WACKER: At a Glance

Facts & Numbers

€930m
EBITDA in 2018

€4,979m
Sales in 2018

18.7%
EBITDA margin in 2018

04
Business Segments

24
Production Sites

14,500
Employees

23
Technical centers
WACKER: An Overview

POLYSILICON
No. 1 in merchant market

SILICONES
No. 2

POLYMERS
No. 1

BIOSOLUTIONS
Leading in niches

Sales FY 2018
€5.0bn

OTHERS
Fact Book 2019: Agenda

- At a glance_p.4
- Strategy_p.9
- SILICONES_p.21
- POLYMERS_p.36
- BIOSOLUTIONS_p.48
- POLYSILICON_p.57
- Sustainability_p.64
- Financials_p.73
## Wacker at a Glance

### Over 100 Years of History

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1914</td>
<td>Foundation of the &quot;Dr. Alexander Wacker Gesellschaft für elektro-chemische Industrie KG&quot;</td>
</tr>
<tr>
<td>1921</td>
<td>Hoechst AG becomes shareholder in Wacker Chemie; providing 50% of the share capital</td>
</tr>
<tr>
<td>1947</td>
<td>Start of work in the area of silicones</td>
</tr>
<tr>
<td>1953</td>
<td>First production of hyper-pure silicon for the semiconductor industry</td>
</tr>
<tr>
<td>1966</td>
<td>Production start of VAC-Ethylene-Copolymer Burghausen, Germany</td>
</tr>
<tr>
<td>1978</td>
<td>Foundation of the Wacker Siltronic Corporation, USA</td>
</tr>
<tr>
<td>1995</td>
<td>Takeover of wafer site in Freiberg, Germany</td>
</tr>
<tr>
<td>1998</td>
<td>Takeover of the silicone site in Nünchritz, Germany; JV with APCI: APP/WPS¹</td>
</tr>
<tr>
<td>2006</td>
<td>Going public; JV with Dow Corning in China; JV Siltronic Samsung Wafer Pte. Ltd.</td>
</tr>
<tr>
<td>2007</td>
<td>Acquisition of outstanding shares of APP/WPS¹</td>
</tr>
<tr>
<td>2010</td>
<td>Takeover of the silicon smelter plant in Norway from Fesil Group</td>
</tr>
<tr>
<td>2012</td>
<td>Inauguration of the new polysilicon plant in Nünchritz, Germany</td>
</tr>
<tr>
<td>2015</td>
<td>Going public of Siltronic; Wacker Chemie AG holds majority with 58%</td>
</tr>
<tr>
<td>2016</td>
<td>Inauguration of the new polysilicon production site at Charleston, Tennessee (USA)</td>
</tr>
<tr>
<td>2017</td>
<td>Deconsolidation of Siltronic, Wacker moves into minority position holding a 30.8% stake</td>
</tr>
<tr>
<td>2018</td>
<td>Acquisition of a production plant for biopharma-ceuticals from SynCo Bio Partners in Amsterdam, NL</td>
</tr>
</tbody>
</table>

¹ APP/WPS = Air Products Polymers/WACKER Polymer Systems
## Wacker at a Glance

### Highly-Integrated Operations Based on Five Key Raw Materials

<table>
<thead>
<tr>
<th>Raw Material</th>
<th>Upstream</th>
<th>Downstream</th>
<th>Customer Industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methanol</td>
<td>Siloxane</td>
<td>Silicones</td>
<td>Chemicals, textiles, consumer care, construction, coatings, manufacturing machinery, energy &amp; electronics, automotive, health care</td>
</tr>
<tr>
<td>Silicon metal</td>
<td>Fumed silica (HDK®)</td>
<td>Polysilicon</td>
<td>Solar and semiconductor wafers, cells and modules</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethylene</td>
<td>Vinyl acetate monomer (VAM)</td>
<td>Vinyl acetate ethylene (VAE)</td>
<td>Adhesives, paints &amp; coatings, carpets, nonwovens &amp; textiles</td>
</tr>
<tr>
<td>Acetic acid</td>
<td></td>
<td>Dispersible polymer powders (DPP)</td>
<td>Construction, renovation, insulation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Polyvinyl acetate (PVAc)</td>
<td>Food, automotive</td>
</tr>
<tr>
<td>Starch/dextrose</td>
<td>Microbial fermentation</td>
<td>Therapeutic proteins, food ingredients</td>
<td>Food, pharma &amp; agro, biopharmaceuticals</td>
</tr>
</tbody>
</table>
WACKER AT A GLANCE
Well Diversified End Market Portfolio

Sales Split by End-market

Sales 2018: €5.0bn

- Smart Construction: 33% (e.g., Walls & Facades, Flooring, Concrete & Masonry, Infrastructure etc.)
- Renewable Energies: 16%
- Energy & Electronics: 12%
- Chemical Industry: 9%
- Textiles: 8%
- Transportation: 6%
- Adhesives: 5%
- Others: 11%

Well Diversified End Market Portfolio

WACKER
WACKER AT A GLANCE

Regional Footprint: Globally Present and Close to Customers

Sales Split per Region

- Europe: 42%
- Americas: 18%
- Asia: 12%
- Other Regions: 5%
- Other Regions: 35%

Employees

FY 2018:

- Europe: 75%
- Americas: 12%
- Asia: 12%
- Other Regions: 5%

Segment Sales 2018

- SILICONES: 100%
- BIOSOLUTIONS: 80%
- POLYMERS: 60%
- POLYSILICON: 40%

Legend:
- Orange: Europe
- Black: Americas
- Grey: Asia
- White: Other Regions
CREATING TOMORROW’S SOLUTIONS

STRATEGY: Managing for Growth and Cash
Targets for the Next Years – Growth and Cash

1. Extend Leverage Phase
2. Continue to Grow Above Chemical Production
3. Focus on Sustainability
4. Sustain Attractive Margins Throughout the Cycle
5. Generate Cash
Target: Extend Leverage Phase with Investment Focus on Chemicals

CapEx vs. Depreciation Expense WACKER Group w/o Siltronic (€m)

<table>
<thead>
<tr>
<th>Year</th>
<th>Polysilicon</th>
<th>Others</th>
<th>Chemicals</th>
<th>CapEx / Sales (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø 2008-2015</td>
<td>Ø17%</td>
<td>7%</td>
<td>7%</td>
<td>9%</td>
</tr>
<tr>
<td>2016</td>
<td>~700</td>
<td>338</td>
<td>325</td>
<td>8%e</td>
</tr>
<tr>
<td>2017</td>
<td>~325</td>
<td>325</td>
<td>325</td>
<td></td>
</tr>
<tr>
<td>2018</td>
<td>~461</td>
<td>461</td>
<td>461</td>
<td></td>
</tr>
<tr>
<td>2019e</td>
<td>~400</td>
<td>400</td>
<td>400</td>
<td></td>
</tr>
</tbody>
</table>

Leverage Phase:
- Group CapEx < Depreciation
- Clear investment focus on Chemicals
Target: Continue to Grow Above Chemical Production

Development of Sales (€bn) – Chemicals Divisions and POLYSILICON

- POLYSILICON
- CHEMICALS +6% CAGR

CAGR +6%
Target: Focus on Sustainability

Raw Materials
- Sustainable Sourcing
  - Product stewardship

Production
- Energy efficiency
  - Integrated cycles - Recycling

Products
- Sustainable Portfolio
  - Enable Sustainable Solutions
Development of Group Earnings (€m) (as reported)

Target: Sustain Attractive Margins Throughout the Cycle

Profitability of Chemicals:
well above the 16% target margin

1) Gross Cash Flow / EBITDA (excluding Siltronic)
Target: Generate Cash

Dividend (€) and Net Debt (€m)

<table>
<thead>
<tr>
<th>Year</th>
<th>Regular dividend</th>
<th>Bonus</th>
<th>Net debt</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>1.50</td>
<td></td>
<td>-1,081</td>
</tr>
<tr>
<td>2015</td>
<td>2.00</td>
<td></td>
<td>-1,074</td>
</tr>
<tr>
<td>2016</td>
<td>2.00</td>
<td></td>
<td>-993</td>
</tr>
<tr>
<td>2017</td>
<td></td>
<td>2.50</td>
<td>-454</td>
</tr>
<tr>
<td>2018</td>
<td></td>
<td></td>
<td>-610</td>
</tr>
</tbody>
</table>

Dividend Yield¹

- 1.7%
- 2.2%
- 2.6%
- 4.0%
- 2.1%

Targets:

- Leverage: 0.5-1.0x EBITDA
- Dividend: 50% of Net income

Leverage

- 1.04
- 1.02
- 1.04
- 0.45
- 0.66

¹) based on average weighted share price
OPERATIONAL EXCELLENCE
Focus on Productivity and Relentless Optimization

Reduce Specific Operating Costs
- Plant utilization levels
- Specific energy consumption
- Raw-material yields
- Labor productivity & maintenance costs

Strong Employee Participation
- 900 employees trained in total at WOS^1 ACADEMY
- Productivity methods, such as Six Sigma and LEAN

Evolution of Operating System

WOS Scorecard 2017
- 6% improvement in labor productivity
- 5% drop in specific maintenance costs
- 3% lower specific energy consumption
- €140m in business value contribution^2

^1 WOS = WACKER Operating System  
^2 2-year reporting period 2017-18
DIGITALIZATION
Further Improving Stability and Efficiency in Production

Digital Operations
Prediction
- Estimate lifetime and maintenance

Condition Monitoring
- Internal view of key equipment

Avoid Surprises
- Anomalies are detected instantly

Soft Sensors
- Process Optimization
## Innovation is Key to WACKER’s Business Strategy

### Innovation Figures

<table>
<thead>
<tr>
<th>Category</th>
<th>Figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>R&amp;D Spend in €m in 2018</td>
<td>165</td>
</tr>
<tr>
<td>Employees in R&amp;D</td>
<td>730</td>
</tr>
<tr>
<td>Active patents</td>
<td>3,900</td>
</tr>
<tr>
<td>Pending patent applications</td>
<td>1,700</td>
</tr>
<tr>
<td>Inventions annually applied for over the last 5 years</td>
<td>85-100</td>
</tr>
<tr>
<td>Scientific collaborations</td>
<td>45</td>
</tr>
</tbody>
</table>

3.3% of 2018 group sales spent in R&D

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### Tomorrow’s Solutions

- New markets & products

### Biotech platforms

- New syntheses & molecules

### Process Development

- Scale-up lab and modelling
- Process improvement

### Chemistry & Formulation

- Profound formulation knowledge
INNOVATION
Our R&D Pipeline Covers a Diverse Range of Applications

New Battery Solutions
- Active anode materials for lithium-ion-batteries
- Silicone based thermal interface materials

Adhesives
- Medical skin adhesives
- Pressure sensitive adhesives for electronics
- Hybrid adhesives

Electronics
- Ready-to-use electroactive silicone laminates
- Silicones for automotive electronics

Sustainable Products
- Biocide-free powder paints
- Silicone fluids and polymer binders made from renewable raw materials

Construction
- Polymer-modified bitumen emulsions
- Reinforced concrete
- Waterproofing membranes

Food / Pharma
- Functional ingredients for food and pharma
- Innovative production systems for biologics
CUSTOMER FOCUS
WACKER ACADEMY – A Global Network for our Customers

- 15 WACKER ACADEMIES
- 8,500 Participants worldwide
- 850 Events Globally

- Customer & Distributor teach-in
- Mix between theory and practice
- Meeting room plus lab
- Direct customer interaction
WACKER SILICONES
An Integrated Global Player with a Leading Market Position

Value Chain

- Raw materials
  - Methanol
  - Quartz
- Upstream
  - Silicon metal
  - Siloxane / polymer
- Downstream
  - Sealants
  - Elastomers
  - Fluids
  - Emulsions
  - Resins
  - Functional silanes
- Customer

Global Footprint

- Production Site
- Technical Center
- Integrated Production Site

Competitive Landscape 2018

- WACKER
- Elkem
- ShinEtsu
- Momentive
- Others

Market Characteristics

- Historic growth rates above worldwide GDP
- High entry barriers (capital and technology)
- Serving diversified end markets through broad market penetration and wide customer base
- Innovation broadens scope of applications

1) WACKER JV participations fully consolidated
**WACKER SILICONES**

**Structural Variety as a Formula for Success**

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**Silicone Fundamentals**

- Non organic silicon-oxygen (Si-O) backbone chain with **organic side groups** (CH₃)

**Extremely Stable**

- Si-O molecule with very **high bonding energy**

**Extremely Versatile**

- Multiple ways to modify structure, side groups and chain length

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**Building Blocks**

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**Silicone Examples**

- Fluids
- Resins
- Antifoam agents
- Textile finishes
- Masonry protection agents
WACKER SILICONES
Silicon – A Material for Unlimited Applications

Broad Spectrum of Adjustable Properties

<table>
<thead>
<tr>
<th>Hydrophilic</th>
<th>Hydrophobic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adhesive</td>
<td>Release</td>
</tr>
<tr>
<td>Electrically conducting</td>
<td>Insulating</td>
</tr>
<tr>
<td>Form stable</td>
<td>Formable</td>
</tr>
</tbody>
</table>

Customized Products with Unique Properties

| UV stability | Long term elasticity |
| Heat stability / resistance | Best-in-class lubrication |
| Chemical resistant | Microbial resistant |
| Softening | Release properties |
| Weather resistant | Surface tension |
| Water-vapor permeable | Water repellent |
Silicones Create Value in Many Industries

Market Structure by Application

Total Silicone Market 2018:
~ €15.4bn

- Energy & Electronics 10%
- Manufacturing Machinery 10%
- Coatings 14%
- Smart Construction 15%
- Consumer Care 15%
- Advanced Processing & Performance Additives 32%
- Automotive 5%
- Health Care 5%

- Defoamers for household, food or process industry
- Release agents for plastics
- Binders for fabrics or textiles
- Impregnating resins

Industry Split; Source: Freedonia, Company Reports, WACKER Estimate
Regional Growth Opportunities: Emerging Markets Catching Up

Silicone Consumption (kg/capita)

Mature Markets
- high silicone consumption

Emerging Markets
- medium silicone consumption

Developing Markets
- low silicone consumption

Source: WACKER Estimate
WACKER SILICONES

Increasing Demand for Silicones in Future Growth Markets

- Comfort
- Urbанизation
- Renewable Energy
- E-Mobility
- Aging Population
- Communication

Hair Care
Cosmetics
Paints
Concrete
Encapsulation
Energy Transmission

Battery
E-Motor
Medical Care
Wound Care
Electronics
Sensors

Transmission

Wound Care

Communication
WACKER SILICONES
Full Portfolio Provider with Focus on Specialties

Full Portfolio Provider

- Backward integrated
- Cost leadership
- Focus on innovation, customers and technical service

Mix Shift Towards Specialties

- High CapEx intensity
- Increasing diversification of products & applications
- High value creation
- Low

Standards

Specialties

Siloxane

Intermediates

Elastomers

Fluids & Emulsions

WACKER SILICONES
Wacker Silicones
A Global Competence Network – Close to our Customers

Munich, Germany
- Corporate R&D

Burghausen, Germany
- Solids and Interface Science
- Central Analytics

Moscow, Russia
- Technical Center Adhesives & Sealants

Adrian / Ann Arbor, USA
- Solutions for Health & Wound Care
- ACEO® Open Print Lab Silicone Rubber

Tsukuba, Japan
- Solutions for Airbag Coatings

Seoul, Korea
- Solutions for Electronics

Shanghai, China
- Solutions for Silicone Rubber
- Competence Centers for Consumer Care
- Competence Center for Cement and Concrete Applications

R&D Center
Technical Center & WACKER ACADEMY
Technical Center
Properties

- **Unique effects**: powder free flow, thermal insulation, rheology control, reinforcement and many more
- A **highly versatile** performance enhancer
- A **safe and consistent** substance, non-hazardous for humans and for the environment

Applications

Beside industrial use, fumed silica applications include:

- Cosmetics & Personal care
- Pharmaceuticals (excipient)
- Food (direct food additive) & Feed
WACKER SILICONES
Fumed Silica HDK® Enables Innovative Insulation Solutions

WACKER Solution: Vacuum Insulation Panels (VIPs) filled with HDK®

- Excellent insulator
- Improved fire safety
- Extremely robust
- Long-term stable
- Re-usable core
- Light weight

Traditional Insulation (e.g. PU, PS, Fiberglass, Mineral wool)

- Flammable and / or Voluminous

Non-Flammable

Space Saving

2cm VIP

Standard insulation panel
“WACKER Silicon Verbund” Enables Competitive Cost Position

- Charleston (TN, USA)
  - Polysilicon
  - Fumed silica
- Nünchritz (Germany)
  - Siloxane
  - Polysilicon
  - Fumed silica
- Burghausen (Germany)
  - Siloxane
  - Polysilicon
  - Fumed silica
- Zhangjiagang (China)
  - Joint Venture with DOW:
    - Siloxane
    - Fumed silica

Verbund sites
Other production sites WACKER SILICONES
WACKER SILICONES

WACKER with Highest Level of Integration in the Industry

Open Loop Silicones & Poly Production

Competitor Processes

- Si
- HCl

CS-Synthesis

- HCl
- Polysilicon
- Waste

Müller-Rochow

- Waste
- Siloxane

Unique Silane-Silicone-Silica Loop

- Si
- MeCl

CS-Synthesis

- HCl
- Polysilicon

HCl Makeup

- NaCl
- Chlorosilane

Methyl Chlorosilane Synthesis

- Methanol
- Organosilane

Müller-Rochow

- Si

Polysilicon

Fumed Silica

Siloxane
## WACKER SILICONES

### Strong Chemistry, Innovation Potential and Set Up

<table>
<thead>
<tr>
<th>A World of Unlimited Potential</th>
<th>Innovative Specialty Portfolio</th>
<th>Unique Silicon Verbund</th>
</tr>
</thead>
<tbody>
<tr>
<td>High performance products for future growth markets</td>
<td>Growth with focus on specialties</td>
<td>Full portfolio provider with benchmark costs</td>
</tr>
</tbody>
</table>
Market Leader in VAE Dispersions and Powders

Value Chain

- Raw Material
  - Ethylene
  - Acetic Acid

- Upstream
  - VAM

- Downstream
  - Dispersions
  - DPP
  - PVAc
  - PVOH

- Key Markets
  - Construction
  - Nonwovens & Textiles
  - Adhesives
  - Carpet
  - Coatings & Paints

VAM = Vinylacetate monomer, PVAc = Polyvinyl acetate, PVOH = Polyvinyl alcohol

Competitive Landscape 2018

Global VAE\(^1\) Dispersions and DPP\(^2\) Market

- WACKER
- Dairen
- Celanese
- Nouryon
- Others

- WACKER
- Dairen
- Nouryon
- Others

Global Footprint

- Dispersion production
- Powder production
- Technical center

Market Characteristics

- Diverse market and customer base
- Historic growth above GDP
- Moderate capital entry barriers and high technology barriers in most segments
- Innovation and in-depth formulating expertise broaden scope of applications

1) VAE = Vinyl acetate ethylene 2) DPP = Dispersible Polymer Powders
VAE Fundamentals

Vinyl acetate  Ethylene

- with ethylene functioning as internal plasticizer, VAE dispersions are waterborne and free of additional solvents

Environmentally friendly solutions

Versatile binders

- with multiple ways to modify (e.g. ethylene content, stabilizing system, etc.)
WACKER POLYMERS
VAE Binders with a Wide Range of Performance Attributes

Features for Consumer & Industrial Applications

- Gloss
- Water repellent
- Color fastness
- Strength
- Absorbency
- Hand feel variety
- Durability
- Adhesion
- Processability

Features for Construction Applications

- Adhesion
- Flexibility
- Leveling/Flow
- Water repellent
- Thixotropic
- Surface quality
- Durability
- Workability
- Mechanical strength
WACKER POLYMERS
Polymer Binders Creating Value in Many Industries

Market Structure by Application

- Smart Construction: Floor Systems
  - e.g.: Tile adhesives
  - Self-leveling compounds

- Smart Construction: Wall Systems
  - ETICS/EIFS: External thermal insulation composite systems

- Adhesives & Sealants

- Paints & Coatings

- Nonwovens, Textiles & Carpet

WACKER POLYMERS 2018

WACKER Sales Split; Source: WACKER Estimate
WACKER POLYMERS
Excellent Performance in a Wide Variety of Applications

**Consumer & Industrial Polymers**

- Printing inks
- Nonwoven
- Heat seal lacquers
- Paper & Packaging
- Industrial coatings
- Carpet
- Paints & Coatings
- Wood & Furniture
- Automotive

**Construction Polymers**

- Tile adhesives
- Insulation systems
- Flooring
- Water proofing membranes
- Plasters
- Skim coat
- Concrete
- Gypsum
- Asphalt
VAE Outgrew Other Polymers in Latex Market in the Last Years

Synthetic Polymer Latex Market\(^1\)
Volume Growth 2011-2016

Global Synthetic Polymer Latex Market 2016

SA = Styrene Acrylics, VAc-copo = Vinyl Acetate Co-Polymers, PVAc = Polyvinyl Acetate, SBL = Styrene Butadiene Latex

\(^1\) Source: Kline 2017


**WACKER POLYMERS**

Growing in Mature Markets and Transforming Emerging Markets

### Enabler in Mature Markets

- Global Ceramic Tiles Market
- Residential New Built
- Commercial New Built
- Others

→ trending towards higher quality

### Enabler in Emerging Markets

1. **Thick bed CTA**
   - Material Savings

2. **Thin bed CTA**
   - Increased Labor Productivity

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¹ CTA = Ceramic Tile Adhesives; Source: Transparency, WACKER Estimate
New Product Opportunity for Paint Industry

**Biocide-Free**
Simply add water just prior to application – no need for adding biocides to avoid spoilage

**Low Weight**
Avoids plastic usage for paint buckets

**Preparation on demand and at precise dosage**

**Ease of Storage**
At challenging climate conditions
**Leading VAE Producer**

- >1,000,000 tons of VAE globally in 2018
- 5 Production Sites
- ~1,600 Employees
- 16 Technical centers

**VAE Dispersions and DPP Tandem**

<table>
<thead>
<tr>
<th></th>
<th>VAE disp.</th>
<th>DPP</th>
<th># of tech centers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global</td>
<td>![VAE disp. icon] + ![DPP icon]</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Americas</td>
<td>✔</td>
<td>✔</td>
<td>5</td>
</tr>
<tr>
<td>Asia-Pacific</td>
<td>✔</td>
<td>✔</td>
<td>7</td>
</tr>
<tr>
<td>EMEA</td>
<td>✔</td>
<td>✔</td>
<td>4</td>
</tr>
</tbody>
</table>

- Only producer with production sites for VAE dispersions and DPP in Americas, Europe and Asia
WACKER POLYMERS
Continuously Expanding Footprint

Latest Capacity Expansions

- **2015**
  - VAE dispersions
  - USA

- **2015**
  - Polymer powder
  - Germany

- **2015**
  - Special monomers
  - Germany

- **2017**
  - VAE dispersions
  - Germany

- **2013**
  - VAE dispersions
  - South Korea

- **2014**
  - Polymer powder
  - China

- **2018**
  - VAE dispersions
  - China

- **2019**
  - Polymer powder
  - South Korea

- **2020**
  - VAE dispersions
  - South Korea
Global Footprint of Technical Centers

Technical Center Istanbul (November 2017)

Technical Center Jakarta (May 2017)

Technical Center Bengaluru (August 2019)

Technical Center WACKER POLYMERS
WACKER POLYMERS

Growth via Customer Focus, Substitution and Innovation

Customer Focus

Global presence with production and technical centers

Substitution

Value based substitution & transformation towards higher building standards

Innovation

Sustainable binder solutions for target markets
WACKER BIOSOLUTIONS
Focusing on Fast-Growing Markets

Value Chain

**Raw Materials**
- Starch/Dextrose
- Ethylene
- Acetic Acid

**Upstream**
- Biologics
- Cyclodextrins / Cysteine
- Gumbase
- Ketene
- Chem. Intermed.

**Downstream**

**Key Markets**
- Biopharmaceuticals
- Life Sciences
- Food & Flavor
- Pharma & Agro

Sales Split

**Food**
- Nutrition/Bioprocessing
  - Cyclodextrins and CD-complexes, Cysteine as food ingredient
- Gumbase
  - Gumbase resin for chewing gum production

**Biopharmaceuticals**
- Drugs
  - Custom manufacturing of biologics with strong technology, fill & finish

**Pharma & Agro**
- Life Sciences
  - Building blocks for drugs or pesticides, auxiliaries and excipients for pharma
WACKER BIOSOLUTIONS

Biopharmaceuticals and Nutrition are Strategic Growth Areas

Accelerated Growth

Biopharmaceuticals

- Service business
- Process development
- Genetic modification, fermentation, purification, fill & finish

Nutrition/Bioprocessing

- Dietary Supplements
- Cysteine for bakery and flavors
- Cyclodextrins for food and household applications

Organic Growth

Pharma & Agro

- Cyclodextrins for pharma, industrial and agro applications
- Cysteine for Pharma
- Acetyl acetone and fine chemicals

Gum

- PVAc$^1$ for gumbase
- Copolymers for innovative products

$^1$ PVAc = Polyvinyl acetate
WACKER BIOSOLUTIONS
Establishing a Fast Growing Biopharmaceuticals Business

Established by R&D and Acquisitions

- 2005: ProThera (Jena)
- 2014: Scil Proteins Production (Halle)
- 2018: SynCo Biopartners (Amsterdam)

Biopharmaceuticals Sales Growth

Business Model

Drug Development → Drug Substance Manufacturing → Formulation → Marketing & Sales

Rationale

- Strengthened position as microbial contract manufacturer globally
- SynCo transaction doubled WACKER Biotech’s fermentation capacity for pharmaceutical actives
- Leverage our proprietary ESETEC® technology
ESETEC® (E.coli secretion technology)

- ESETEC® reduces the number of process steps
- ESETEC® reduces production costs
- ESETEC® significantly increases yields

Example: Medimmune Project

<table>
<thead>
<tr>
<th>Client system (mammalian)</th>
<th>ESETEC® 2.0</th>
<th>g/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2</td>
<td>2.7</td>
<td></td>
</tr>
</tbody>
</table>

up to 5x lower costs

>10x higher output
Cyclodextrins & Cysteine: The Pillars of Our Nutrition Business

**Cyclodextrin Applications**
- Emulsifier
- Taste masking
- Whip-it
- Curcumin complex
- Soluble fiber
- Vegetable sausages
- Fat-binding fiber
- Bakery

**Cysteine Applications**
- Dough Softening
- Vegetarian Savory Flavor
- Probiotics
- Anti-Fruit Browning

*WACKER BIOSOLUTIONS*
VINNAPAS® Gumbase Resins

- Leading supplier of PVAc\(^1\) to the chewing gum industry with over 60 years of experience
- Two world-scale sites in Germany and China with highest food quality standards

Innovation

CAPIVA® platform for next generation chewing gums:

**CAPIVA® S:** Simplified gum base formulation replacing elastomers and resins

**CAPIVA® C:** New kind of gum made in a cooking process enabling new shaping technologies.

\(^{1}) PVAc = Polyvinyl acetate
**WACKER BIOSOLUTIONS**

Pharma & Agro: Profitable Business with Our Ketene Products

---

**Ketene Products**

- Acetic Acid
- Acety1 Acetone (AcAc)

**Acetyl Acetone Downstream**

- Ketene
- Isopropenyl Acetate (IPA)
- 3.5-DMP
- Ca-AcAc

- Acetyl acetone
- Ca-AcAc

- Continuous high temperature process

- Other Metal-AcAc salts for e.g., rubber curing (Co), print applications (Ti), PVC stabilization (Zn)

---

1) Ca-AcAc = Calcium Acetylacetonate
WACKER BIOSOLUTIONS
Well Positioned for Further Growth

Unique Technology Platforms
Develop fast growing biotechnology businesses

Innovative Solutions Partner
Leveraging our know-how, experience and assets

Strong Track Record
Continuous investments in innovation and growth
WACKER POLYSILICON
A Market Leader in Cost and Quality

Value Chain

<table>
<thead>
<tr>
<th>Raw Material</th>
<th>Upstream</th>
<th>Downstream</th>
<th>Key Markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt</td>
<td>Polysilicon</td>
<td>Electronic wafer</td>
<td>Semi-conductors</td>
</tr>
<tr>
<td>Silicon Metal</td>
<td></td>
<td>Solar wafer</td>
<td>Solar Modules</td>
</tr>
<tr>
<td>Hydrogen</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Global Footprint

- Production site and head office
- Sales and application representatives
- Production site

Competitive Landscape 2018

- WACKER
- GCL
- OCI
- Easthope
- Hemlock
- Yongxiang
- Daqo
- Xinte/TBEA
- Others

- ~413kt

Market Characteristics

- PV market growth driven by increasing competitiveness of solar as a source of power
- Excellent product quality is key to highest conversion efficiencies in solar
- Cost and quality are decisive for market success
- Intense competition further drives industry consolidation

Source: Industry announcements; WACKER estimate
WACKER POLYSILICON
Solutions for all Silicon-Crystal-Pulling- and Wafer-Technologies

Product Groups

- Polysilicon chunks
- Polysilicon rods

Various Chip Sizes for Optimized Crucible Filling and Recharging
Solar PV LCOE

- Solar is lowest cost and most scalable form of energy production
- Market shifts from subsidy driven to competitive pricing

Module Output

- Mono (p-type PERC) modules have ~5% more power output
- New technologies (mono n-type HJT) improve output further

Market Share

- Shift to highest efficiency modules continues
- WACKER material is a key enabler to our customer’s processes

* HJT = Heterojunction technology; Source: ITRPV Roadmap, 10th edition, Mar. 2019

Source: LCOE Analysis, v.12, Lazard

60
Market Structure by Application Segment

**Semiconductor**

Volume Growth (CAGR 2015-2018)

~5% Global Silicon Consumption in Semi Market

~25% WACKER Shipments (in tons)

**Polysilicon Market**

2018 ~ €6bn

80%

20%

**Solar**

Market Volume Split (2018)

- Multi: 50%
- Mono: 50%

WACKER Volume Split (2018)

- Multi: 20%
- Mono: 80%

Source: WACKER Estimate; Semiconductor: Gartner
Polysilicon Market Segmentation

- Semi
- Mono n-Type
- Mono PERC
- Mono Standard
- Multi PERC
- Multi Standard

Aggressive Cost Reduction Targets

- Continuous cost reduction at all sites
- Reducing energy consumption
- Optimizing raw materials mix and resource efficiency
- Improving labor productivity etc.

Cash Costs (Index = 100)

<table>
<thead>
<tr>
<th>Year</th>
<th>Value</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>2017</td>
<td>67</td>
<td>&gt;30%</td>
</tr>
<tr>
<td>2021e</td>
<td></td>
<td>&gt;30%</td>
</tr>
</tbody>
</table>

1) without Tennessee
WACKER POLYSILICON
Generate Cash Flow from Strong Assets

Serving High-End Markets
Focus on cost and quality

Aggressive Cost Roadmap
Cost leadership in high quality polysilicon

Fully Invested
Leveraging our assets
Global challenges that WACKER can help overcome

Significant opportunities for our operations

Our guiding principle for innovations

SUSTAINABILITY
Our Contribution to the UN Sustainable Development Goals
**SUSTAINABILITY**

**WACKER’s Integrated Production Helps Avoid CO₂ Emissions**

**Hydrogen Chloride System**

- **Very High Recycling Rates**
  - Integrated production at Burghausen prevents about 1 million metric tons of CO₂eq¹ emissions annually

- **Closed Loops Reduce Waste**
  - Byproducts and waste heat are fed back into production via highly complex material and energy loops

---

¹ CO₂eq=CO₂ equivalent
SUSTAINABILITY
Our Environmental Management Strictly Controls Emissions

**Fewer Dust Emissions**
- Silicon-metal production
- Process optimization
- Reduction of specific dust emissions by 50% since 2012

**Fewer Water Pollutants**
- Wastewater treatment plant
- Emissions of organic pollutants to the Salzach river have decreased by 42% since 2010

**Fewer CO₂ Emissions**
- Ethylene recovery plant
- CO₂ emissions reduced by 6,800 mt per year since 2015
SUSTAINABILITY
We Offer Coatings and Cosmetics Based on Renewable Raws

Polymers with Bio-Acetic Acid

- VINNECO® VAE
  - Performance identical to non-biomass based
  - No reformulation necessary
  - Bio-acetic acid feedstock: cellulose, no competition to food
  - Renewable content available at 60% and 100% based on solids

Silicones with Bio-Methanol

- BELSIL® eco Silicone
  - Same properties as fossil based products
  - Drop-in-solution for customers
  - Bio-methanol feedstock: grass, straw, sugar beets
  - 100% fossil free cosmetic products
SUSTAINABILITY
Our Products Reduce Material Intensity and CO₂ Emissions

Polysilicon for Photovoltaics (PV):

Avoided Emissions Compared to Coal

Emissions along the entire value chain

Generating energy based on national grid mixes

Solution with WACKER solar-poly for photovoltaics

Emissions avoided 466 million mt¹

Binders for Ceramic Tile Adhesives (CTA):

Reduced Materials compared to Thick-Bed CTA

Emissions along the entire value chain

Reference Technology: Thick-bed mortar CTA

Thin-bed mortar CTA using WACKER DPP

Emissions avoided 12 million mt²

¹) over a life span of 30 years with the amount of solar-poly sold in 2017 ²) using the amount of Dispersible Polymer Powder (DPP) produced in 2017
SUSTAINABILITY
Our Products Enable Sustainable Applications and Processes

Antifoam Compounds for Hand Wash

- Reduction in Water Consumption
  - Laundry rinsed with water
  - SILFOAM® reduces water usage by 50%

Sustainable Cysteine Production

- Reduction in Consumption of HCl¹
  - HCl consumption traditional process
  - WACKER process needs less HCl

¹ HCl = Hydrochloric acid; Source: WACKER Estimate
SUSTAINABILITY
Continuously Working on Quantitative EHS and Energy Targets

Safety

- Lost Time Injury Frequency
  - 3.0 in 2016, 2.9 in 2018, 1.7 in 2020
  - Target: 1.7

- Process Safety Incident
  - 1.6 in 2016, 1.7 in 2018, 0.7 in 2020
  - Target: 0.7

Environment

- Specific dust emissions
  - 100% in 2007, 52% in 2018, 50% in 2020
  - Target: 50%

- Spec. rel. VOC\(^1\) / Spec. NO\(_x\)
  - 100% in 2012, 77% in 2018, 75% in 2020
  - Target: 75%

Energy & Climate

- Spec. energy consumption
  - 100% in 2007, 73% in 2018
  - Target: 73%

- Spec. CO\(_2\) emissions
  - 100% in 2012, 88% in 2018
  - Target: 88%

EHS = Environment – Health – Safety; \(^1\) VOC = Volatile Organic Compounds
SUSTAINABILITY
Recognition for Sustainability by Independent Organizations

- WACKER ranked as “Outperformer” by SUSTAINALYTICS in 2017
- “Very strong Environmental Management Systems”

- WACKER received a “GOLD” CSR rating by EcoVadis in 2018
- “The result in all evaluated areas is well above the industry average”

- WACKER ranked with a “B” in CDP’s 2018 climate change ratings

- WACKER ranked with an “A” by MSCI in 2017
- “Corporate governance practices are generally well aligned with shareholder interests”
### FINANCIALS

**FY 2018 and 6M 2019 Results – P&L**

<table>
<thead>
<tr>
<th></th>
<th>FY 2018</th>
<th>FY 2017</th>
<th>% YoY</th>
<th>6M 2019</th>
<th>6M 2018</th>
<th>% YoY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In €m</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales</td>
<td>4,979</td>
<td>4,924</td>
<td>+1%</td>
<td>2,504</td>
<td>2,548</td>
<td>-2%</td>
</tr>
<tr>
<td>EBITDA</td>
<td>930</td>
<td>1,014</td>
<td>-8%</td>
<td>353</td>
<td>515</td>
<td>-32%</td>
</tr>
<tr>
<td>EBITDA margin</td>
<td>18.7%</td>
<td>20.6%</td>
<td>-</td>
<td>14.1%</td>
<td>20.2%</td>
<td>-</td>
</tr>
<tr>
<td>EBIT</td>
<td>390</td>
<td>424</td>
<td>-8%</td>
<td>71</td>
<td>247</td>
<td>-71%</td>
</tr>
<tr>
<td>EBIT margin</td>
<td>7.8%</td>
<td>8.6%</td>
<td>-</td>
<td>2.8%</td>
<td>9.7%</td>
<td>-</td>
</tr>
<tr>
<td>Net income for the period</td>
<td>260</td>
<td>250</td>
<td>+4%</td>
<td>32</td>
<td>163</td>
<td>-81%</td>
</tr>
<tr>
<td>EPS from continuing operations in €</td>
<td>4.95</td>
<td>4.85</td>
<td>+2%</td>
<td>0.52</td>
<td>3.11</td>
<td>-83%</td>
</tr>
<tr>
<td>Capital expenditures</td>
<td>461</td>
<td>327</td>
<td>+41%</td>
<td>202</td>
<td>167</td>
<td>+21%</td>
</tr>
<tr>
<td>Depreciation / amortization</td>
<td>540</td>
<td>590</td>
<td>-9%</td>
<td>282</td>
<td>268</td>
<td>+5%</td>
</tr>
<tr>
<td>Net cash flow from continuing operations</td>
<td>86</td>
<td>358</td>
<td>-65%</td>
<td>-113</td>
<td>51</td>
<td>n.a.</td>
</tr>
</tbody>
</table>
## FINANCIALS

### FY 2018 and 6M 2019 Results – Breakdown by Business

<table>
<thead>
<tr>
<th></th>
<th>FY 2018</th>
<th></th>
<th>FY 2017</th>
<th></th>
<th>6M 2019</th>
<th></th>
<th>6M 2018</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SALES</td>
<td>EBITDA</td>
<td>MARGIN</td>
<td>SALES</td>
<td>EBITDA</td>
<td>MARGIN</td>
<td>SALES</td>
<td>EBITDA</td>
</tr>
<tr>
<td><strong>In €m / %</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemicals</td>
<td>4,009</td>
<td>788</td>
<td>19.7%</td>
<td>3,651</td>
<td>688</td>
<td>18.8%</td>
<td>2,051</td>
<td>358</td>
</tr>
<tr>
<td>SILICONES</td>
<td>2,500</td>
<td>617</td>
<td>24.7%</td>
<td>2,200</td>
<td>445</td>
<td>20.2%</td>
<td>1,255</td>
<td>248</td>
</tr>
<tr>
<td>POLYMERs</td>
<td>1,282</td>
<td>148</td>
<td>11.5%</td>
<td>1,245</td>
<td>206</td>
<td>16.5%</td>
<td>677</td>
<td>97</td>
</tr>
<tr>
<td>BIOSOLUTIONS</td>
<td>227</td>
<td>24</td>
<td>10.4%</td>
<td>206</td>
<td>38</td>
<td>18.2%</td>
<td>119</td>
<td>13</td>
</tr>
<tr>
<td>POLYSILICON</td>
<td>824</td>
<td>72</td>
<td>8.8%</td>
<td>1,124</td>
<td>290</td>
<td>25.8%</td>
<td>381</td>
<td>-30</td>
</tr>
<tr>
<td>Others</td>
<td>171</td>
<td>71</td>
<td>41.4%</td>
<td>169</td>
<td>33</td>
<td>19.3%</td>
<td>83</td>
<td>26</td>
</tr>
<tr>
<td>Consolidation</td>
<td>-24</td>
<td>-1</td>
<td>-</td>
<td>-20</td>
<td>3</td>
<td>-</td>
<td>-11</td>
<td>-1</td>
</tr>
<tr>
<td><strong>WACKER Group</strong></td>
<td>4,979</td>
<td>930</td>
<td>18.7%</td>
<td>4,924</td>
<td>1,014</td>
<td>20.6%</td>
<td>2,504</td>
<td>353</td>
</tr>
</tbody>
</table>

**Note:** The table above provides a breakdown of sales and EBITDA margins for different business segments of the Wacker Group for the fiscal years 2018 and the first half of 2019.
## Key Figures

<table>
<thead>
<tr>
<th></th>
<th>6M 2019</th>
<th>2018</th>
<th>2017</th>
<th>2016&lt;sup&gt;1&lt;/sup&gt;</th>
<th>2015</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>2,504</td>
<td>4,979</td>
<td>4,924</td>
<td>4,634</td>
<td>5,296</td>
<td>4,826</td>
</tr>
<tr>
<td>EBITDA</td>
<td>353</td>
<td>930</td>
<td>1,014</td>
<td>956</td>
<td>1,049</td>
<td>1,042</td>
</tr>
<tr>
<td>EBITDA margin</td>
<td>14.1%</td>
<td>18.7%</td>
<td>20.6%</td>
<td>20.6%</td>
<td>19.8%</td>
<td>21.6%</td>
</tr>
<tr>
<td>EBIT</td>
<td>71</td>
<td>390</td>
<td>424</td>
<td>338</td>
<td>473</td>
<td>443</td>
</tr>
<tr>
<td>EBIT margin</td>
<td>2.8%</td>
<td>7.8%</td>
<td>8.6%</td>
<td>7.3%</td>
<td>8.9%</td>
<td>9.2%</td>
</tr>
<tr>
<td>Net income for the period</td>
<td>32</td>
<td>260</td>
<td>885</td>
<td>189</td>
<td>242</td>
<td>195</td>
</tr>
<tr>
<td>- From continuing operations</td>
<td>32</td>
<td>260</td>
<td>250</td>
<td>178</td>
<td>242</td>
<td>195</td>
</tr>
<tr>
<td>- From discontinued operations</td>
<td>-</td>
<td>-</td>
<td>635</td>
<td>11</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Net cash flow</td>
<td>-113</td>
<td>86</td>
<td>358</td>
<td>361</td>
<td>23</td>
<td>216</td>
</tr>
<tr>
<td>Return on capital employed</td>
<td>-</td>
<td>5.9%</td>
<td>7.5%</td>
<td>5.6%</td>
<td>8.1%</td>
<td>8.4%</td>
</tr>
<tr>
<td>EPS in €</td>
<td>0.52</td>
<td>4.95</td>
<td>17.45</td>
<td>3.61</td>
<td>4.97</td>
<td>4.10</td>
</tr>
<tr>
<td>Dividend per share</td>
<td>-</td>
<td>2.50</td>
<td>4.50</td>
<td>2.00</td>
<td>2.00</td>
<td>1.50</td>
</tr>
<tr>
<td>Dividend yield</td>
<td>-</td>
<td>2.1%</td>
<td>4.0%</td>
<td>2.6%</td>
<td>2.2%</td>
<td>1.7%</td>
</tr>
</tbody>
</table>

<sup>1</sup> Adjusted according to IFRS 5
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Publications

ISIN
DE000WCH8881

WKN
WCH888

Deutsche Börse
WCH

Publication date: October 17, 2019