

Reducing the Environmental Impact of Radiosonde Observations

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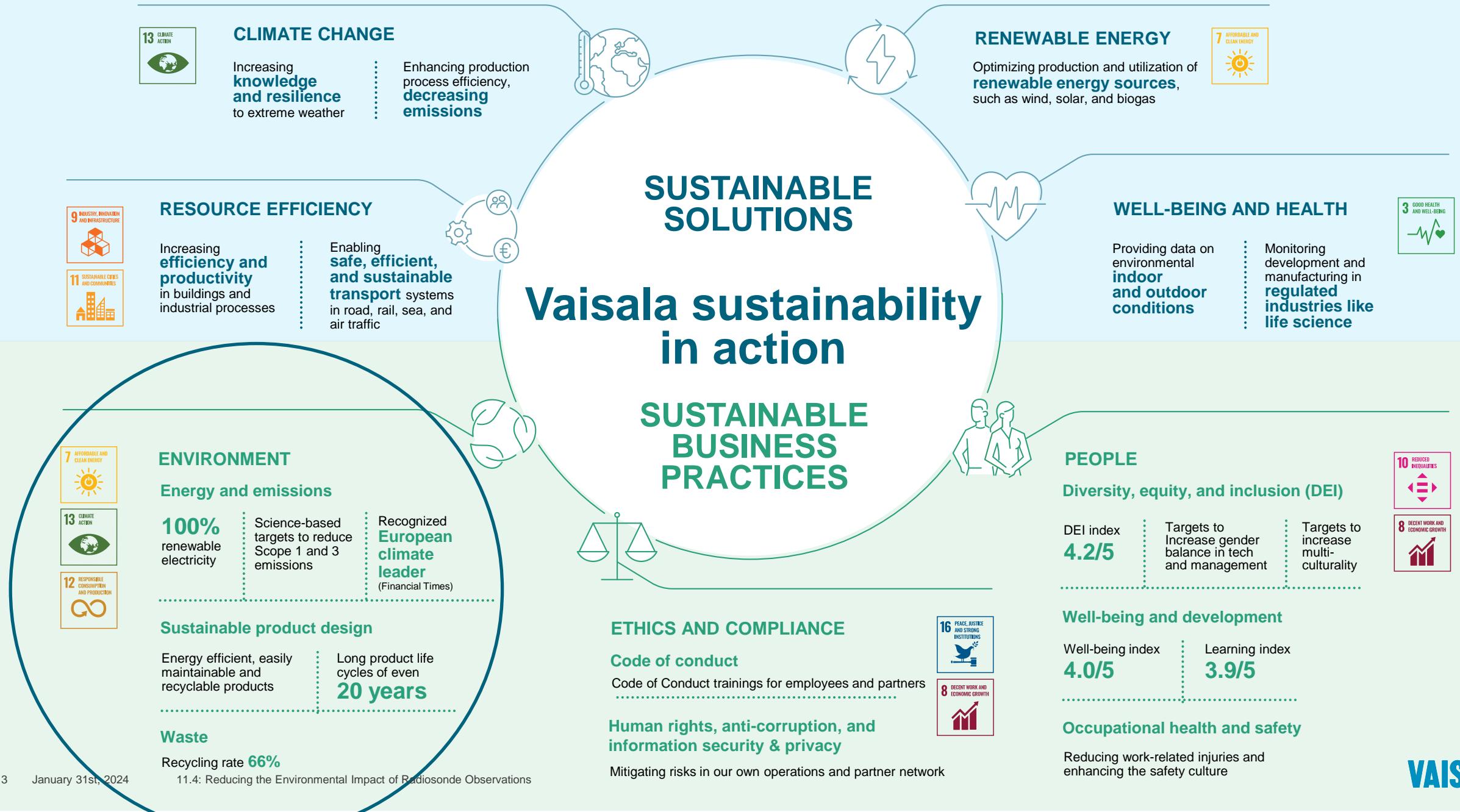
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Agenda

- Introduction
- Vaisala BioCover™ and BioTwine™
- Disintegration and mechanical strength test results
- Comparison of sounding results for BioCover™ and BioTwine™
- Summary and further information



Radiosondes Are Used Everywhere



Terminology should be unambiguous

Bio-based

- Refers to the source of the material only, bio-based is not interchangeable with biodegradable

Biodegradable

- Material degrades over a period of time in natural environment to the base substances such as water, carbon dioxide, methane, basic elements and biomass

Microplastic

- Plastic particles with the size less than 5 mm (0.20 in) in length, that remain in the nature after disintegration



RS41 E-models with Vaisala BioCover™

- Bio-based, compostable, and plastic-free materials (cover, insulation)
- Biodegradable mechanical parts (cover, insulation, fasteners, string pin)
- Reliable and accurate observations, performance verified in soundings



RS41-SGE vs standard RS41-SG

- Reduction of non-biodegradable plastic is 66%
- Weight increase from 80 g of standard RS41 to 90 g of RS41-SGE
- Negligible changes in dimensions
- The unwinder body and battery holder remain from conventional plastics



Introduction to Vaisala BioTwine™

- Biodegradable material
- No microplastics after the disintegration
- Made from cellulose-based fiber
- Closed manufacturing process where 99% of organic solvent can be recovered and reused

Four test environments for BioCover and BioTwine



Home compost

Freshwater

Grassy terrain

Baltic Sea

Predictions of complete disintegration times in different environments for BioCover

Environment	Cover	Insulation	Fasteners and unwinder pin
Home compost	8 months	4 months	15 months
Freshwater, temperature < 5 °C	50 months	8 months	19 months
Grassy terrain	27 months	3 months	5 years
Baltic Sea	17 months	< 1 month	

Results of twine comparisons mechanical strength

Material	PP (kg)	Cotton (kg)	Biodegradable twine (kg)
Dry	11.54	11.63	8.48
Wet	9.24	13.74	7.03
Compost 5 months	6.87	-	1.26
Freshwater 5 months	5.77	-	2.12
Terrain 7 months	-	7.55	1.91
Baltic Sea 1 month	-	7.20	1.86
Baltic Sea 8 months	-	3.01	0.46



RS41 E-models Comparison Sounding Results

Carried tests

- RS41 E-model vs. standard RS41 with EPS covers
- Flight comparisons between unwinders with biodegradable twine (right) and polypropylene string (left)
- Based on comparison soundings the change to BioCover™ or BioTwine™ does not have any impact on the measurement performance of RS41
- Technical Paper available on the test results





Summary

- Reducing the environmental impact of soundings is important as radiosondes are used everywhere
- RS41 E-models with BioCover™ and BioTwine™ are an industry first in biodegradable materials
- Disintegration and mechanical strength have been tested in four different environments
- Based on comparison soundings the change to BioCover™ or BioTwine™ does not have any impact on the measurement performance of RS41

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