

**Ruukki wind towers**

# Reaching the heights with Ruukki

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## Wind power: an excellent source of energy

Wind power is one of the most competitive ways of generating renewable energy. Not only is it environmentally friendly, but also increasingly cost-efficient due to rising fuel prices and improved wind power technology. Wind energy demand is constantly growing as environmental factors and security of supply gain more and more focus in decision making and consumer reactions.

## Challenges in wind energy

There are, however, also challenges in wind power supply. Pressure and negative feedback from the big audience is often significant, especially in coastline wind tower installations. Also, there is a strong need to find new geographical territories and favourable locations for new wind farms, especially inland. Producing wind power inland is possible and cost-efficient with sufficiently high wind tower structures. To date, this has not been possible with existing steel tubular towers.

## Reaching better wind conditions

Reaching better wind conditions results in higher average power and full load hours, and consequently also delivers higher return on investment. This is particularly significant in inland areas, where wind speed increases considerably with height. According to several inland wind measurements, wind speed increases by at least 0.5 m/s when measured at a height of 120 metres compared to 80 metres. Based on 12 months' wind condition measurements, energy

output increases by 40–50% when hub height changes from 100 metres to 140 metres in Swedish forest inland. A wind speed increase of 0.5 m/s means an increase in power output of 25%.

## Ruukki takes you where the wind is

Ruukki has developed a new type of wind tower structure to enable the construction of higher towers with hub heights of up to 160 metres. Our unique tower enables you to benefit from inland wind conditions by going higher and reaching



increased wind velocity. You benefit not only from increased profitability and minimum lifecycle costs, but also from access to advanced technology and a safe, environmentally-aware tower solution.

Our tower includes complete life-cycle management consisting of design, foundation, steel structure, erection, maintenance and recycling. The competitiveness of our wind tower structure is the result of several innovations, including a hexagonal tower concept, a unique steel tower profile, having all joints with bolts, Ruukki's

pile foundations, steel processing expertise and know-how in high-strength steels. Ruukki's innovative, world-class wind tower specialists are at your disposal from tower design to recycling.

#### **Respecting the environment**

Being constructed of steel profiles, the body of Ruukki's wind tower is open. This lattice structure makes the tower more acceptable and enables it to harmonise better with the landscape. Furthermore, the tower has an optimal recycling capability due to easy dismantling and re-usage of steel parts. The light weight of the wind tower

structure translates into:

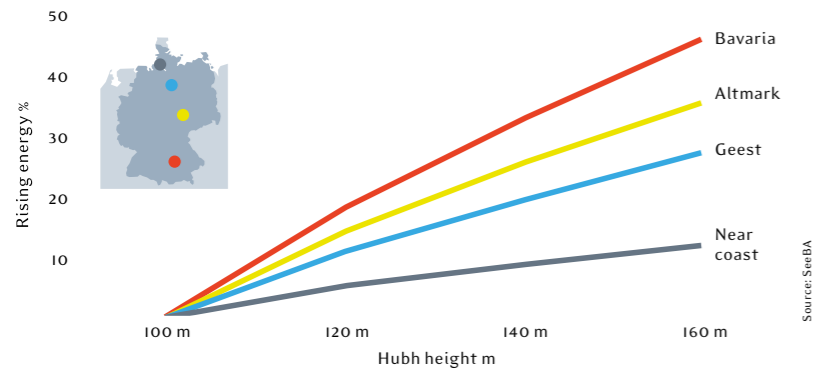
- less raw material
- fuel savings in logistics
- less energy consumption
- less CO<sub>2</sub> emissions

Ruukki - Your partner in high tower solutions

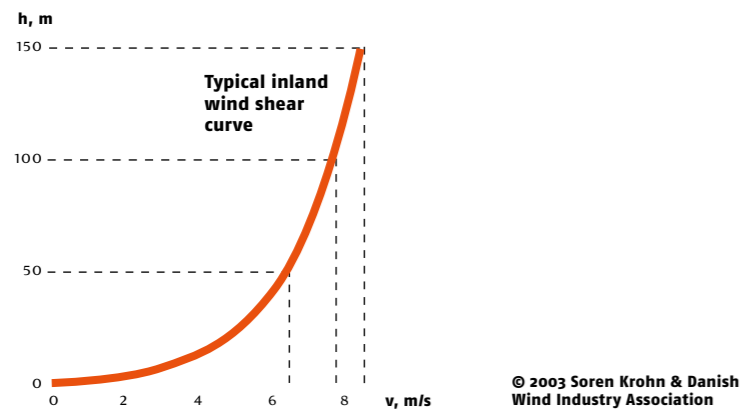
[www.ruukki.com/windtowers](http://www.ruukki.com/windtowers)



**Table 1.**  
Energy efficiency inland  
Increase of wind energy in German locations for hub heights from 100 m to 160 m



**Table 2.**  
Wind shear when increasing hub height



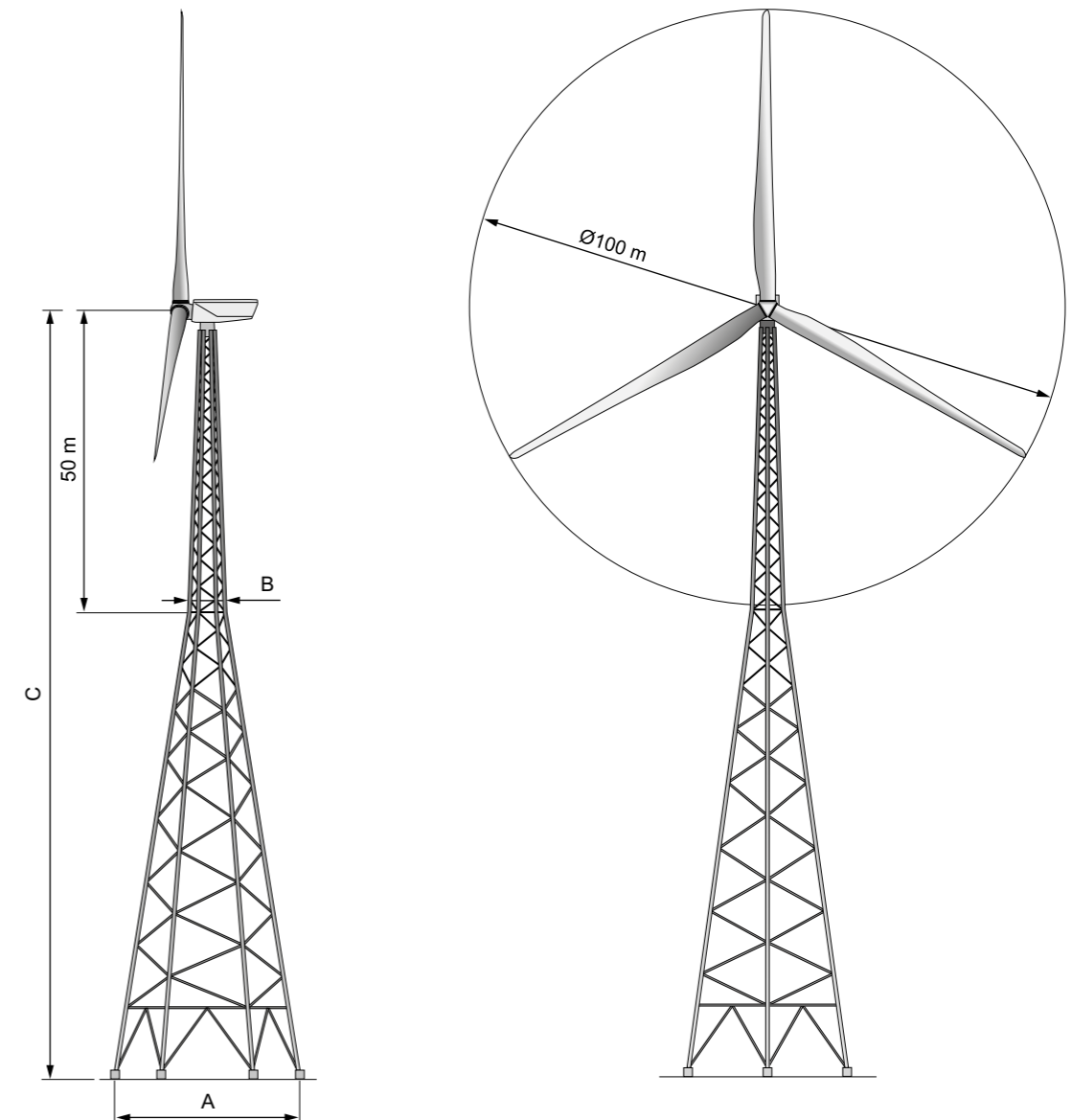
**Table 3.**  
Comparison of different wind towers

	Tubular Steel Tower Hub height only 100 m	Ruukki Wind tower (lattice tower) Hub height 140 m	Hybrid tower (steel tube/concrete) Hub height 140 m
Tower section steel/tons	270	277	150
Foundation reinforcement steel/tons	48	41	84
Tower section reinforcement steel/tons	Not needed	Not needed	186
Total steel/tons	318	318	420
Tower section concrete/m <sup>3</sup>	No concrete	No concrete	780
Foundation concrete/m <sup>3</sup>	379	300	640
Total concrete/m <sup>3</sup>	379	300	1420

Comparison is based on 2.5 MW turbines.  
For the tubular steel tower, all values are based on a hub height of 100 m.

**Table 4.**  
Ruukki Wind Tower. Typical dimensions with 2.5 MW turbine

C: Hubheight m	100			120			140			160		
B: Waist diam. m	4	6	8	4	6	8	4	6	8	4	6	8
A: Root circle diam. m	19	20.1	21.2	25	25.8	26.5	31	31.4	31.8	37	37	37
Mass (w/o foundation) tons	196	184	177	241	227	219	291	277	270	350	336	328



Ruukki is a metal expert you can rely on all the way, whenever you need metal based materials, components, systems and integrated systems. We constantly develop our product range and operating models to match your needs.