



**LEOSPHERE**  
A VAISALA COMPANY

# Towards a European Leader in Wind Remote Sensing: Leosphere & Vaisala

Why it makes sense: market positioning and numbers





# Lidar technology: Fields of application



WIND POWER



WEATHER &  
CLIMATE



AVIATION WEATHER



AIR QUALITY &  
INDUSTRIAL RISK



# Lidar technology: Fields of application

85% of the Leosphere installed base. Where we feel closest to the industry



WIND POWER



WEATHER &  
CLIMATE



AVIATION WEATHER



AIR QUALITY &  
INDUSTRIAL RISK



# Lidar technology: Fields of application

85% of the Leosphere installed base. Where we feel closest to the industry

Vaisala is #1 in operational weather networks. Leosphere primarily in research



WIND POWER



WEATHER &  
CLIMATE



AVIATION WEATHER



AIR QUALITY &  
INDUSTRIAL RISK



# Lidar technology: Fields of application

85% of the Leosphere installed base. Where we feel closest to the industry



WIND POWER

Vaisala is #1 in operational weather networks. Leosphere primarily in research



WEATHER &  
CLIMATE

Vaisala has considerable presence and track record. Leosphere is new but growing fast in windshear and wake vortex



AVIATION WEATHER



AIR QUALITY &  
INDUSTRIAL RISK



# Lidar technology: Fields of application

85% of the Leosphere installed base and where we are most comfortable. Vaisala complementary in terms of technology and footprint.



WIND POWER

Vaisala is #1 in operational weather networks. Leosphere primarily in research



WEATHER &  
CLIMATE

Vaisala has considerable presence and track record. Leosphere brings Lidar technology to complement existing offerings



AVIATION WEATHER

Vaisala has considerable presence and track record. Leosphere brings Lidar technology to complement existing offerings



AIR QUALITY &  
INDUSTRIAL RISK



# Leosphere in key figures



## The Company



**Industrial Capacity**  
**>300 Lidar/Year**



**>27,5 M€**  
**Turnover (2017)**



**>25M€** invested in  
**R&D last 5 years**



**>120** Employees



## Global presence



**>1200+** Lidar in  
**50+ Countries**

**>50+ Worldwide partners**



**4 Service Centers**



## ...and Vaisala

Employs

**1600**

professionals  
worldwide



EMEA  
**70%**

Americas  
**22%**

APAC  
**9%**

Has over

**30**

offices

in

**17**

countries



**37%**

of Vaisala  
people work  
outside of Finland

Serves

customers

in over

**150**

countries  
annually



2017 net sales

**332.6** million  
euros

EMEA  
**32%**

Americas  
**38%**

APAC  
**29%**

2017 R&D

investments  
were

**11.9%**

of net  
sales

**20%**

of employees  
work in R&D  
activities

Committed to using


**100%**

renewable  
electricity by

**2020**







# 13x the people

Has over

**30**

offices

in

**17**

countries



**37%**

of Vaisala  
people work  
outside of Finland

Serves

customers

in over

**150**

countries

annually



2017 net sales

**332.6** million  
euros

EMEA  
**32%**

Americas  
**38%**

APAC  
**29%**

2017 R&D

investments  
were

**11.9%**

of net  
sales

**20%**

of employees  
work in R&D  
activities


Committed to using

**100%**

renewable  
electricity by

**2020**





# 13x the people

## 28 more offices in 15 more countries



Serves  
customers

in over

# 150

countries  
annually

2017 net sales

# 332.6

million  
euros

EMEA  
32%

Americas  
38%

APAC  
29%

2017 R&D

investments  
were

# 11.9%

of net  
sales

# 20%

of employees  
work in R&D  
activities

Committed to using

# 100%

renewable  
electricity by


# 2020





13x the people

28 more offices in 15  
more countries



Serving customers in  
98 more countries

2017 net sales

**332.6** million  
euros

EMEA  
**32%**

Americas  
**38%**

APAC  
**29%**

2017 R&D

investments  
were

**11.9%**

of net  
sales

**20%**

of employees  
work in R&D  
activities

Committed to using

**100%**

renewable  
electricity by

**2020**





13x the people

28 more offices in 15  
more countries

Serving customers in  
98 more countries

11x the turnover

2017 R&D  
investments  
were

**11.9%**

of net  
sales

**20%**

of employees  
work in R&D  
activities

Committed to using

**100%**

renewable  
electricity by


**2020**





13x the people

28 more offices in 15  
more countries



Serving customers in  
98 more countries

11x the turnover

Same R&D focus

Committed to using

**100%**

renewable  
electricity by

**2020**





13x the people

28 more offices in 15  
more countries

Serving customers in  
98 more countries

11x the turnover

Same R&D focus

Same passion about  
the environment



# Leosphere brings the complete range of Lidar systems

## WINDCUBE

### Vertical Profiler Lidar



- Ranges: 40 to 200+ meters
- 12 user defined range gates
- Speed Accuracy : 0,1 m/s
- Buoy version

## WINDCUBE

### 360° Long Range Scanning Lidar



- Ranges: 3km / 6km / 10km
- Up to 320 range gates
- Speed Accuracy : 0,1 m/s
- Configurable scanning patterns

## WIND IRIS

### Turbine-mounted Lidar



- Range: 50 to 450+ meters
- 10 user defined range gates
- Speed Accuracy : 0,1 m/s
- Hub Height measurement

## WIND IRIS

### Feed Forward Turbine Control Lidar



- Range: 50 to 200+ meters
- 10 user defined range gates
- Integrated to turbine control system

## GROUND BASED

## NACELLE MOUNTED

# More complementary than competitive with Sodar according to DNV

## SODAR – Acoustic based remote sensor

= **SO**und **D**etection **A**nd **R**anging

### Advantages

- Low power requirements;
- Inexpensive;
- Portable and easy to dispatch without permits.

### Disadvantages

- Potential for echo interactions with trees/structures;
- Possible insect or background noise interference;
- Cannot obtain accurate measurements when precipitation is present;
- Limitations associated with volume versus point averaging;
- Turbulence and gust wind speed measurements;
- Cannot site SODAR directly next to a met mast.



## LIDAR – Laser based remote sensor

= **LI**ght **D**etection **A**nd **R**anging

### Advantages

- Measures valid data in light to moderate precipitation events;
- High data recovery, even at upper heights;
- Portable and easy to dispatch without permits.

### Disadvantages

- Systems contain delicate components;
- Relatively high initial cost (currently);
- May require a special power system for remote applications;
- Limitations associated with volume versus point averaging;
- Turbulence and gust wind speed measurements.







And according to us after some initial discussions

RSD Use Cases / Requirements	SODAR	LIDAR
Near residences		X
Near Turbines		X
High atmospheric absorption		X
Low aerosols / particulates	X	
Frequent low clouds, fog and mist	X	
Customer just prefers LiDAR		X
Higher heights: esp. above 140m		X
Security (theft/vandalism) concerns	X	
Ambient Noise		X
Offshore		X
Rain		X
IEC Power Performance Test		X
Offshore Met Reference Station		X
Nacelle mounted turbine control		X
Turbine Yaw Alignment		X
Turbine Control		X
Heavy snow conditions	X	
Remote + extended extreme Cold	X	



**LEOSPHERE**  
A VAISALA COMPANY

## Contact Us:

Leosphere - 14/16 rue Jean Rostand

91400 Orsay – France

[info@leosphere.com](mailto:info@leosphere.com)

[www.leosphere.com](http://www.leosphere.com)

