

# up and beyond

a Dutch mountain

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# To build a 2km high mountain

Natural questions are

- Where to build it?
  - How to build it?
  - How to sustain it?
  - How to use it?
- 
- Duration
  - Infrastructure
  - Ownership



# Location



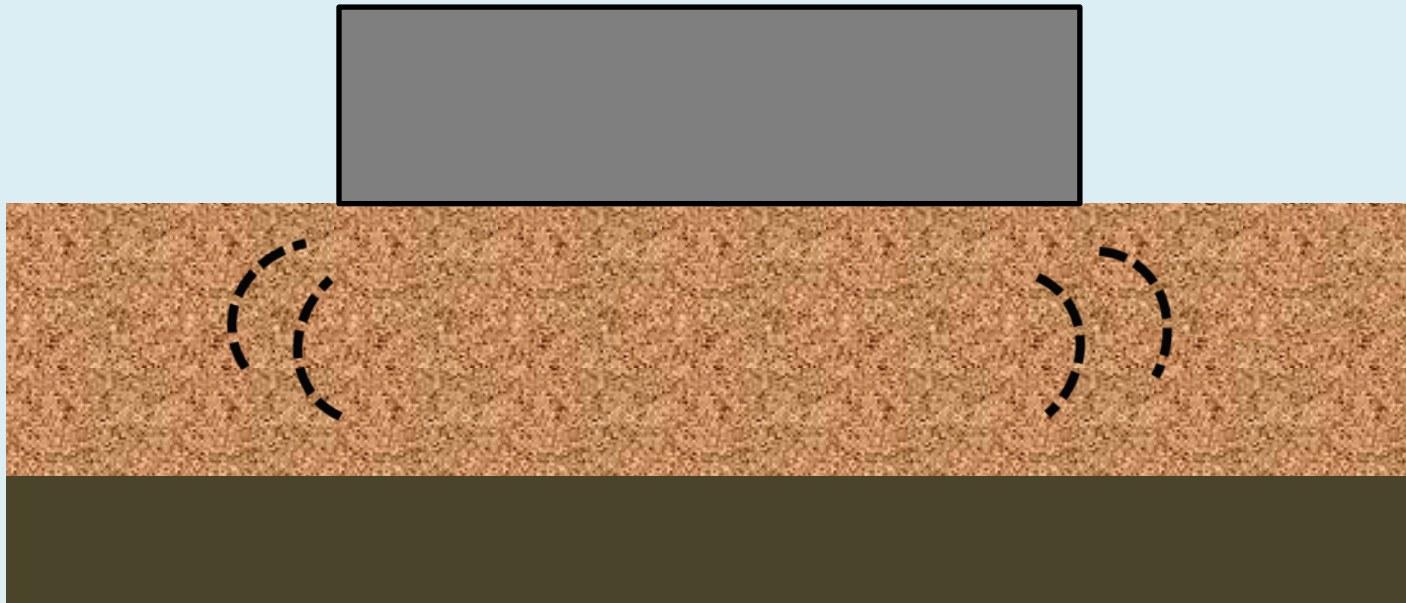
# Arguments

- Flight routes / Air traffic
- Ship routes
- Sea currents
- Sedimentation / Coast erosion
- Protected environment
- Accessibility
- Impact on society

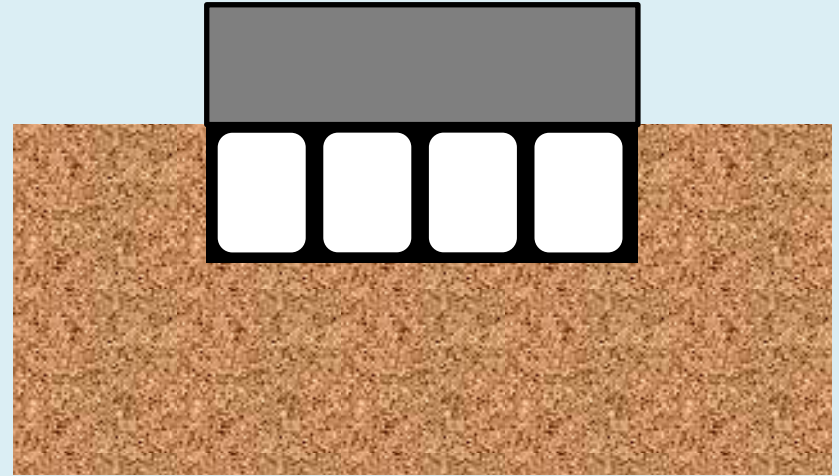
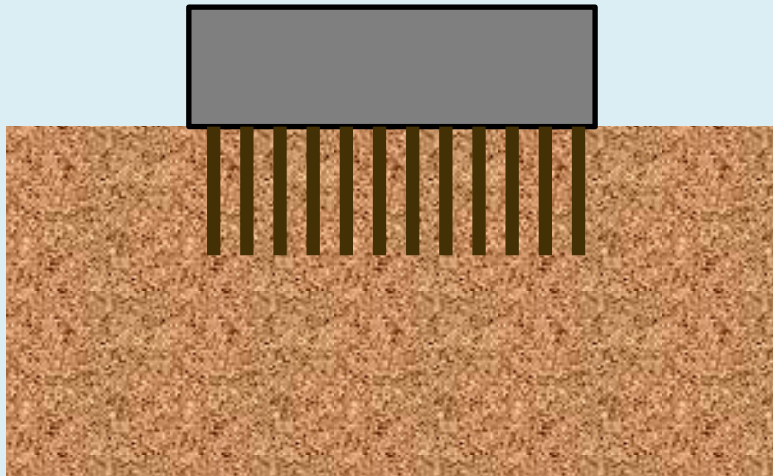


# Soil

- Soil layers
- Load carrying capacity, stress resistance
- Prevent shear failure



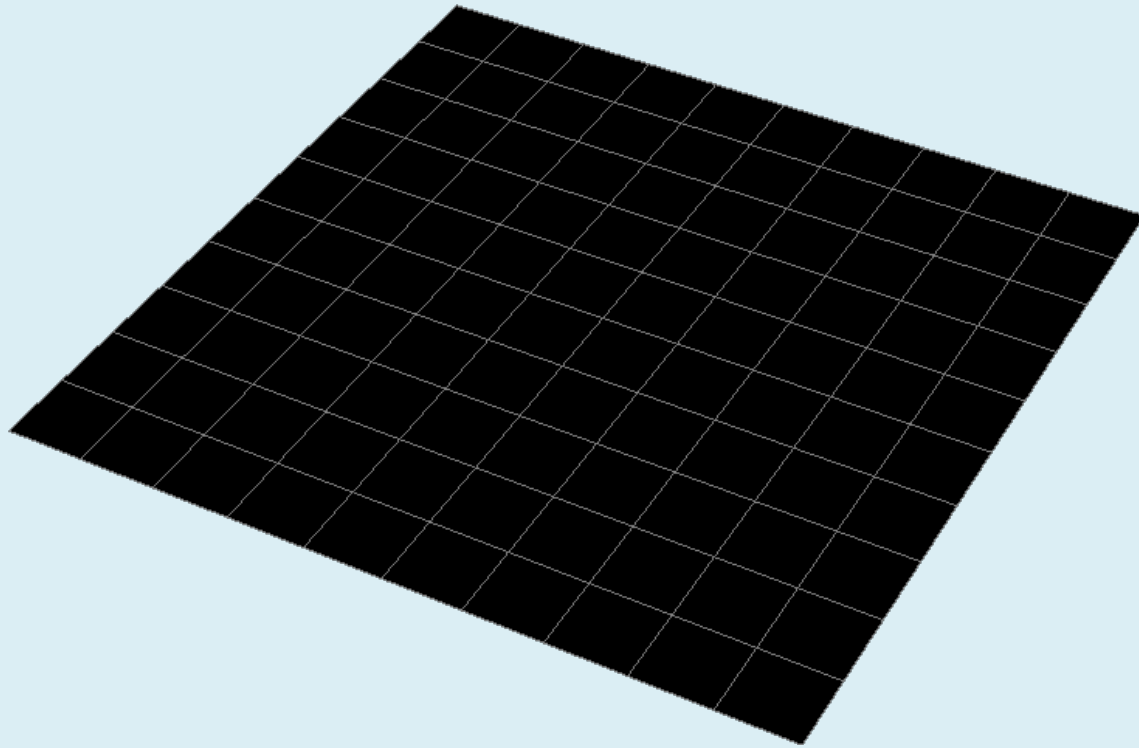
# Foundation



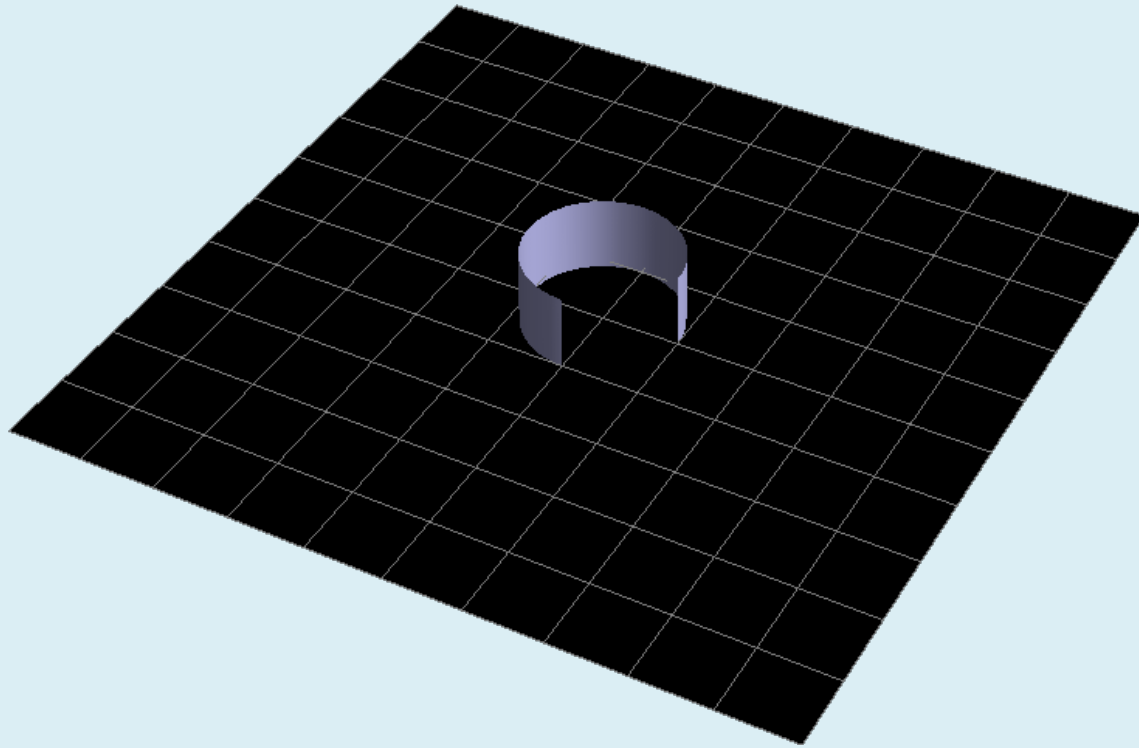
±30% per m<sup>2</sup> support

- Hollow cell
- Decrease soil pressure
- Let structure 'float' (ship)

# Structure

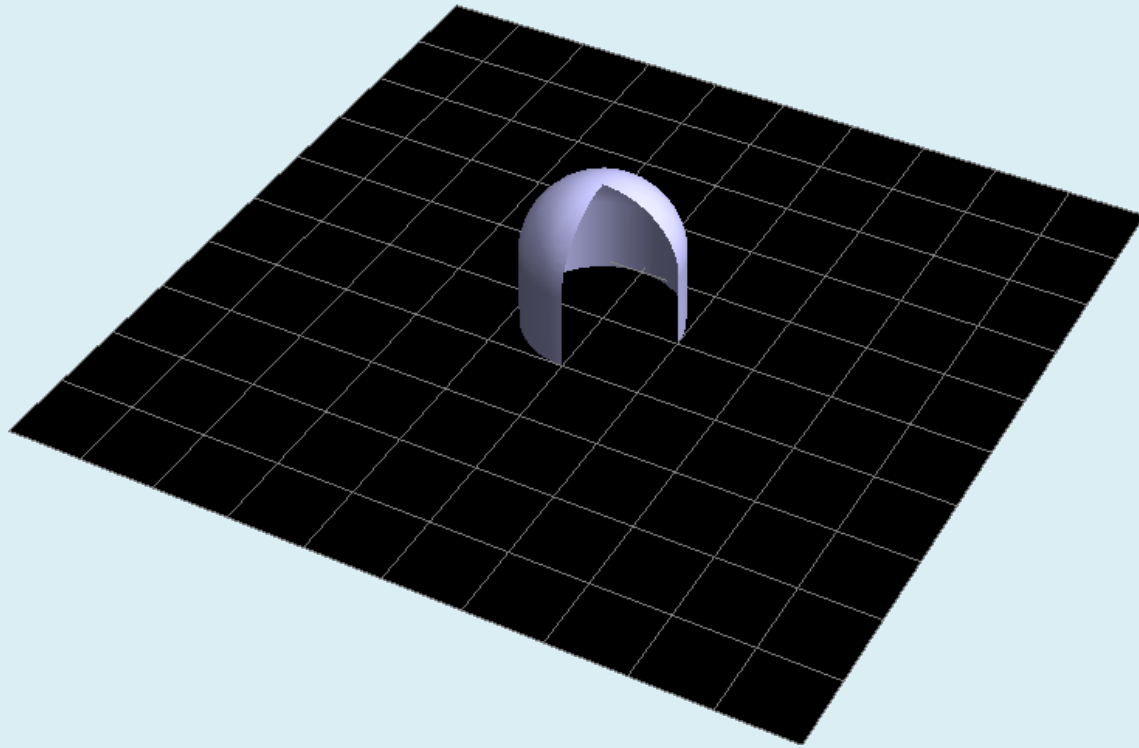


# Structure

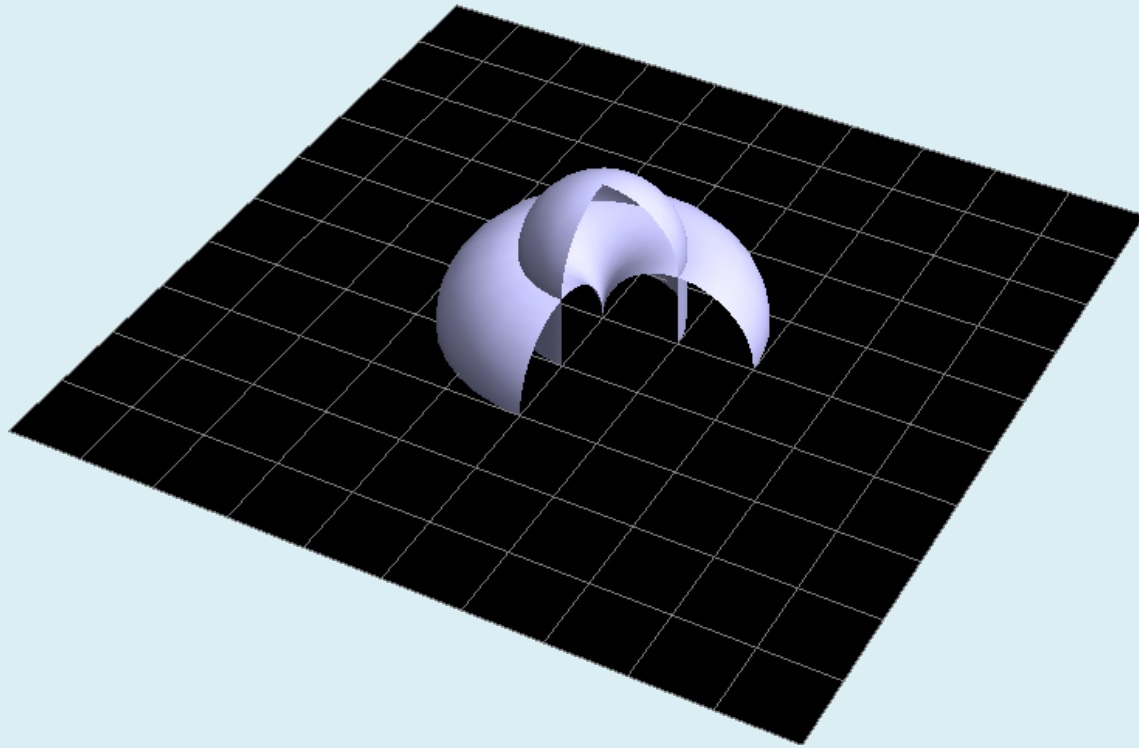




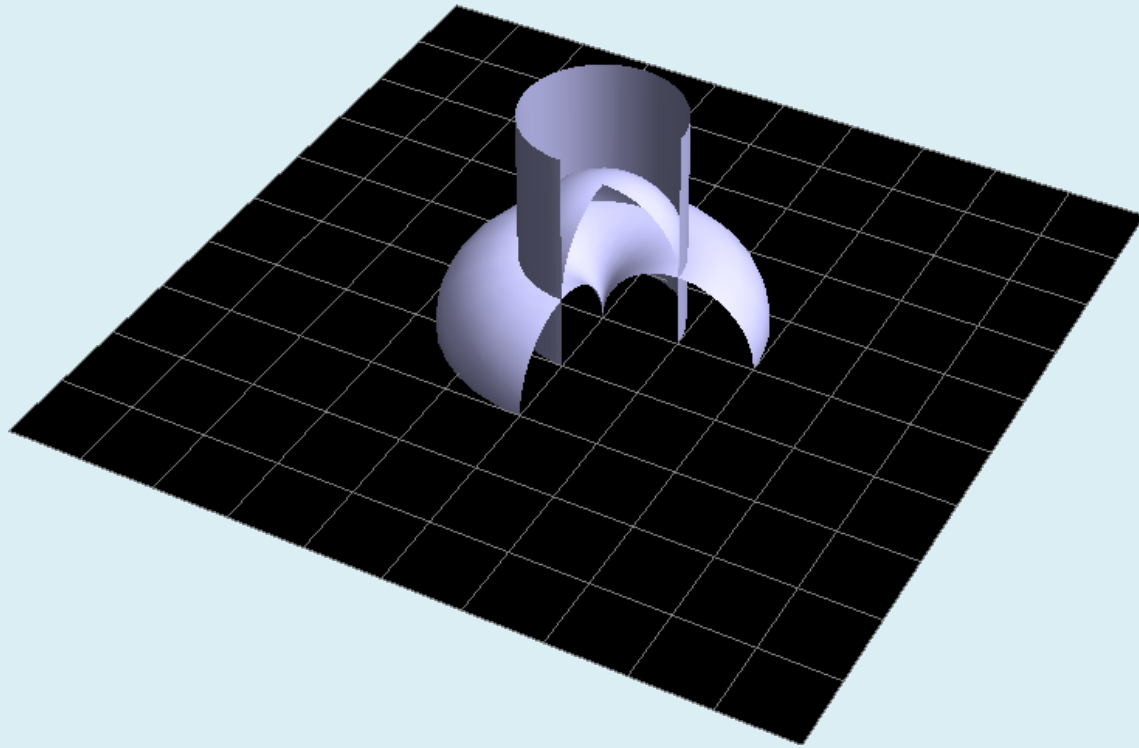
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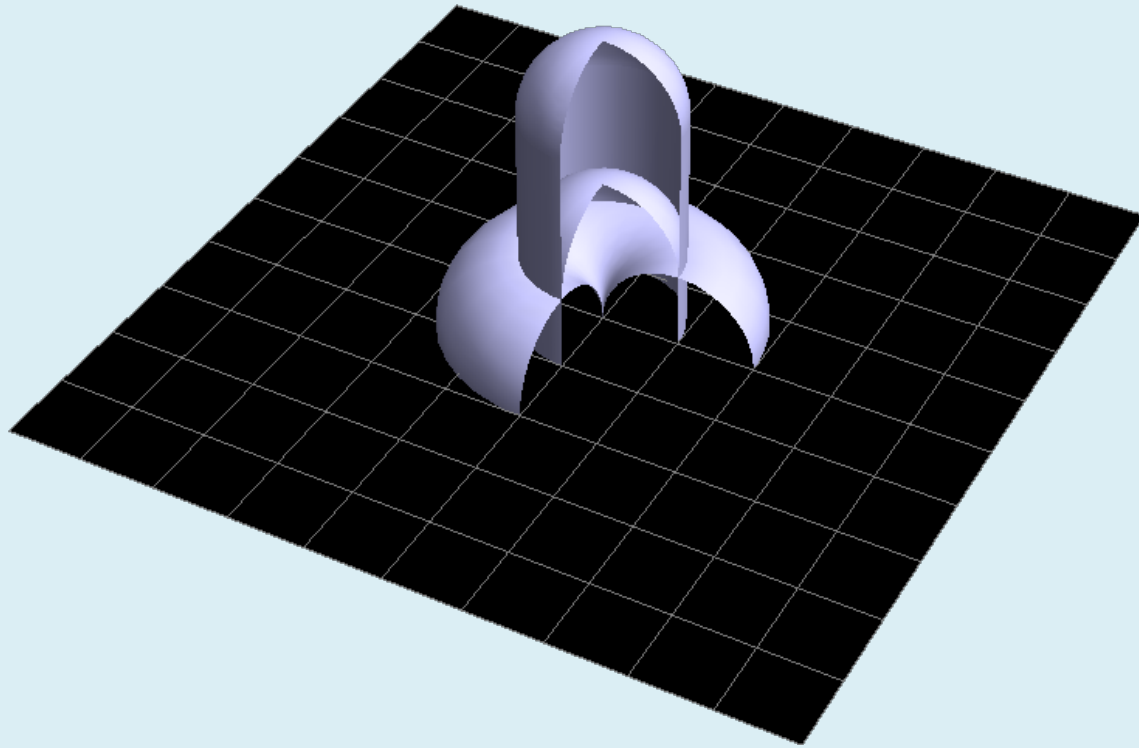
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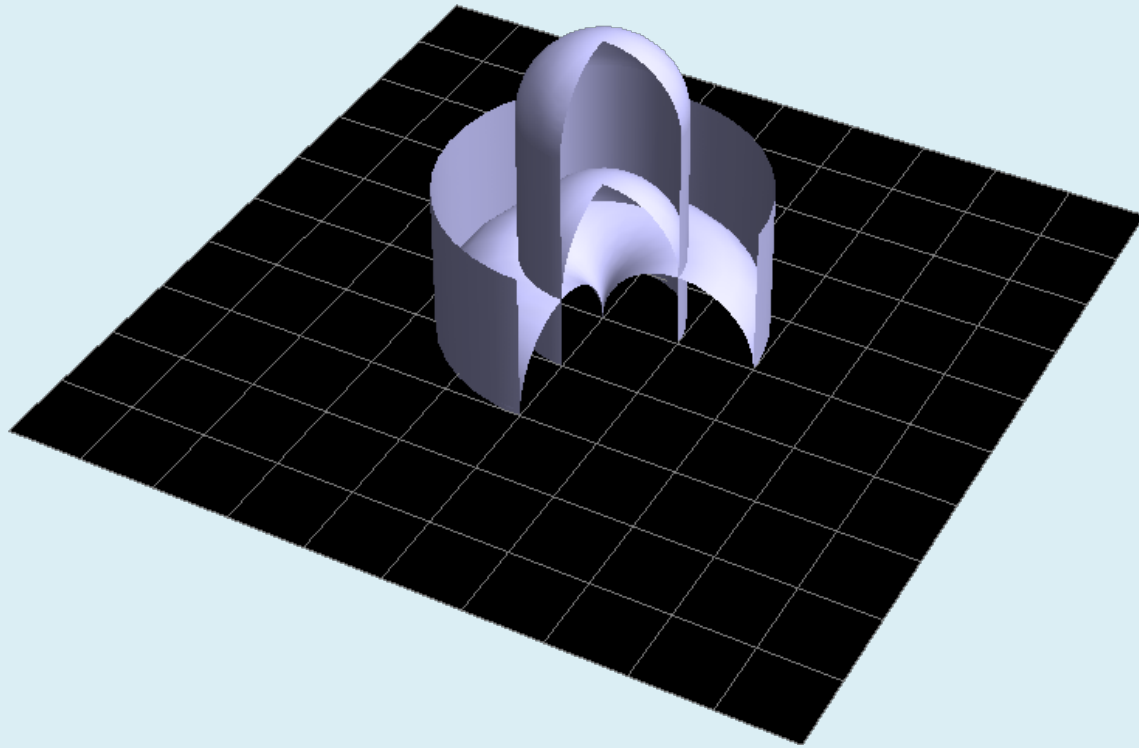
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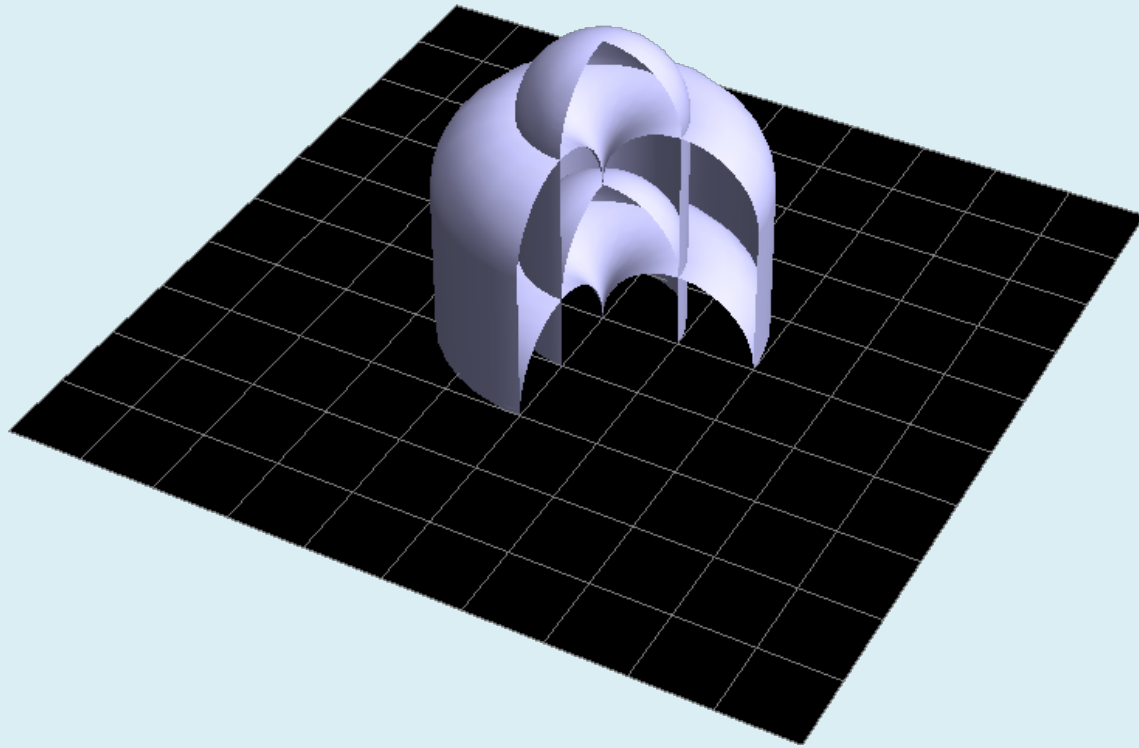
# Structure



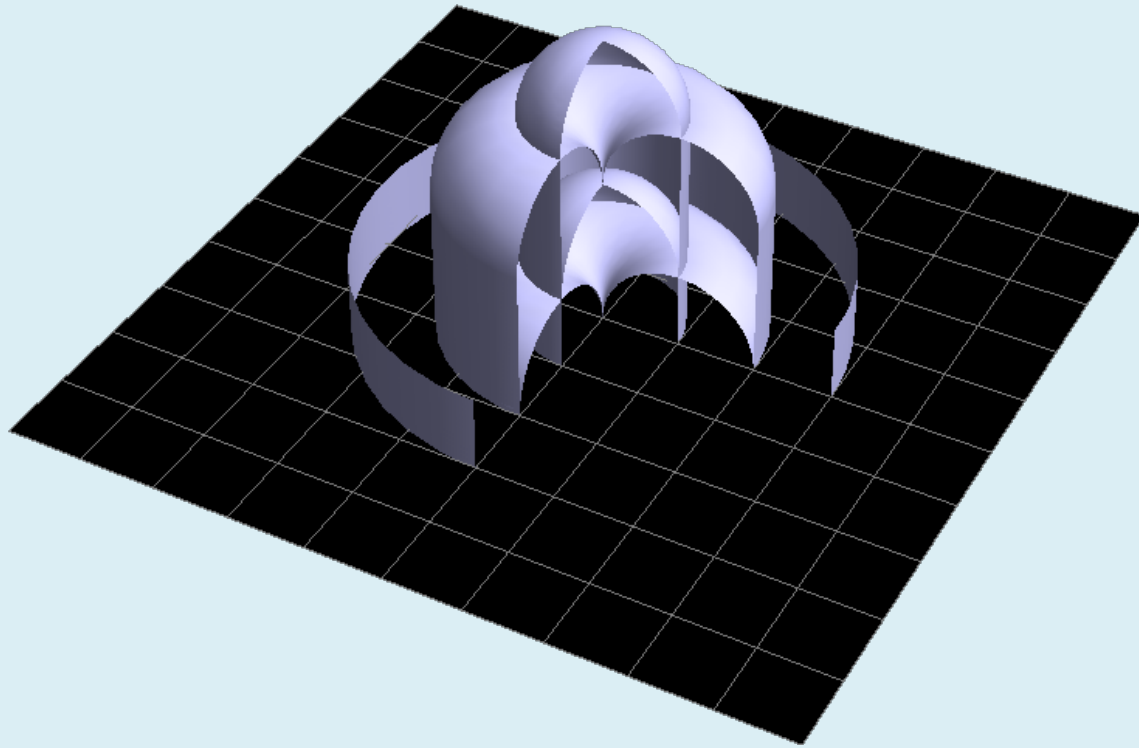
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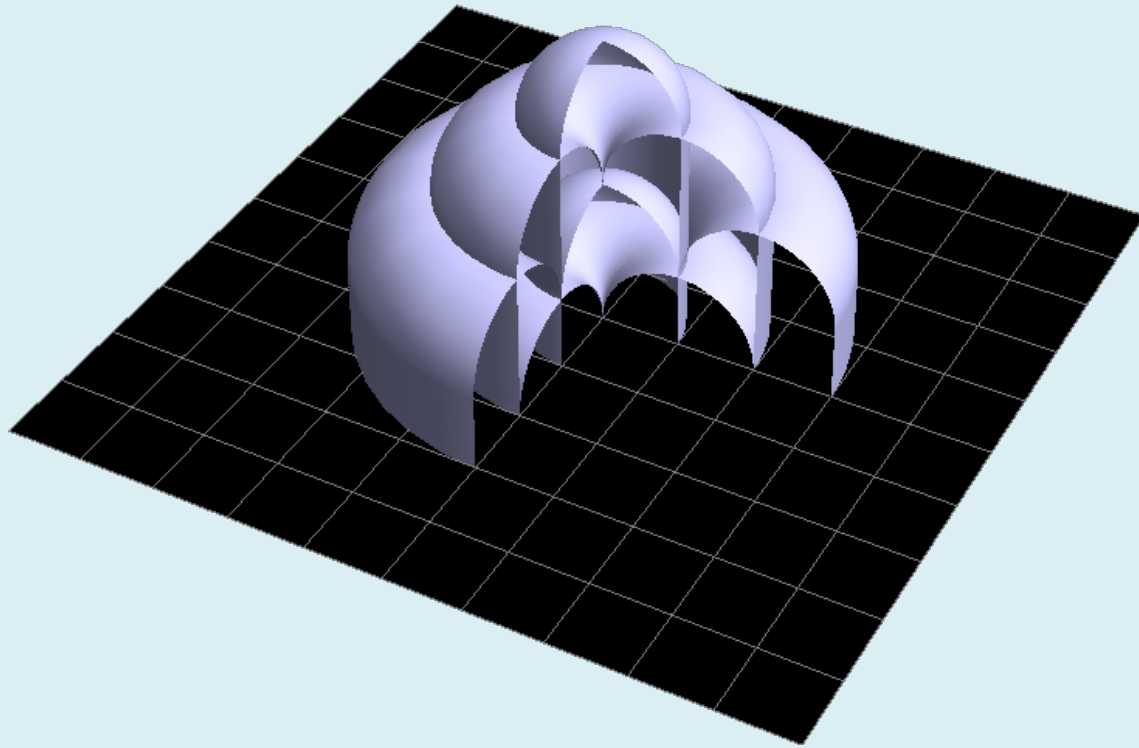
# Structure



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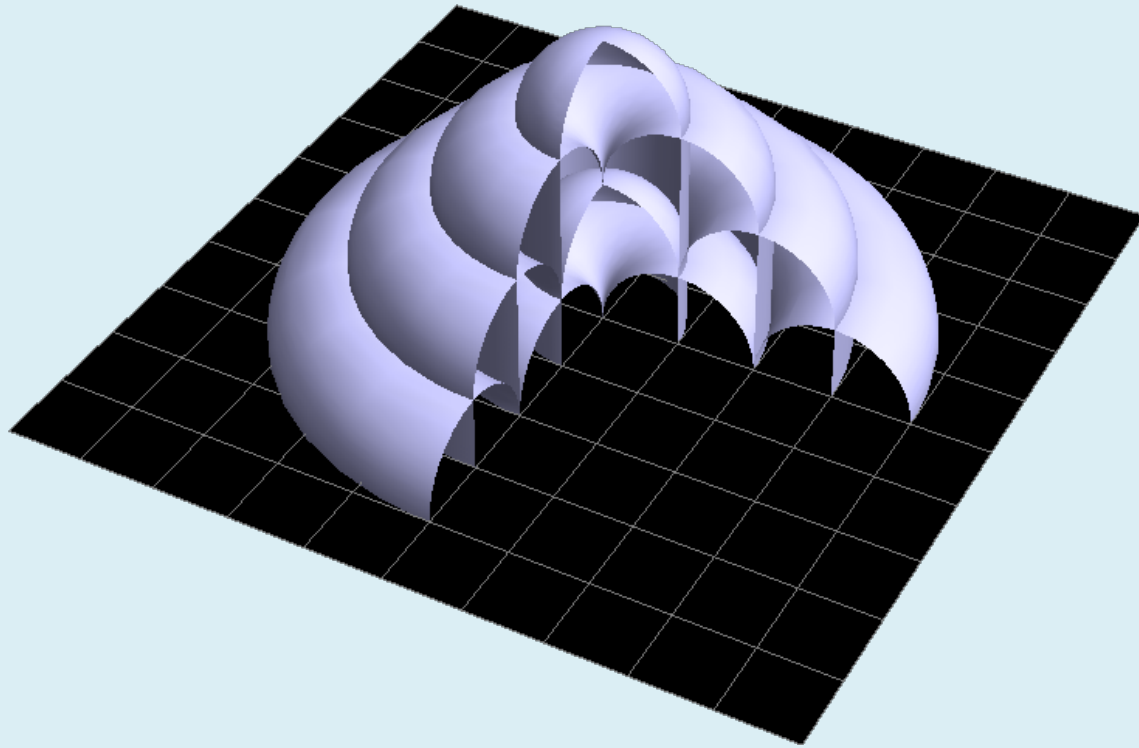


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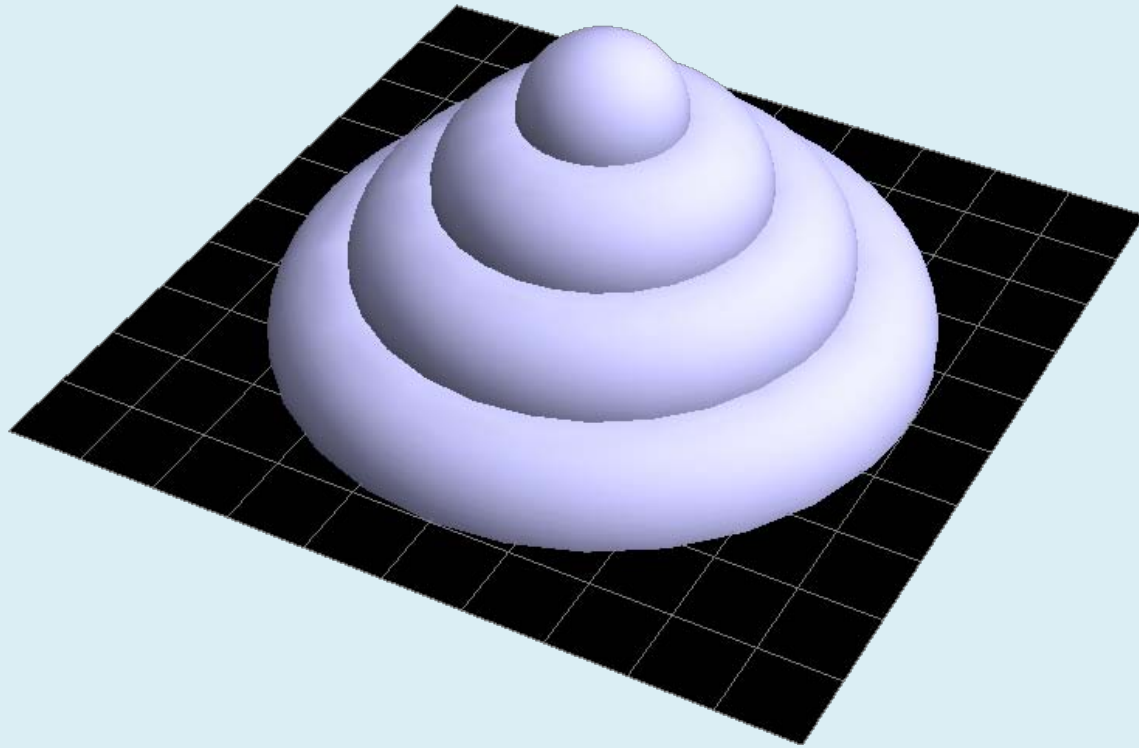




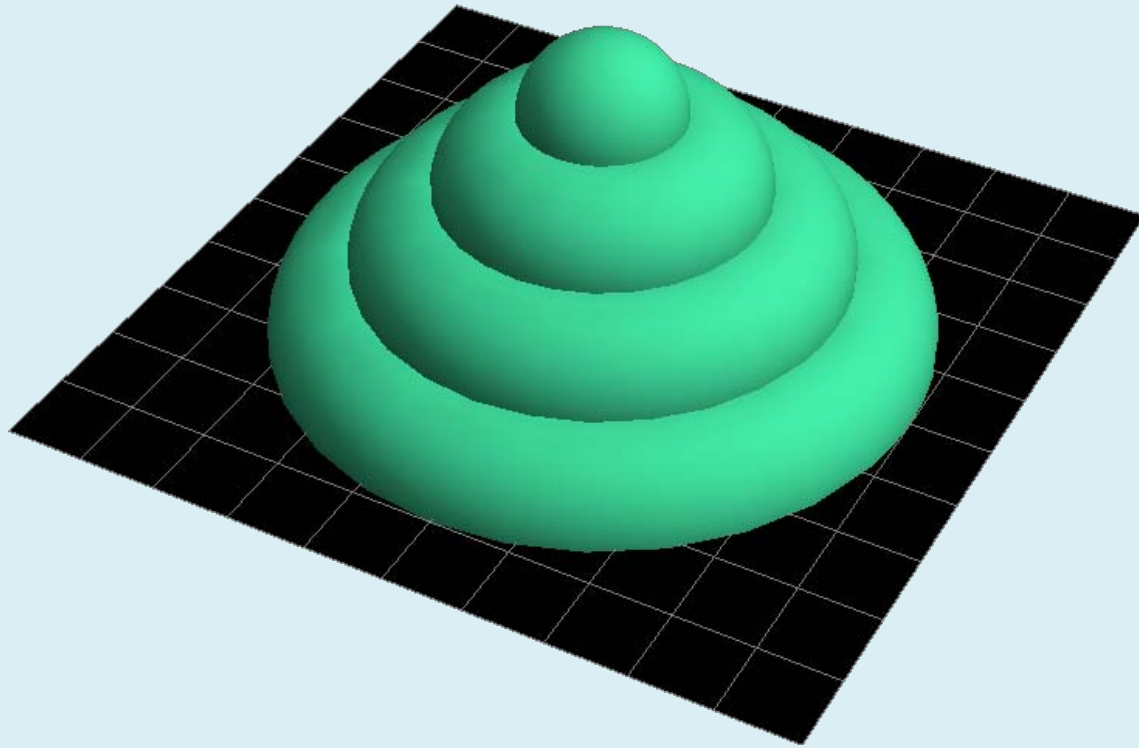
# Structure



# Structure



# Structure



# Materials

Material	Estimated cost (x 10 <sup>12</sup> €)	Mass (x 10 <sup>13</sup> kg)	CO <sub>2</sub> (x Dutch annual emission)
Rock	6.5	2.5 (s)	---
Sand	7.0	2.7 (s)	---
Concrete	4.0	0.7 (h)	120
Plastic	30	0.3 (h)	335
Steel	1400	2.4 (h)	185
Glass	2700	0.8 (h)	140

(s) Solid

(h) Hollow

- Alternative structure / material

# Zero Net Building

- CO<sub>2</sub> – Neutral
- Energy conservation and production
- Water conservation



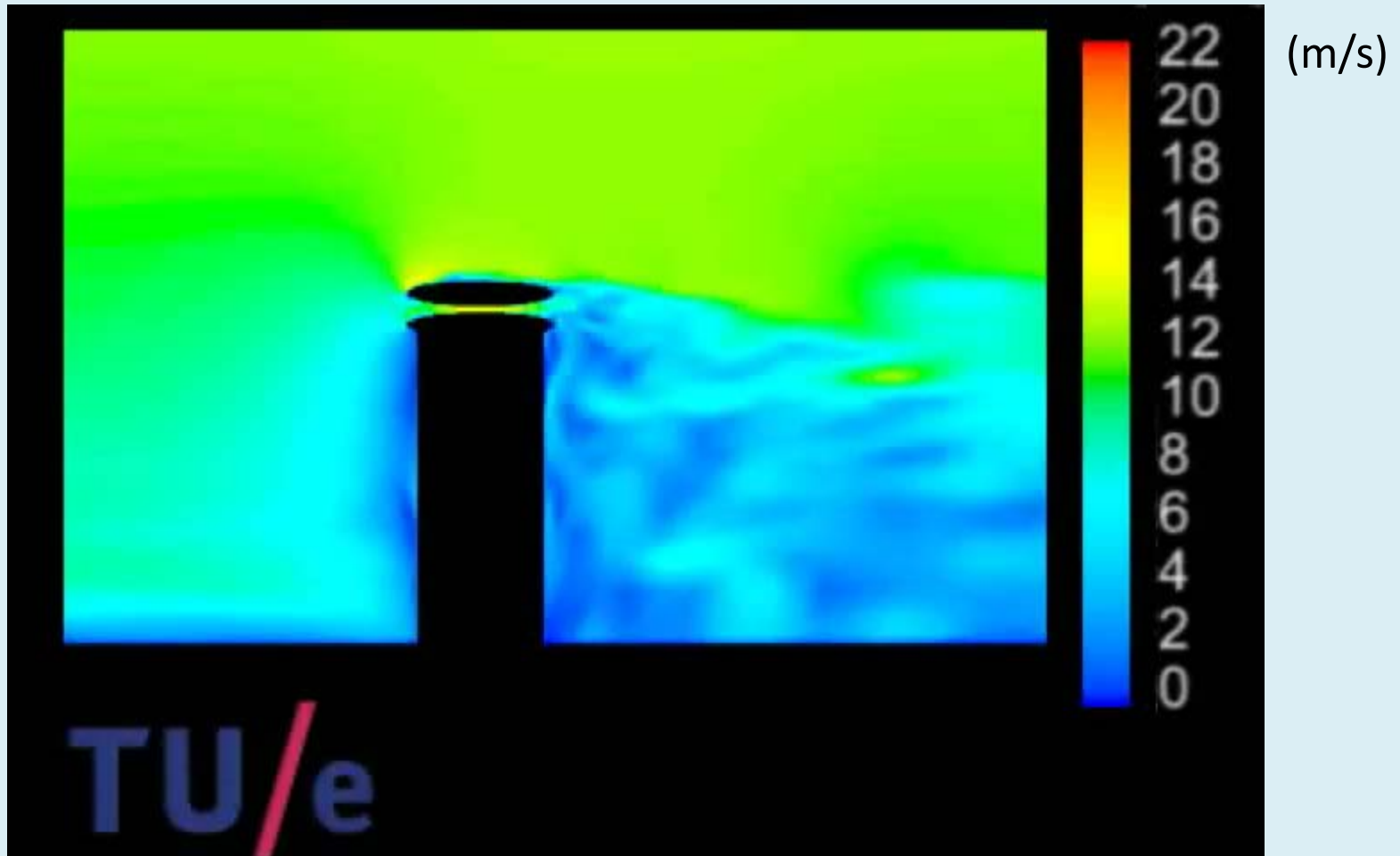
- Basin in levels to catch rain water
- Store energy by pumping at night

# Wind Power

- Higher wind power at 2000m
- Energy demand at the structure
- Wind turbines within tunnels;  
improves energy production 6-10 times  
compared to traditional turbines

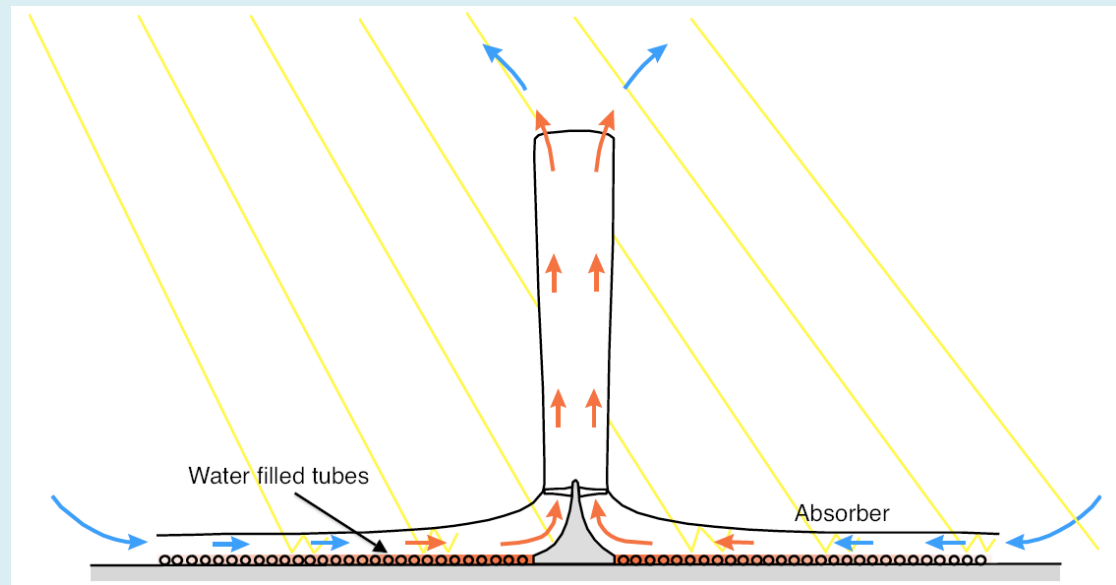


# Wind Flow



# Solar Energy

- Solar panels are improving in near future profitable
- Heat storage inside structure or lake
- Solar chimney will provide energy for 30,000 Dutch consumers





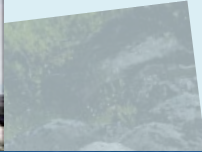
# Endless Possibilities



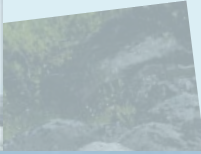
# Endless Possibilities



# Endless Possibilities



# Endless Possibilities



# Endless Possibilities



# Concluding Advice

- Where?
  - Sea
  - Land
- How?
  - Foundation
  - Structure
  - Materials
- Zero Net Building
- Endless Possibilities



# Questions?

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Special Thanks:

Rijk Blok, Bert Blocken, Marko Boon,  
Juan Manuel Davila Delgado, Hans Hoenderkamp