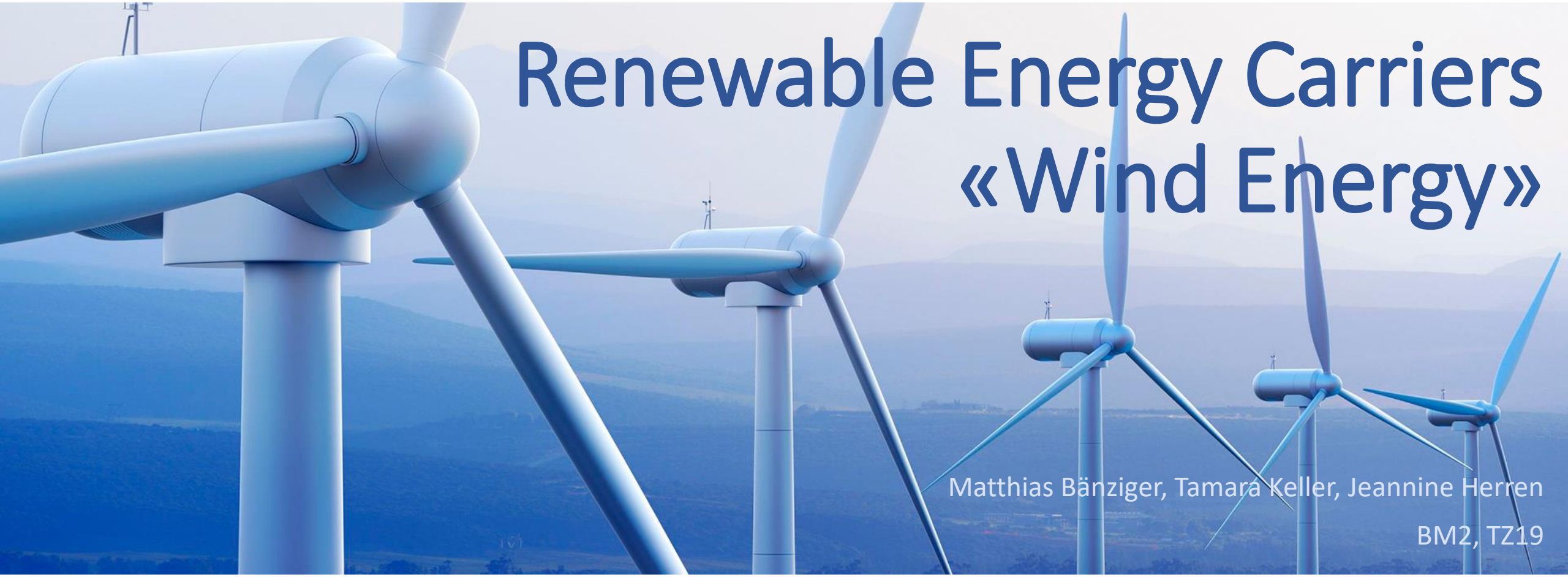


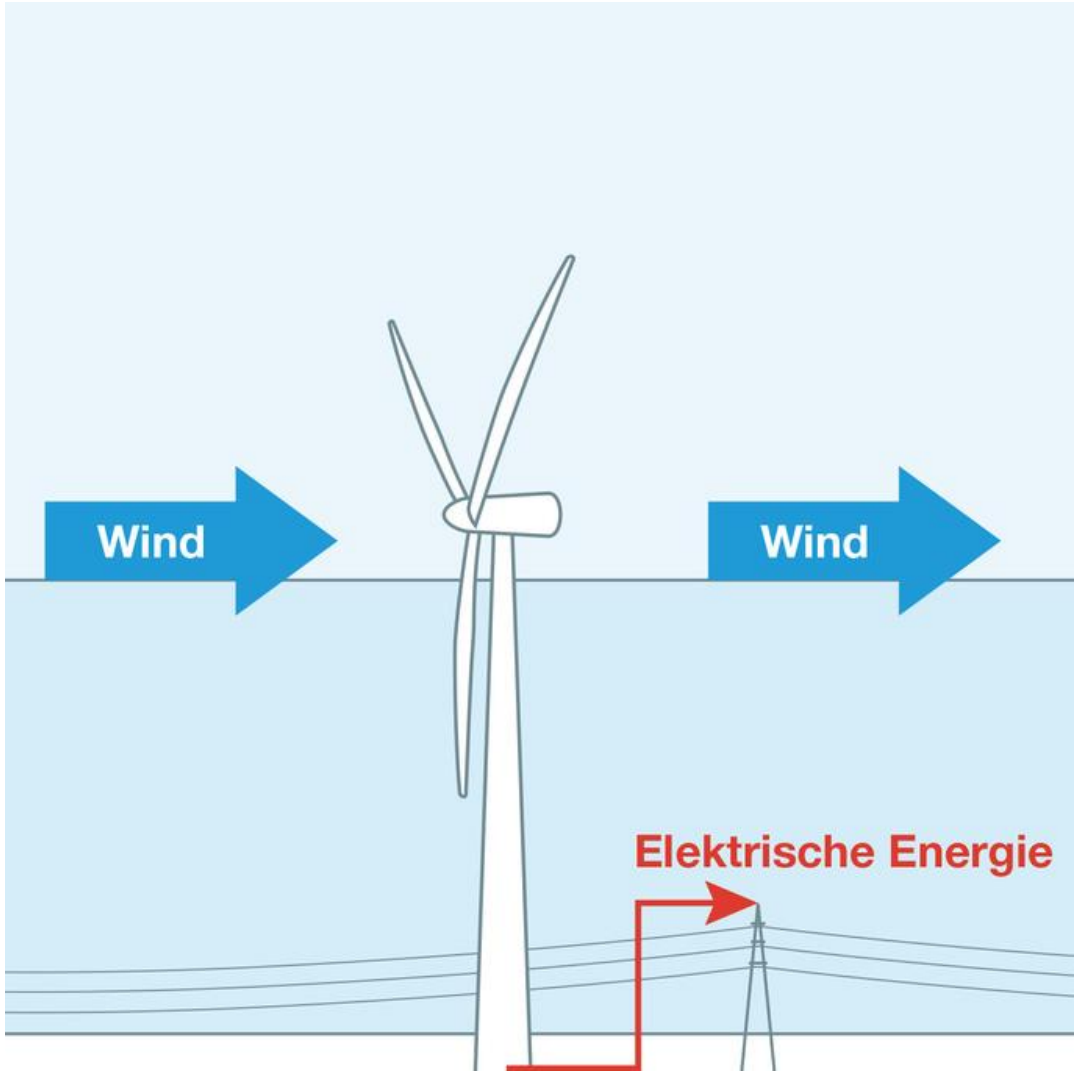
Renewable Energy Carriers «Wind Energy»

Matthias Bänziger, Tamara Keller, Jeannine Herren

BM2, TZ19


Wenn der Wind der Veränderung weht,
bauen die einen Mauern
und die anderen Windmühlen.
Chinesisches Sprichwort

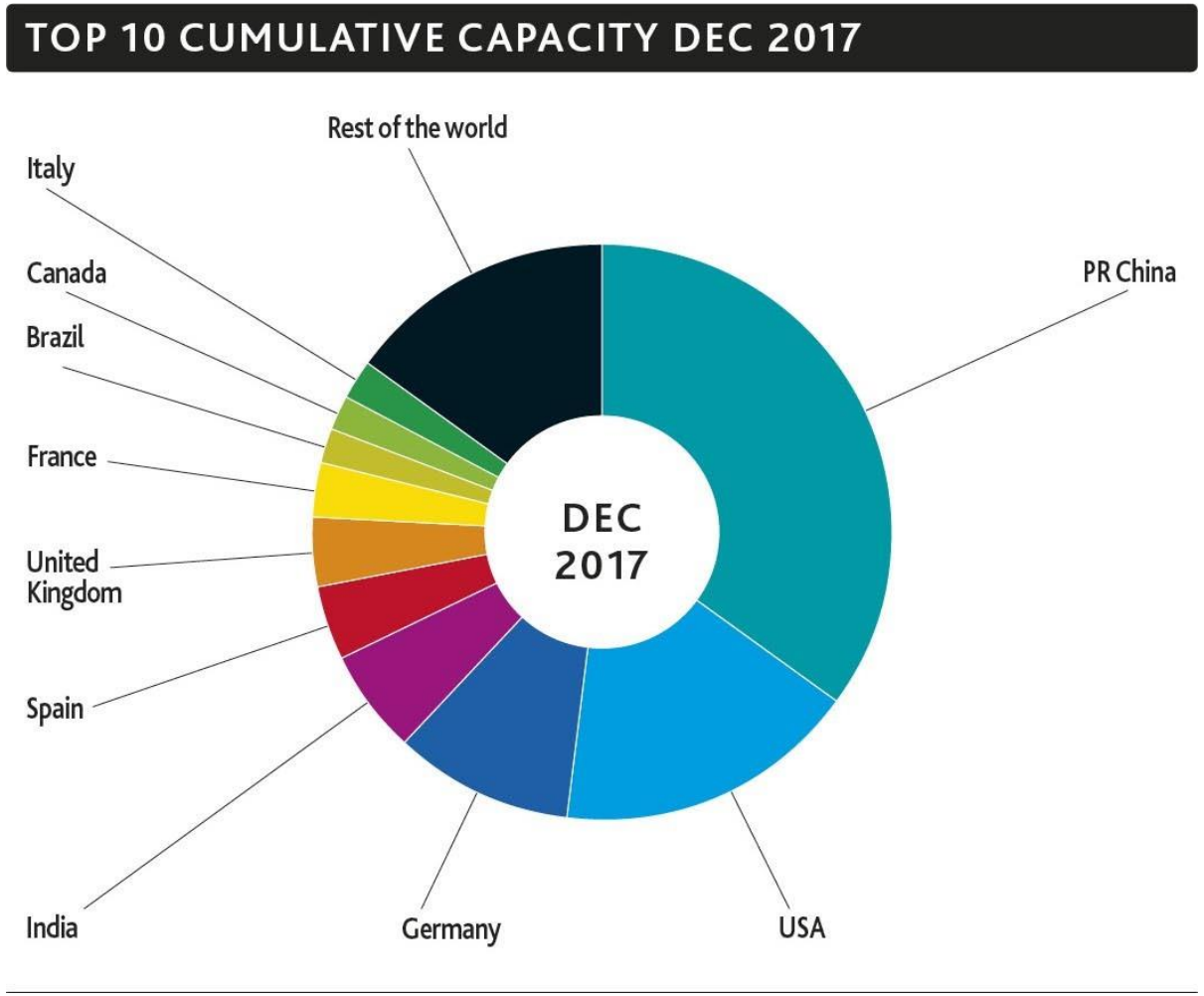
How does wind energy work?



How does wind energy work?

- Electricity production with renewable wind energy
  - Very safe
  - Generates neither CO2 or pollutants

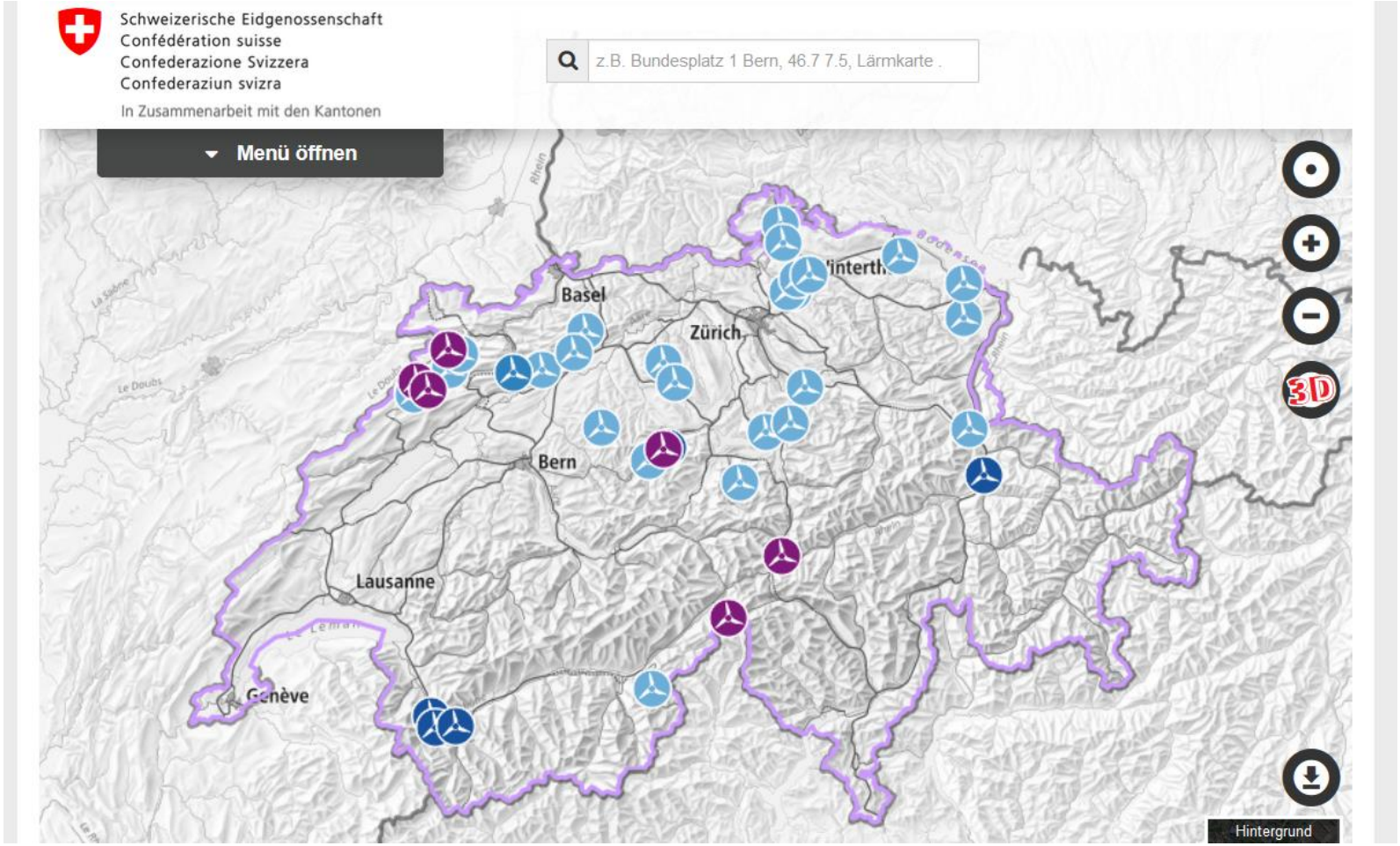
In which countries and locations does wind energy occur?



Wind turbines in Switzerland

- At the end of 2018, 37 large Wind turbines with capacity of 75 megawatts in Switzerland
- Annual Production in 2018, 121.7 million kilowatt hours
- 36'500 Swiss households or less than 0.2% of our total electricity consumption

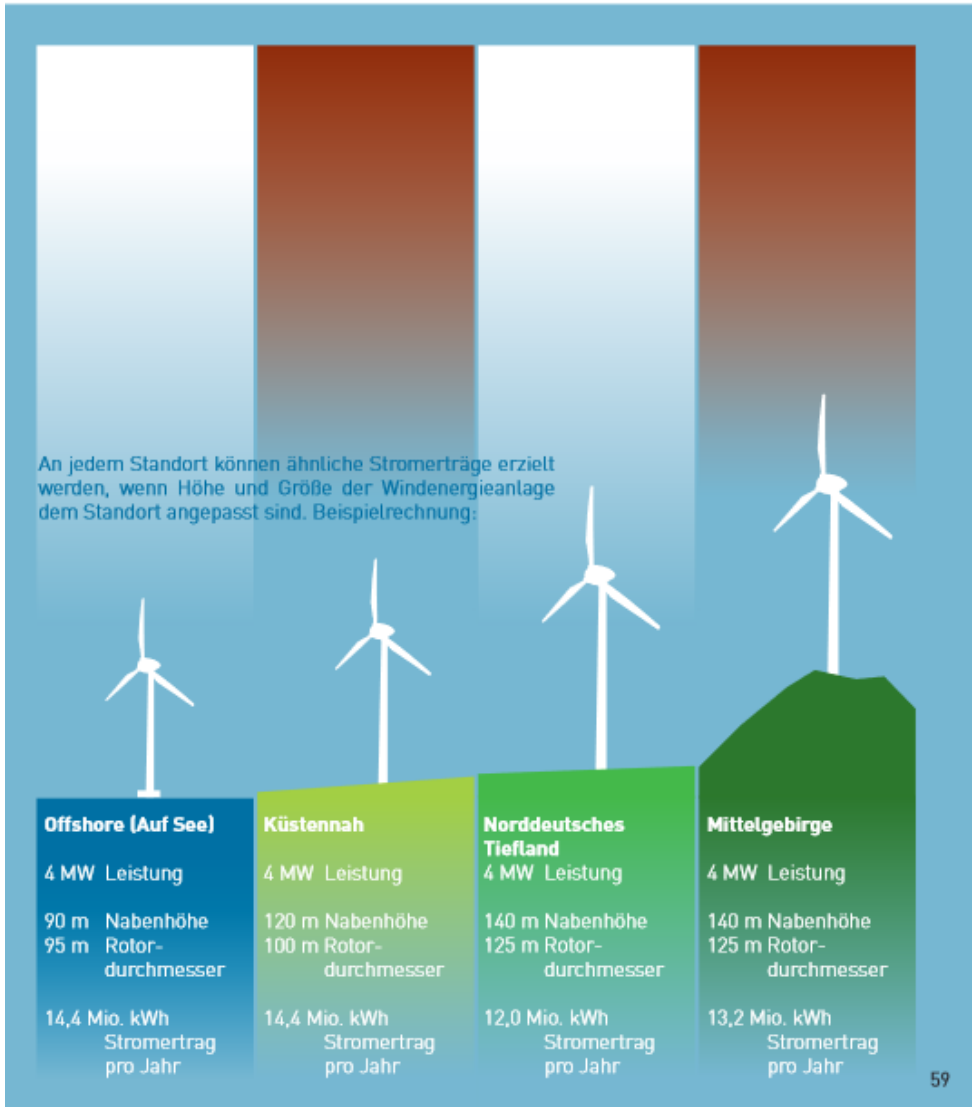
Wind turbines in Switzerland



Wind turbines near Zürcher Oberland

- 2 turbines in Brütten
- 1 turbine Winterthur Taggenberg
- 1 turbine Winterthur Wiesendangerstrasse
- 1 turbine in Feusisberg

Es gibt überall Wind und für jeden Standort die passende Anlage.



Requirements to build «wind farms»

- Location factors
- Know more about local wind conditions
- Building regulations

Location factors

The most important question when choosing a location is:

- How many hours a year the wind blows here?
- Is it a «windy area»?
- How is the speed and the direction of the incoming winds?
- Are there obstacles in the way, that may reduce wind speed?
- How is the air density (Wind-Dichte)?

Know more about local wind conditions

<u>How to find out:</u>

- with online tools (www.wind-data.ch)
- with wind charts
- by local wind measurement (this is essential!)

<u>How it is done:</u>

- by wind power planning offices
- measurement at least 6 months at 50 m altitude to get more information about the existing wind potential.

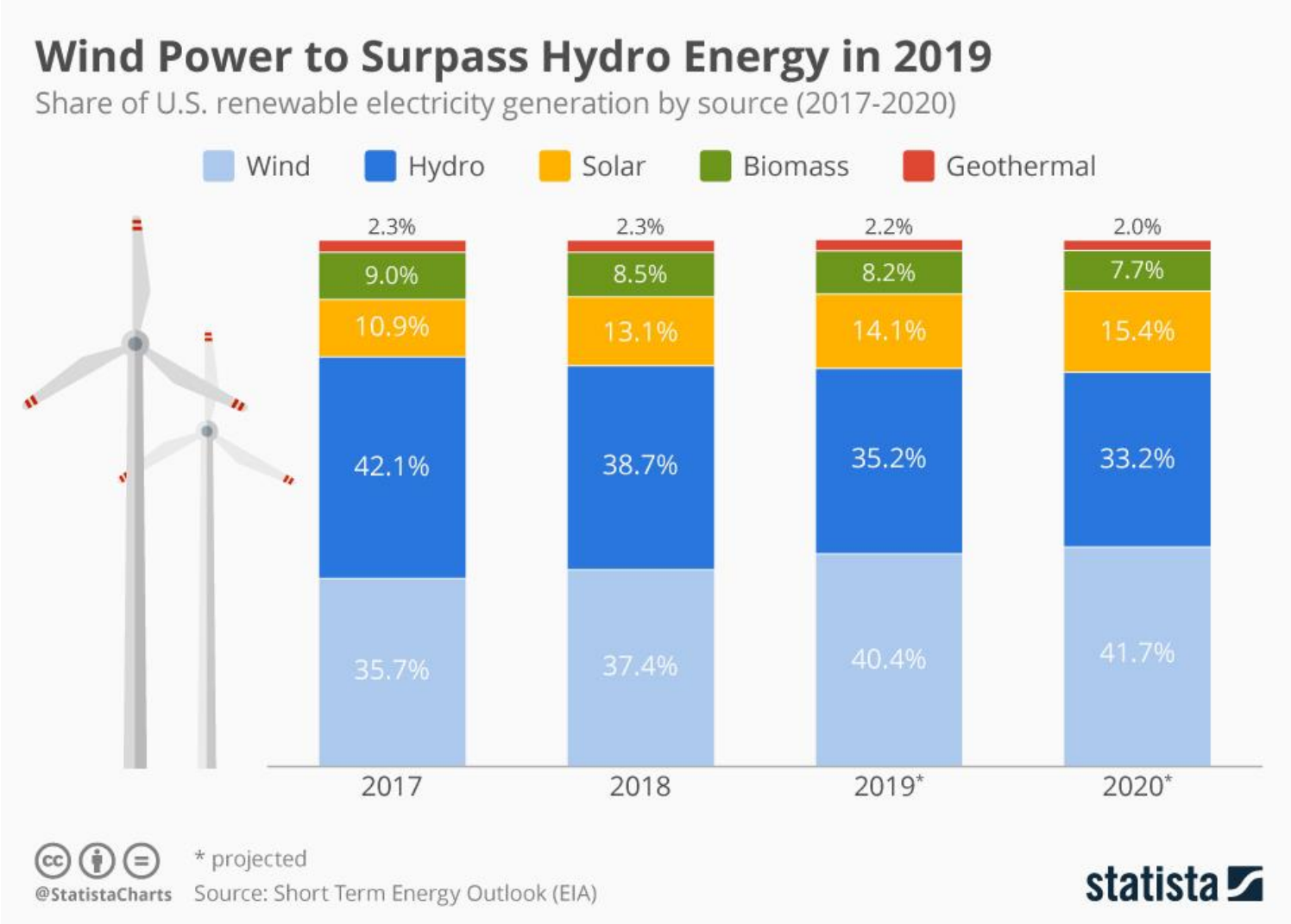
Building regulations

- minimum clearance to inhabited area
- noise emissions / noise pollution
- protected and sensitive areas (nature)
- aviation obstacle check

Opportunities of wind energy in the future

- safe and clean
- excellent eco-balance
- (mostly) wanted and accepted
- still high untapped (ungenutztes) potential above all at sea, as well as inland at high heights
- well-developed technologies are now available
- cost-effective power production
- low space requirement

Comparison to other energy carriers



Contras and Pro`s

- Contra
  - Visibility (Sichtbarkeit)
  - Consistency (Konstant)
  - Audible
  - Very expensive
- PRO
  - 100% Clean and sustainable energy
  - Wind is a free resource and endless
  - Not much space to build a wind wheel
  - Everybody can build a Windwheel

Challenges to build a wind wheel

- Place
- Building permit (Baugenehmigung)
- Contras and protestes from the general public
- Costs

Keywords on wind energy

- Wind wheel (Windrad)
- Power (Kraft)
- Electricity (Elektrizität)
- Renewable energy (erneuerbare Energien)
- Free energy (Freie Energie)
- Wind turbine (Windturbine)
- Wind speed (Windgeschwindigkeit)

If you are interested to learn more about rewnewable energy, following event would be something for you:

Energy Day @ ETH 2019

Klimaneutrale Energiesysteme bis 2050 – (k)ein Problem oder (k)eine Chance?

Dienstag, 10. Dezember 2019, 9 bis 18 Uhr

ETH Zürich, Hauptgebäude
Rämistrasse 101
8092 Zürich

https://esc.ethz.ch/events/