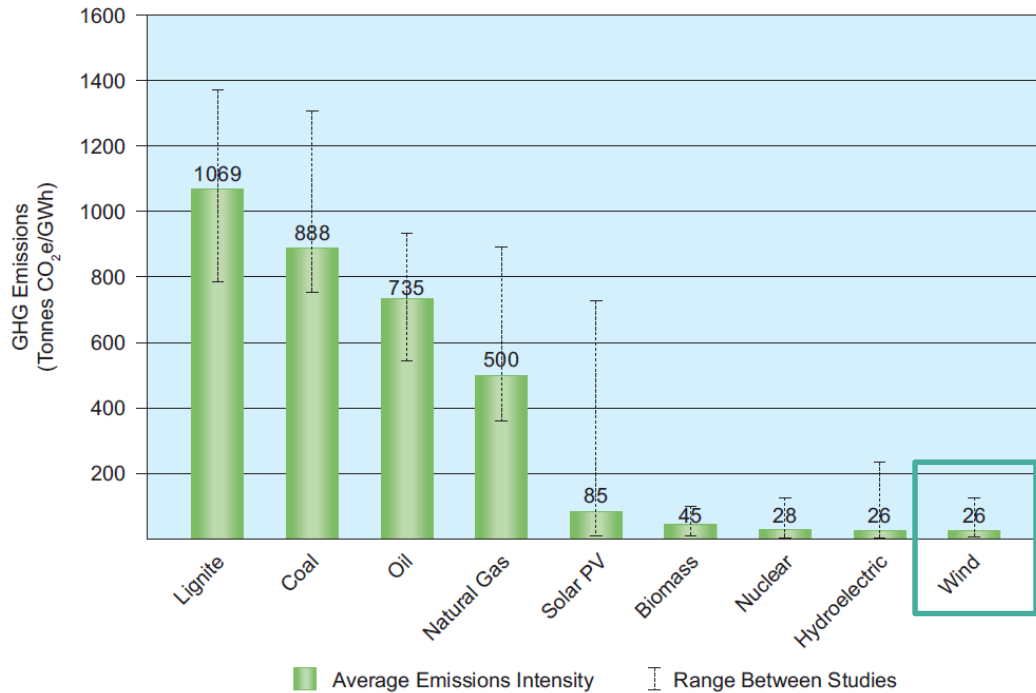


<https://www.lazard.com/perspective/lcoe2019/>



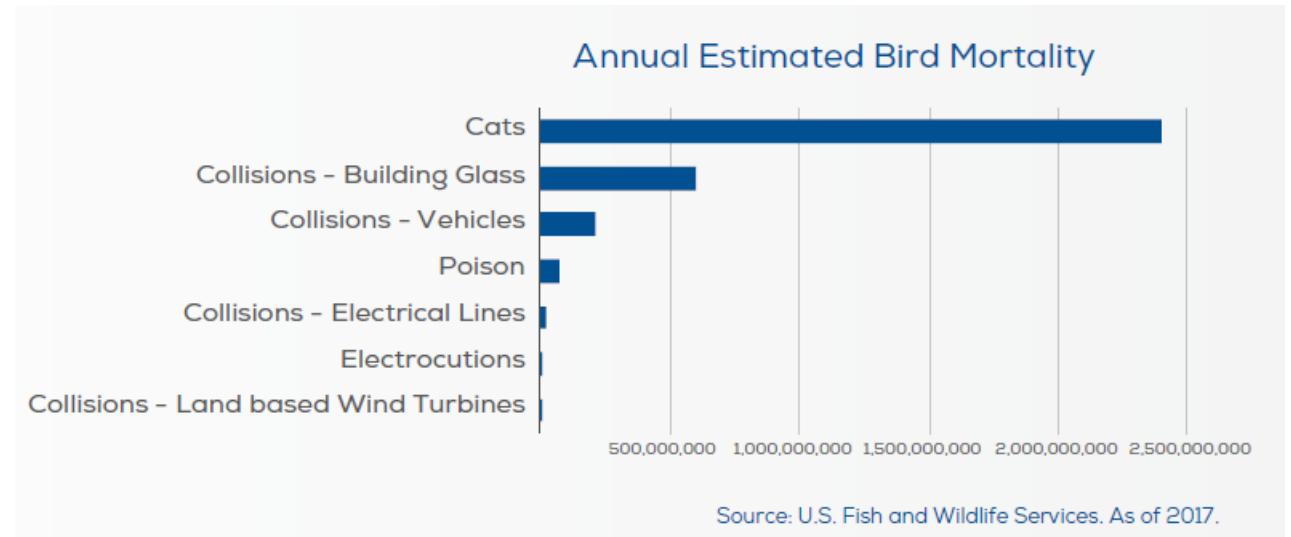
# Wind energy is good for the environment

## Low CO2 emissions



Comparison of Lifecycle Greenhouse Gas Emissions of Various Electricity Generation Sources, World Nuclear Association, 2011

## Minimal impact on surrounding habitats and species





# Wind energy benefits communities and society

## Communities:

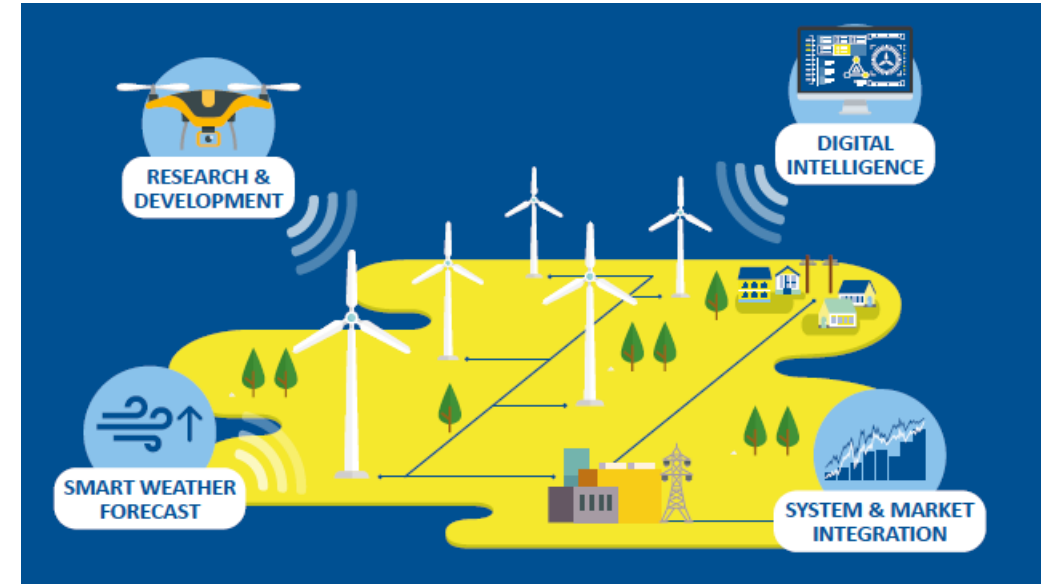
- Local tax benefits and financial contributions.
- Polls from WindEurope show that 75-80% of people living near wind farms support them.

## Society:

- 300'000 jobs in Europe.
- Contributes €37bn to EU GDP.

## Also: wind energy drives Europe's tech leadership:

- The wind industry invests around 5% of its revenue in R&D.

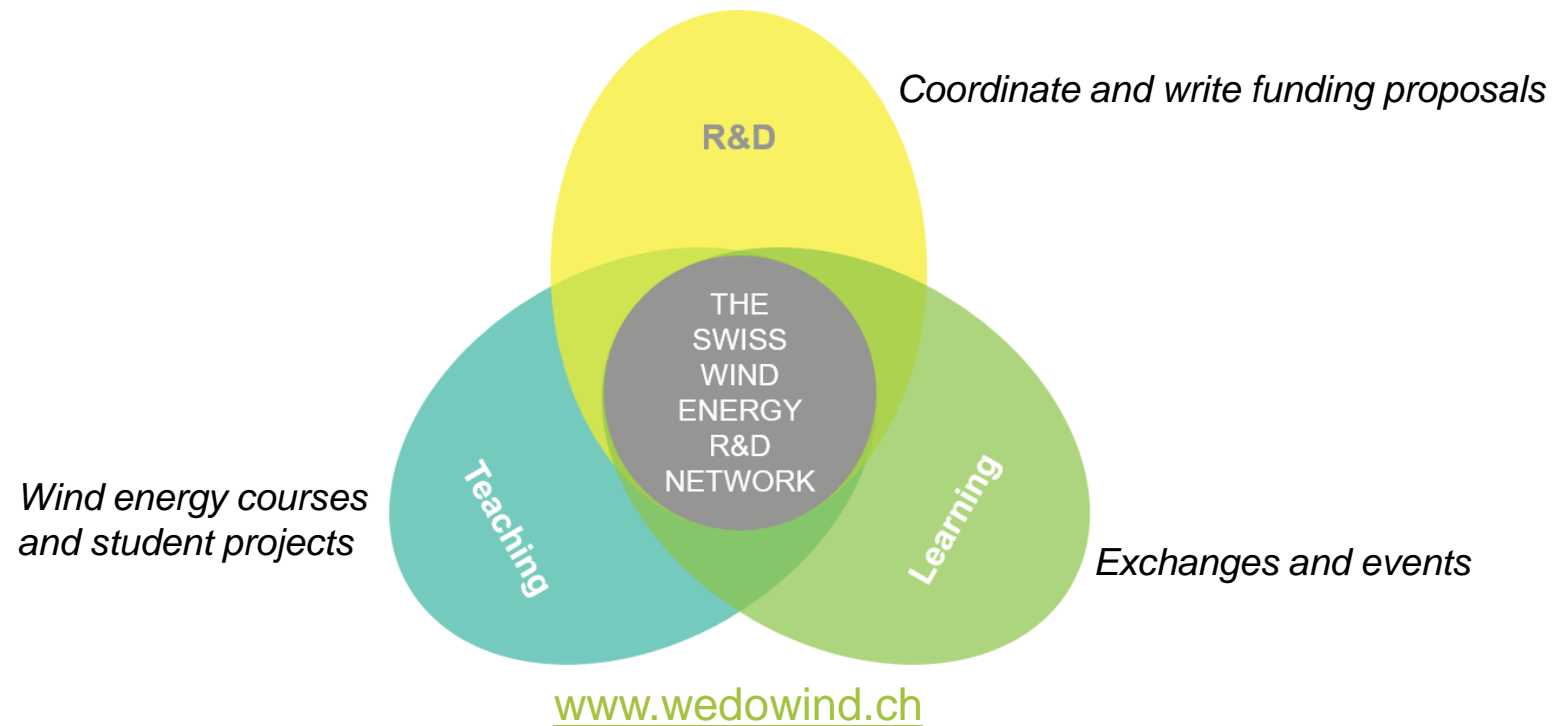


<https://windeurope.org/data-and-analysis/product/infographic-all-you-need-to-know-about-onshore-wind/?ref=mainbanner#infographics>

# The Swiss Wind Energy R&D Network

## Bundling Swiss R&D wind energy capabilities for the global wind energy market

We provide a platform to initiate and coordinate new collaborative wind energy projects in the areas of R&D, learning and teaching, ultimately aiming to foster excellence in Swiss wind energy R&D and to promote the export of Swiss know-how in products and services to the international wind energy market.



# The Swiss Wind Energy R&D Network

## Management Board:



*Sarah Barber*  
OST



*Imad Abdallah*  
ETH Zurich



*Bernhard Brodbeck*  
WinJi AG



*Ursula Dubois*  
Sociolution



*Karen Mulleners*  
EPFL



*Alexandre Oudalov*  
Hitachi ABB



*Ishan Pendharkar*  
FHNW



*Philipp Schmid*  
SKF



*Ruth Schmitt*  
FHNW



*Anastasios Vassilopoulos*  
EPFL

## Advisory Board:



*Andrew Clifton*  
WindForS



*Henrik Nordborg*  
OST

# The Swiss Wind Energy R&D Network

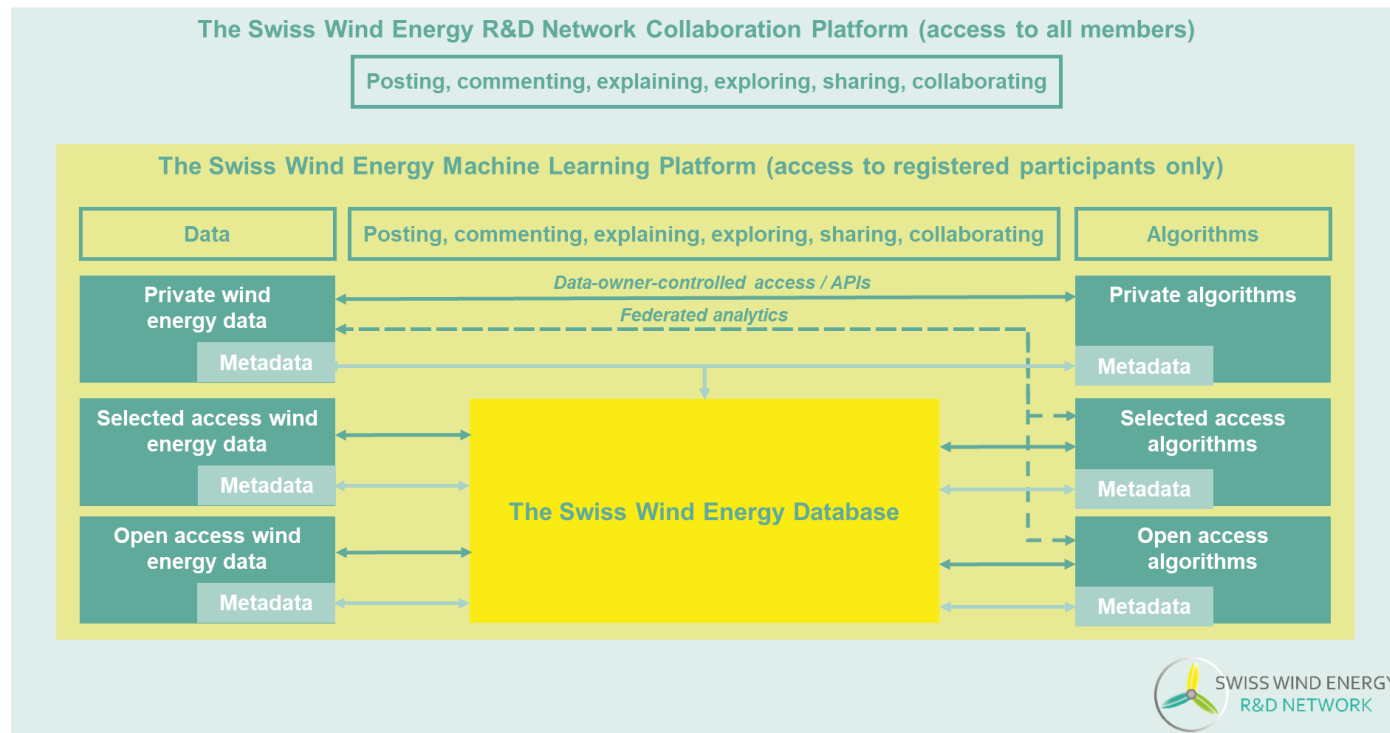
## ■ Some of our 90+ members:



# The Swiss Wind Energy R&D Network

## ■ Example project 1: The Swiss Wind Energy Machine Learning Database

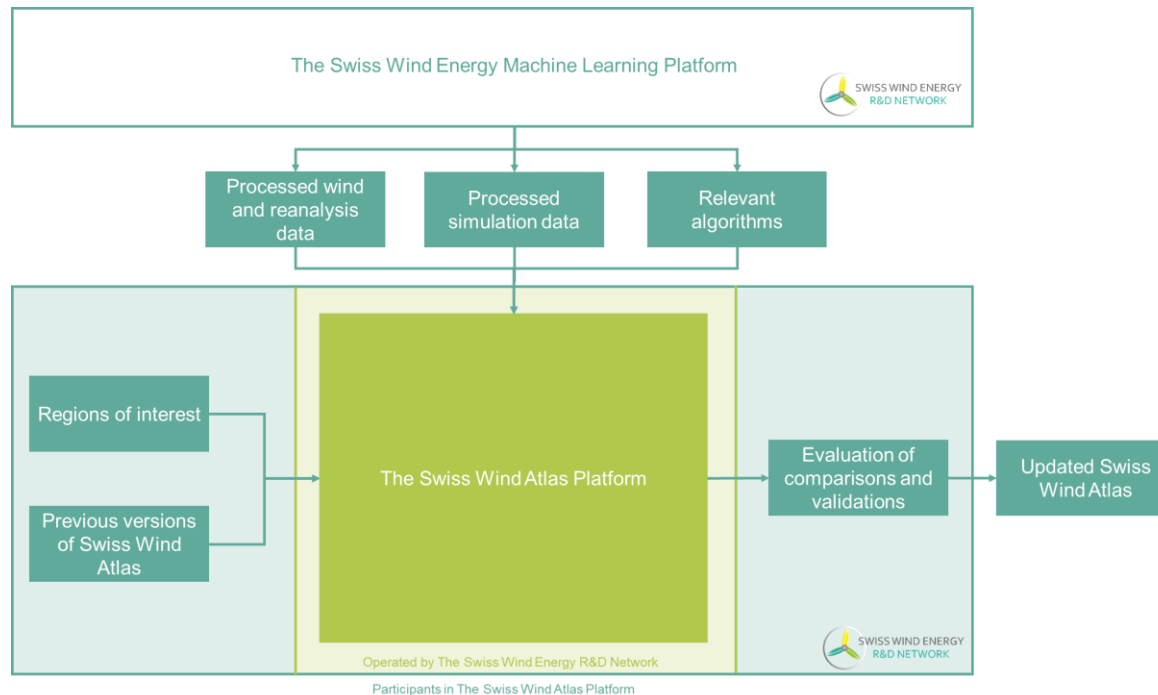
- Goal = develop a new Swiss Wind Energy Machine Learning Platform, which can be used to develop and apply new machine learning methods for improved wind energy project planning and operation.
- Partners = OST, ETHZ, ZHAW, 10+ international partners: Swiss companies needed!



# The Swiss Wind Energy R&D Network

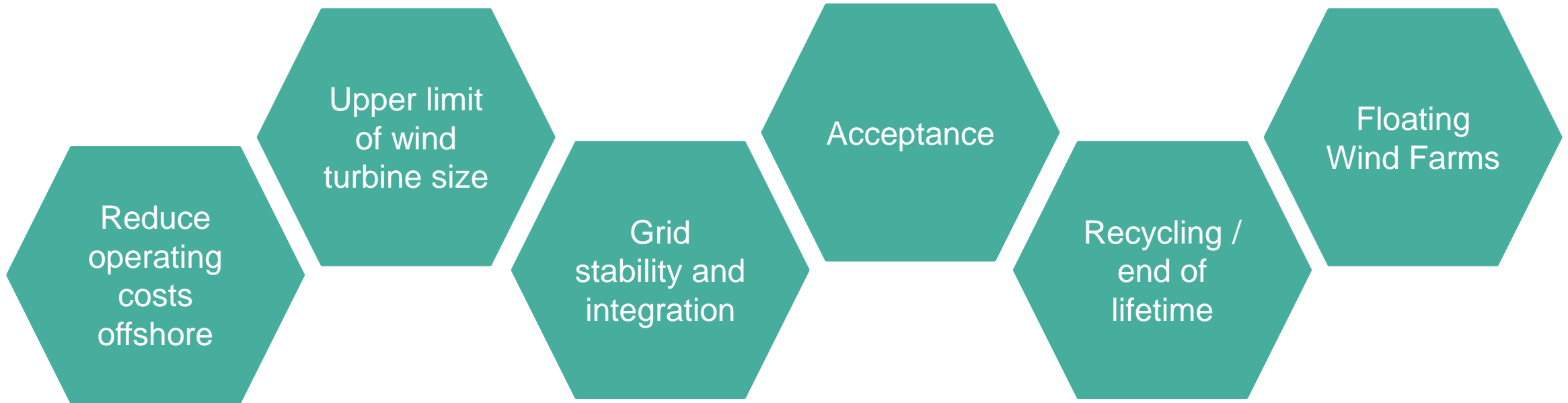
## ■ Example project 2: The Swiss Wind Atlas Platform

- Goal = develop a platform allowing efficient long-term continuous improvement of the Swiss Wind Atlas, and then to improve the wind speed prediction accuracy in 2-3 pre-defined regions of interest to  $\pm 1-2$  m/s as well as to develop an effective communication strategy for using the new Atlas.
- Partners = OST, ETHZ, FHNW, Meteotest, Meteomatics (concept underway).



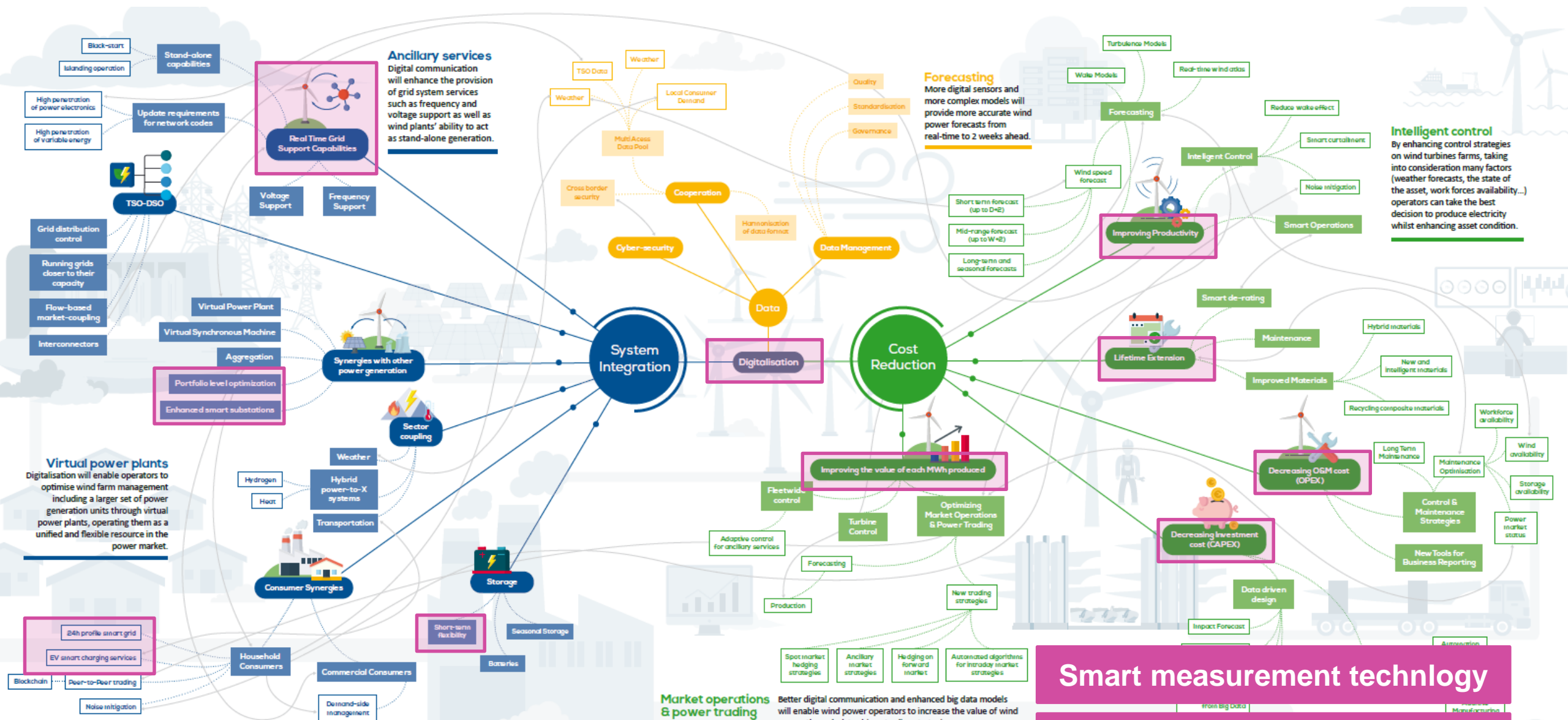
# The role of smart measurement technology and machine learning/AI

## ■ Main R&D and innovation focus of wind energy today:





# A closer look at "system integration" and "cost reduction"



Smart measurement technology

Machine learning and AI

# Key-note presentation 1: smart measurement technology

- **Application of smart measurement technologies in wind energy.**



*Mattia Boccolini*  
*DNV GL*



## ■ Introductions:



*Mattia Boccolini  
DNV GL*



*Prof. Eleni Chatzi  
ETHZ*



*Dr. Michele Magno  
ETHZ*



*Dr. Andrin Landolt  
streamwise gmbh*

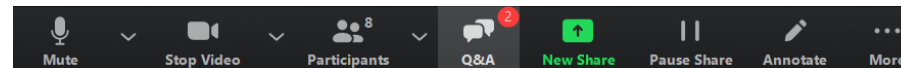


*Dr. Martin Fengler  
Meteomatics*

## ■ Question "How can smart measurement technology be applied effectively in the wind energy industry?"

### ■ Questions from audience:

- Please use Q&A function:



- Say who you are addressing the question to!
- More time for questions at 11:45!

## Key-note presentation 2: machine learning and AI

- **Application of machine learning and AI in the wind energy industry.**



*Anton Kaifel*  
ZSW



## ■ Introductions:



*Anton Kaifel*  
ZSW



*Prof. Guido Schuster*  
OST



*Bernhard Brodbeck*  
WinJi AG



*Dr. Imad Abdallah*  
ETHZ

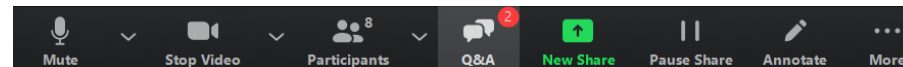


*Dr. Angela Meyer*  
ZHAW

## ■ Question "How can machine learning and AI be applied effectively in the wind energy industry?"

### ■ Questions from audience:

- Please use Q&A function:



- Say who you are addressing the question to!
- More time for questions at 11:45!

## Interactive part

- **Please leave this room (Main Room 1) and enter Main Room 2 now.**
- **At 10:30 you will be randomly grouped into break-out rooms for round 1 "Challenges in the wind energy industry".**
- **At 10:45 you will be brought back into Main Room 2 and then randomly grouped into new break-out rooms for round 2 "Smart technology solutions".**
- **At 11:00 you will be brought back into the Main Room 2 and then randomly grouped into new break-out rooms for round 3 "Machine learning and AI solutions".**
- **At 11:15 you will be brought back into the Main Room 2 and then randomly grouped into new break-out rooms for round 4 "How can Swiss innovators break into the international wind energy industry?".**
- **At 11:30 you will be brought back into the Main Room 2. You have 15 minutes to chat to other participants, take a break and fill in the feedback form (link in email).**
- **At 11:45 there will be a summary and wrap-up in Main Room 2.**

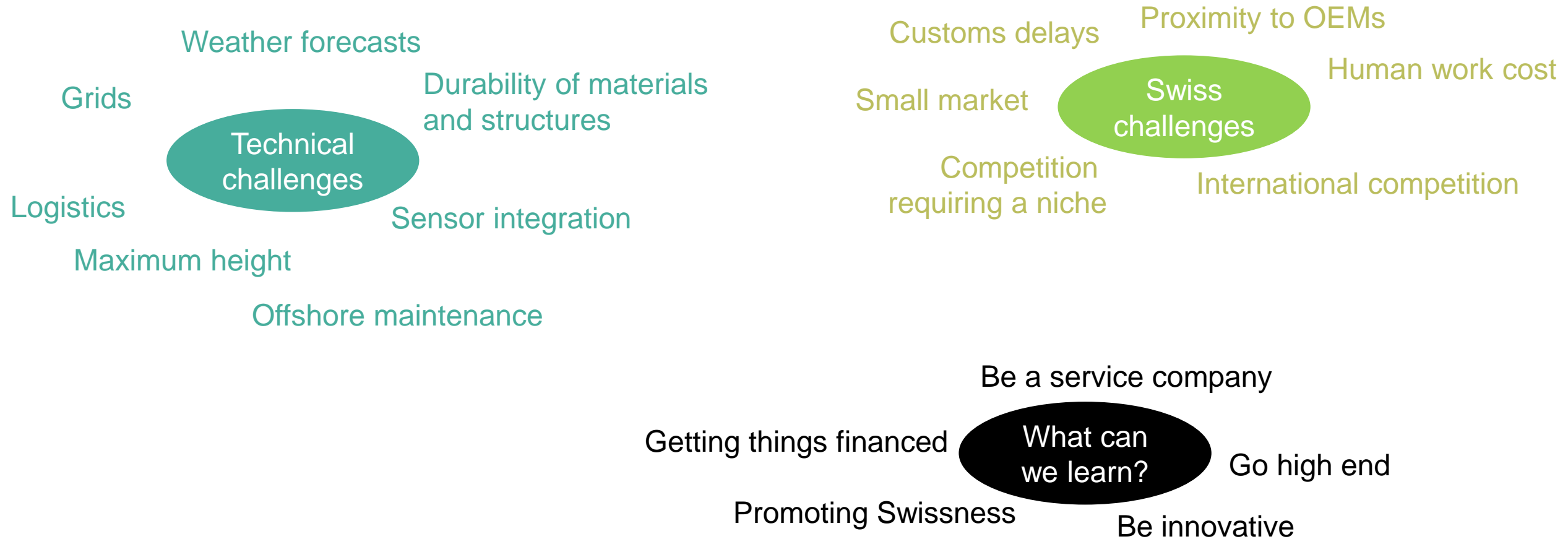
- **Podium discussion "smart measurement technology":**
  - **Mattia:**
    - The use case is key: what should the data actually do? What key decisions can be made?
    - Data is gold, wind energy was born digital!
    - Hire people who are able to combine data management and wind energy.
  - **Eleni:**
    - Fusion of existing SCADA data with structural measurements for lifetime extension.
  - **Michele:**
    - Implement smart sensors with energy harvesting and wireless communication.
  - **Andrin:**
    - Develop a use case that you really believe in.
    - Build a digital model of the system.
    - Fuse data from different sources.
  - **Martin:**
    - The quality of the input data is key for model accuracy.
    - Crowd-sourced data is useful but need to be careful about the accuracy.



- **Podium discussion "machine learning and AI":**
  - Anton:
    - Data availability and quality is key.
  - Guido:
    - Data is the key.
    - Sharing needs to be incentivised.
  - Imad:
    - Infer non-measured data.
    - Which algorithms to choose?
    - Sharing can be improved using synthetic data to create incentives.
  - Angela:
    - Lots of data is available: how to manage it?
    - Dealing with rare faults.
    - Transferability.
  - Bernhard:
    - Making sense of data.
    - Integration of different types of data source, regulation.

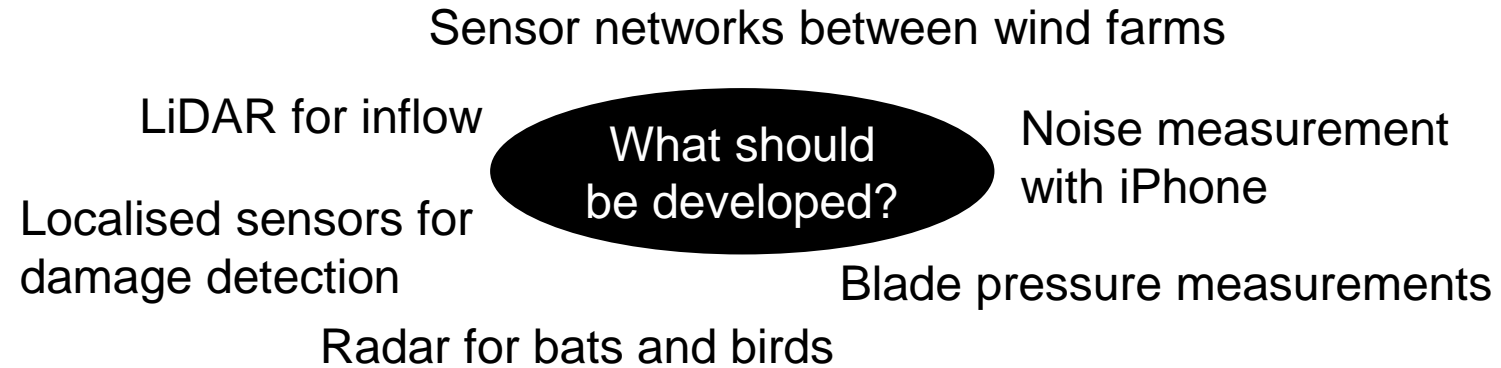
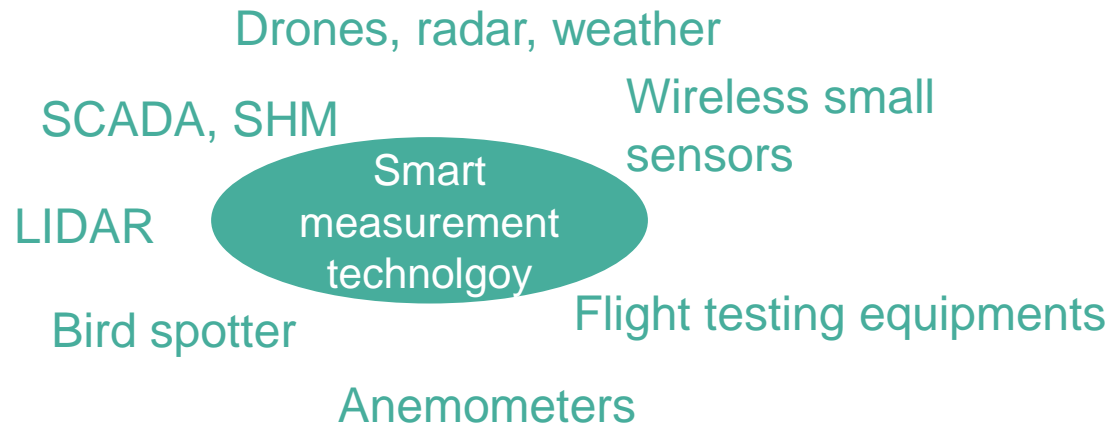
# Conclusions

## ■ Round 1 "Challenges in the wind energy industry":



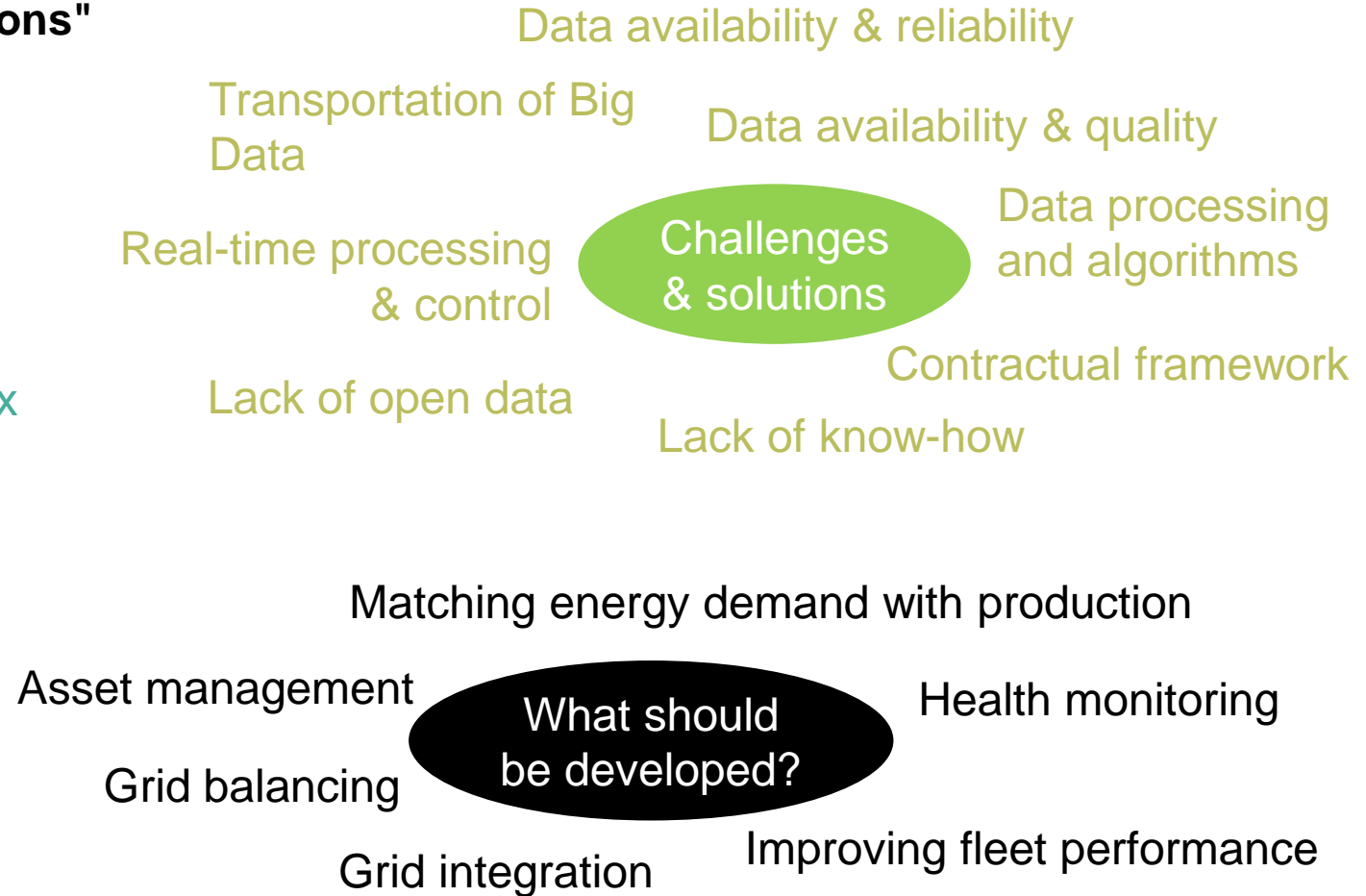
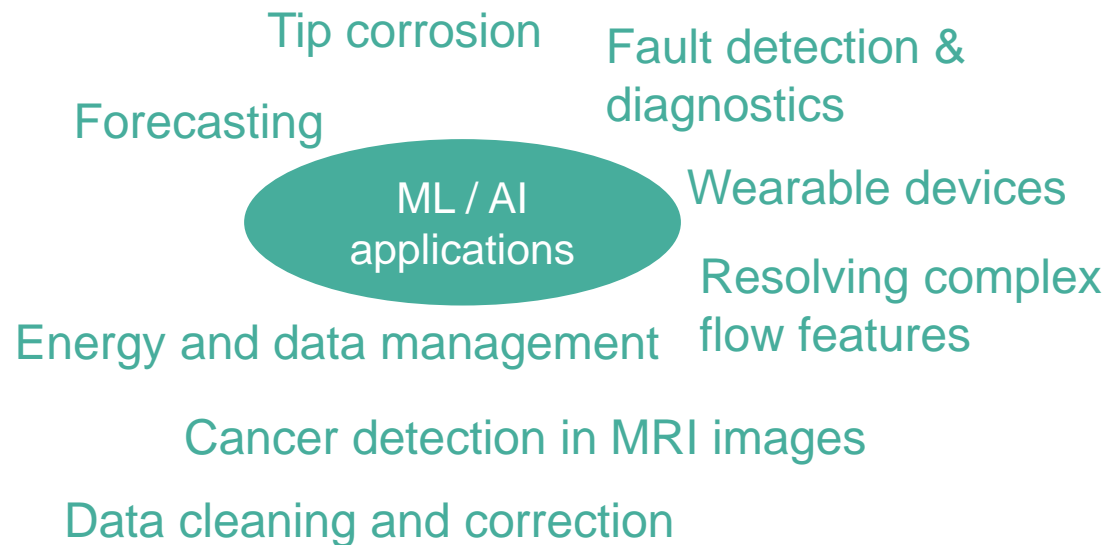
# Conclusions

## ■ Round 2 "Smart technology solutions"



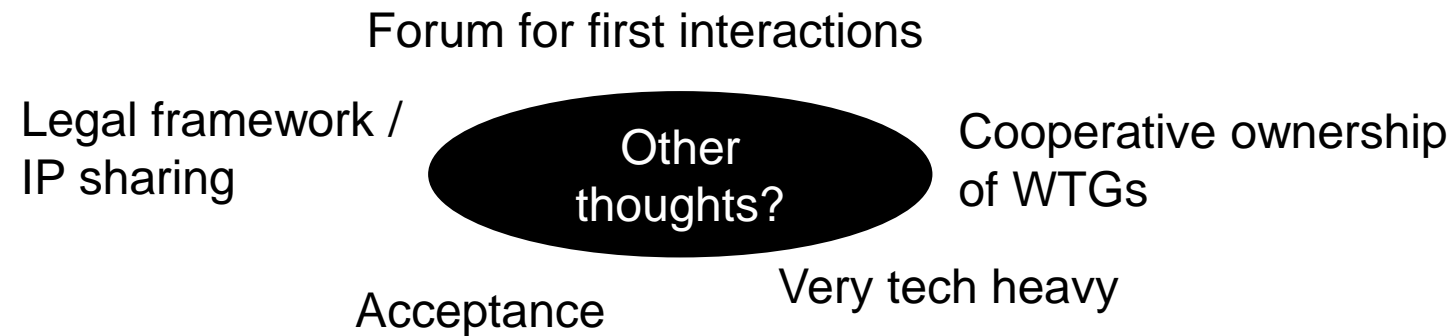
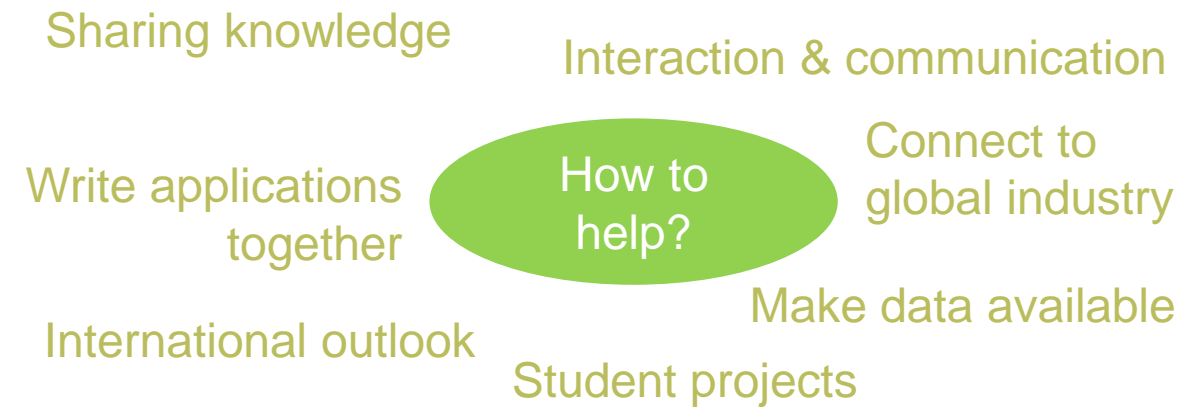
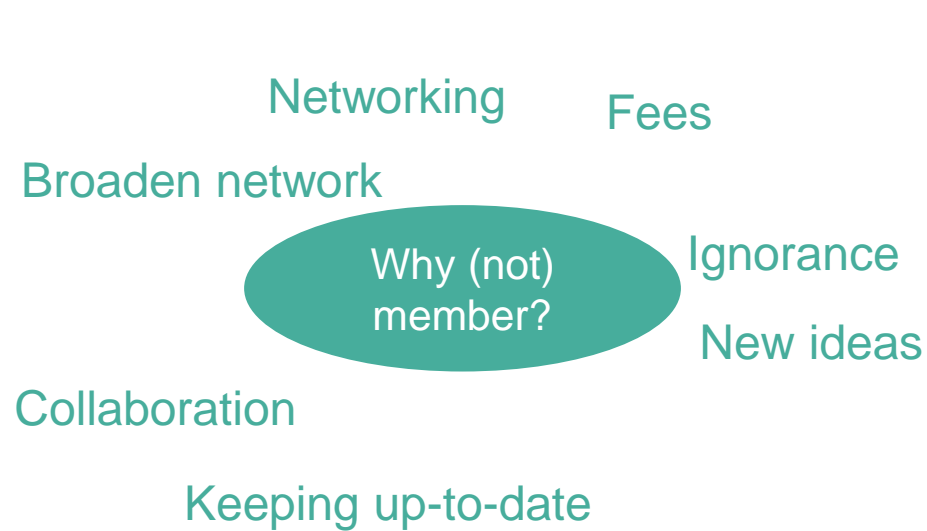
# Conclusions

## ■ Round 3 "Machine learning and AI solutions"



# Conclusions

## ■ Round 4 "How can Swiss innovators break into the international wind energy industry?"



- Results will be published on [www.wedowind.ch](http://www.wedowind.ch) in more detail ASAP.
- View the videos of speakers here: <https://tube.switch.ch/channels/661c6f66>.
- Become a member of the Network at [www.wedowind.ch/join](http://www.wedowind.ch/join) (free).
- Join the LinkedIn group The Swiss Wind Energy R&D Network.
- Please fill in the [feedback form](#).
- Contact me any time on [sarah.barber@ost.ch](mailto:sarah.barber@ost.ch).
- If you an engineer looking for a new challenge, check out this job opportunity in my team: <https://jobs-ost.ch/Projektingenieurin-Projektingenieur-Windenergie-50-100-de-j54.html>
- We hope to see you at The Third Swiss Wind Energy R&D Forum on May 6th, 2021 in Rapperswil!