

Wind Power and Renewables Division Facts at a glance



Siemens Wind Power facts

One of the world's leading suppliers of wind power solutions

Acquired Danish wind turbine manufacturer Bonus Energy A/S in 2004

Installed Base: > 16,800 turbines with ~ 32,400 MW capacity

Installed in FY 2015: > 1,970 turbines with > 5.6 GW capacity

~12,800 employees globally incl. Wind Service

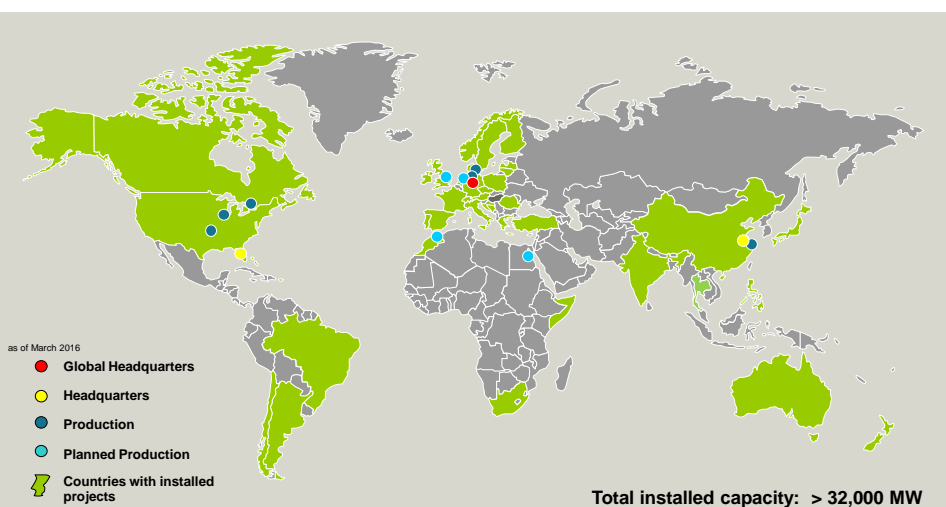
Revenue in FY 2015: € 5.7 billion

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A global business, with >16,000 turbines installed in >40 countries




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Four product platforms in our product portfolio



Platforms			
Siemens G2 Platform	Siemens D3 Platform	Siemens G4 Platform	Siemens D7 Platform
Products			
SWT-2.3-101 SWT-2.3-108 SWT-2.3-120	SWT-3.0-101/108/113/130 SWT-3.2-101/108/113 SWT-3.3-130 SWT-3.4-108	SWT-3.6-120 SWT-4.0-120 SWT-4.0-130	SWT-6.0-154 SWT-7.0-154
Feature level			
e.g. Net Converter, Scada, TLM			



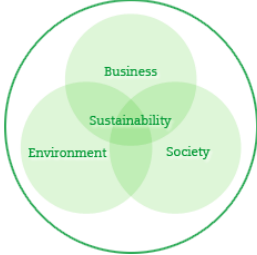
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Sustainability at Siemens - Part of the Business Strategy



Sustainable development is the cornerstone of all Siemens' activities

- Responsible use of natural resources
- Targeted investments in future-oriented technologies
- Company ethic with integrity at the center of business operations



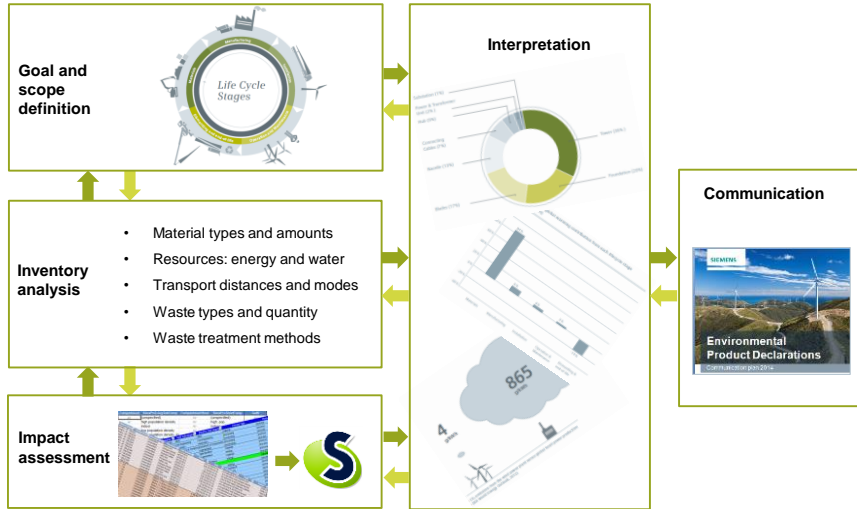
Top placements in international sustainability rankings and ratings

- Number 1 on Dow Jones Sustainability index
- 99 out of 100 possible points in the Carbon Disclosure Leadership Index 2014

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LCAs as the basis for understanding our products

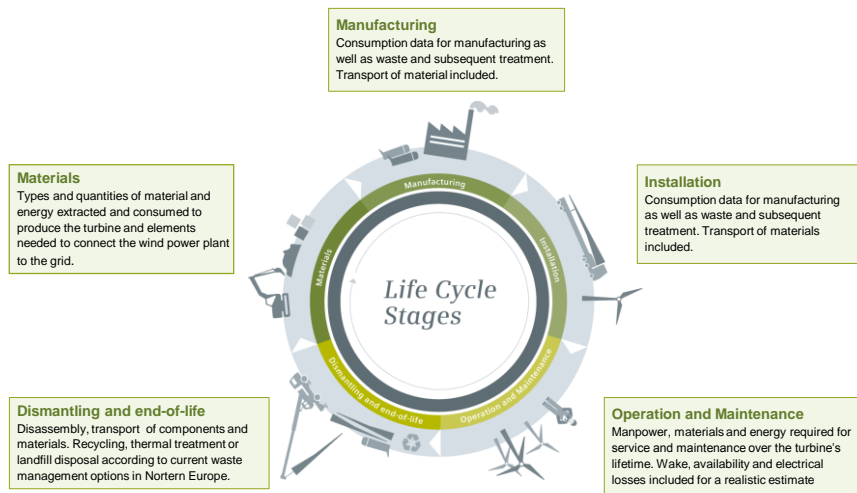


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All phases of the life cycle were assessed



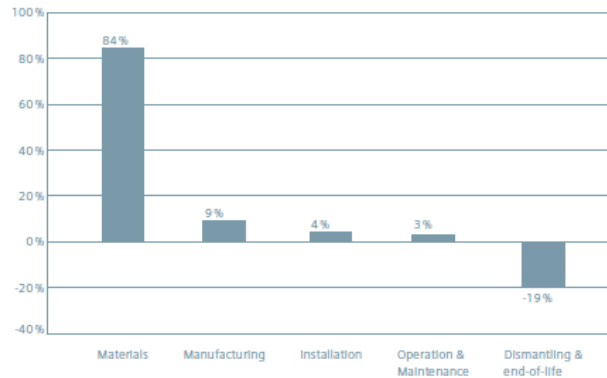
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Impact from the different life cycle phases

Percentage of global warming contribution from each life cycle stage (g CO₂e/kWh)



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Circular economy – an excellent opportunity

	Stage 1: Inactive	Stage 2: Reactive	Stage 3: Active	Stage 4: Proactive	Stage 5: Integral
External positioning of sustainability	Prevent condemnation	Advertising	Pollution prevention	Product stewardship	Sustainable transition
External driving force	Minimise negative publicity	Consumer awareness	Minimise emissions, effluents and wastes	Minimise life-cycle cost of products	Differentiation and resource scarcity
Competitive advantage	-	New consumers	Cost reduction	Pre-empt competitors	Future position
Internal positioning of sustainability	Legal department	Communication department	Sustainability department	R&D	Strategy, innovation
Organisational capabilities needed	Legal	Marketing and communications	Technical (internal) and operational excellence	Technical (external) and strategic	Innovation
Phase of Sustainability Agenda	Compliance	Competition		Market Creation	
Approach	Linear				Circular

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Source: Bocken et al, 2016

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Looking at other industries



Automotives	Aircraft	Shipping
1 billion automotives in 2010 – Lifetime 10-12 years	Design life time 20-30 years	Life time of 20 to 30 years
Lots of different parts and material (alloys, composites, etc)	Lots of different parts and material (alloys, composites, etc)	Lots of different parts and material (alloys, composites, etc)
56 million ton end-of-life per year (5 % of World's waste scrap)	Estimates of 500-600 planes per year	Expected 10 to 15 millions tons
ELV directive in 2010	Process for Advanced Management of End-of-Life Aircraft (PAMELA) and industrial standards	<ul style="list-style-type: none"> •2004: IMO adopts 'Guideline on Ship Regulation' voluntarily Recommends 'Green passport' •2009: IMO adopts the Hong Kong Convention Requirement: Inventory of Hazardous Materials
Internal Dismantling Information System (20.000 parts)	Documentation logs	Compliance data exchange (CDX) system – build on automotive system
Recovery rates up to 95%	Documentation improves recycling rates from 60% → 85%	Expected 10% increase in recycling value (Example: 6 million USD per Maersk Triple-E)
Reductions of hazardous substances	Better control of hazardous materials	Expected better control of hazardous materials

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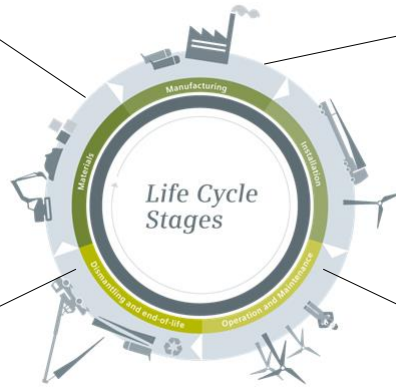
Lessons learned



- A verified record of materials used in the construction can increase its value
- Increased transparency and traceability improves supply chain relationships, and opportunities for remanufacture, reuse and higher salvage value
- Starting from scratch is a HUGE task
 - Commercial sensitivity, a lot of suppliers, awareness and interest, getting it right
- Ensuring high quality of data requires resources and clearly defined guidelines
- A data reporting tool (software) is essential in complex data management
- It took the car industry 5 years to get close to 100% reporting (with legislation!), so commitment is key.

Implications of Product Passport

- Mitigates risk of material scarcity
- Potential to make circular business (take back option)



- Initially raises cost
- Can raise QEHS standards
- Reputational benefits for early adopters
- Greater transparency creates opportunities for reuse and recycling

- Recycling operations can be done more efficiently
- No downgrading of materials

- No costs during operation
- Owner know salvage value and salvage value is (potentially) higher

Where are we now?

- Increased understanding of the complexity
- Aware of (some of) the challenges and benefits related to this
- In the process of assessing customer and supply chain interest
- Hopefully, one step further in our circular economy journey!