Dow Ecosystem

"The Materials Science Company"

The Dow Chemical Company
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Midland, MI 48674
Phone: 1-989-636-1000; www.dow.com

Outside Relationships

Regulators | Capital | Suppliers | Customers

Regulators
- Subjects of Regulation and Litigation
- Litigation
  - Union Carbide Asbestos-Related Litigation
- Environmental Protection
  - Pollution Control
  - Greenhouse Gas Emissions
  - Generation, Storage, Handling, Transportation, Treatment, Disposal and Remediation of Hazardous Substances and Waste Materials
- Plastic Waste
  - Bans on Single-Use Plastics and Plastic Straws and Utensils

Capital
- Public Debt Holders
- Commercial Banks

Suppliers
- Derivative Counterparties
  - Commercial Customers
  - Banks
- Joint Ventures
  - SCG-Dow Group (50% JV) *Polyethylene, Polystyrene, Styrene, Latex and Specialty Elastomers*
  - EQUATE Petrochemical Co. KSCC (42.5% JV) *Internal Consumption: Ethylene, Polyethylene and Ethylene Glycol End Markets: Monoethylene Glycol, Diethylene Glycol, and Polyethylene Terephthalate Resins*
  - Kuwait Styrene Company (42.5% JV) *Styrene Monomer*
  - The Kuwait Olefins Company KSCC (42.5% JV) *Ethylene and Ethylene Glycol*
  - Sadara Chemical Company (35% JV) *Internal Consumption: Chlorine, Ethylene, Propylene and Aromatics End Markets: Polyethylene, Ethylene Oxide, Propylene Oxide Derivatives, and Isocyanates*
  - Map Ta Phut Olefins Company (32.77% JV) *Propylene and Ethylene*

Customers
- Bond Financing
- Commercial Loans
- Interest Rate and Foreign Currency Swaps
- Crude Oil and Natural Gas Hedges
- Business Regulation
- Chlorine, Ethylene, Polyethylene and Other Feedstock Supplies
- Marketing Services Outside of the Middle East (Sadara pays Marketing Fee)
- Hydro-Carbons and Energy Feedstocks and Other Raw Materials Supplies
- Packaging and Special Plastics Feedstocks and Other Raw Materials Supplies

Illustration: Upstream and Downstream Value Chain Production Processes

Crude Oil-Based
- Raw Material Sourcing
  - Crude Oil Extraction
    - *Crude Oil and Naphtha*
  - Crude Oil Refinement
    - *Feedstocks*
  - Natural Gas Liquids Feedstocks (e.g., ethane and naphtha)
    - *Ethane and Naphtha Sales*

Natural Gas-Based
- Raw Material Sourcing
  - Natural Gas Extraction
    - *Natural Gas*
  - Natural Gas Refinement
    - *Feedstocks*
  - Natural Gas Liquids Feedstocks (e.g., propane)
    - *Propane Sales*

Dow Chemical
- Chemical Processing
  - Crack Ethane and Naphtha (break into smaller molecules)
    - *Ethylene*
  - Polymerization (add catalyst to link molecules together to form polymers/resins)
    - *Polyethylene*
  - Resin Conversion (melt resins, cool and then chop resulting block into pellets (nurdles))
    - *Nurdles Sales*
  - Crack Propane (break into smaller molecules)
    - *Propylene*
  - Polymerization (add catalyst to link molecules together to form polymers/resins)
    - *Polypropylene*
  - Resin Conversion (melt resins, cool and then chop resulting block into pellets (nurdles))
    - *Nurdles Sales*
- Downstream Manufacturing
  - Melt Nurdles
    - *Liquid Nurdles*
  - Mold Liquid into Finished Goods
    - *Sales of Intermediate Goods (beverage bottles, cups, milk jugs, plastic bags, six-pack rings, and tubing)*
  - Melt Nurdles
    - *Liquid Nurdles*
  - Mold Liquid into Finished Goods
    - *Sales of Intermediate Goods (auto parts, industrial fibers, food containers, margarine containers, yogurt pots, syrup bottles, prescription bottles, plastic bottle caps)*
- Consumer Products Manufacturing
  - Incorporate into Consumer Goods or as Packaging
    - *Sales of Finished Goods*
    - End Consumers
  - Incorporate into Consumer Goods or as Packaging
    - *Sales of Finished Goods*
    - End Consumers

Raw Materials Supplies
- For Hydrocarbons and Energy
  - Natural Gas
  - Butane
  - Condensate
  - Ethane
  - Naphtha
  - Propane
- For Packaging and Specialty Plastics
  - Aliphatic Solvent
  - Butane
  - Ethylene
  - Hexene
  - Octene
  - Propylene

Dow Inc. and The Dow Chemical Company (Delaware Corporation)

Debt Structure

Debt ($25.4 Billion @ 12/31/2019) — **Credit Ratings (Long Term Debt): Fitch (BBB+), Moody's (Baa2), S&P (BBB-)**

- 5-Year Competitive Advance Revolver: $5B (Floating Rate)
- Commercial Paper and Short-Term Notes Payable: $586M (Avg. 6.30%)
- Term Loan Facility: $2B (Floating Rate)
- Bilateral Revolving Credit Facilities (11): $2.428B (Floating Rate)
- 2020 Senior Unsecured Notes: $76M (Avg. 8.44%)
- 2021 Senior Unsecured Notes: $174M (Avg. 8.95%)
- 2022 Senior Notes: $1.372B (Avg. 3.50%)
- 2023 Senior Unsecured Notes: $325M (Avg. 7.64%)
- 2024 Senior Unsecured Notes: $1,397B (Avg. 3.37%)
- 2025+ Senior Unsecured Notes: $9,482B (Avg. 5.70%)

Equity Structure

Mkt Cap: $36.48B

- **Common Stock Share Repurchase Program**
  - *Authorized Amount: $3 Billion (No Expiry)*
  - *2019 Repurchases: $500 Million*
  - *Remaining Authority: $2.5 Billion*
- **Common Stock**
  - *Authorized Shares: 5 Billion*
  - *Outstanding Shares: 748,771,240*
  - *Recordholders: 81,546*

Governance

Board of Directors

- Samuel R. Allen (C, G)
- Ajay Banga (C, G)
- Jacqueline K. Barton (EHS)
- James A. Bell (A, G)
- Wesley G. Bush (A, EHS)
- Richard K. Davis (A, G)
- Jeff M. Fettig (C, G),
- Jim Fitterling
- Jacqueline C. Hinman (A, EHS)
- Ruth G. Shaw (C, EHS) (Retired from Service April 2020)
- Daniel W. Yohannes (A, EHS)

Committees Audit (A), Compensation and Leadership Development (C), Corporate Governance(G), and Environment, Health, Safety & Technology (EHS)

Executive Officers

- Chief Executive Officer: Jim Fitterling
- President and Chief Financial Officer: Howard Ungerleider
- President, Feedstocks & Energy: Jack Broodo
- President, Performance Materials & Coatings: Mauro Gregorio
- President, Industrial Intermediates & Infrastructure: Jane Palmieri
- President, Packaging & Specialty Plastics: Diego Donoso
- SVP, Operations—Manufacturing, Engineering and Environment, Health and Safety Operations: Peter Holicki
- SVP, Corporate Development: Torsten Kraef
- SVP, Research & Development and Chief Technology Officer: A.N. Sreeram
- General Counsel and Secretary: Amy E. Wilson
- Chief Human Resources & Inclusion Officer: Karen S. Carter
- Vice President, Chief Information and Digital Officer: Melanie Kalmar

Corporate Matters

Finance
- Finance
- Public Affairs
- Government Affairs
- Information Technology
- Business Services
- Purchasing
- Integrated Supply Chain
- *Accounting/Finance*
- Corporate Tax
- Accounting
- Financial Controls
- Treasury

Research and Development
- New Product Innovation
- New Product Commercialization
- Throughput Experimentation and Analysis

Corporate Development
- Corporate Strategy
- Key Strategic Tracks Implementation
- Enterprise Risk Management
- Strategic Planning
- New Business Incubation
- Corporate Security

Human Resources
- Human Resources Policies
- Human Resources Practices
- Talent
- Recruiting
- Compensation
- Benefits
- Employee Experience
- Diversity and Inclusion

Legal
- Real Estate
- M&A Transactions
- Contract Management
- Employment Law
- Environmental Proceedings
- Business and Tort Litigation
- IP Management
- Corporate Governance
- Securities Law Compliance

Information and Digital
- Global IT Strategy
- Digital Capabilities
- Cyber Security and Risk Management
- Reporting and Advanced Analytics
- Facilities Management
- Global Information Systems
- Dow Business Services

Operations, Manufacturing, Engineering, and EHS
- Operations Leadership Team
- Manufacturing Excellence
- Environment, Health and Safety
- Operations Performance and Productivity

Feedstocks and Energy
- Global Feedstocks Supply and Trading
- Commodity Risk Management
- Energy Operations
- Power Operations
- Steam Operations
- Carbon Reduction and Sustainability

Operations

Key Offices and Manufacturing Sites

- **US and Canada:** Midlands , Michigan (HQ); Pack Studio Locations in Every Geography; 35 Manufacturing Sites (including Kentucky, Louisiana, Michigan, Texas, and Alberta)
- **Asia Pacific:** 19 Manufacturing Sites in 10 Countries (including China and Thailand)
- **Europe, Middle East, Africa, and India:** 37 Manufacturing Sites in 15 Countries (including Germany, Spain, United Kingdom)
- **Latin America:** 18 Manufacturing Sites in 4 Countries (including Argentina and Brazil)

Pack Studio Locations in Every Geography

PACKAGING AND SPECIALTY PLASTICS

Plastics to Customers in Food and Specialty Packaging, Industrial and Consumer Packaging, Health and Hygiene, Caps, Closures and Pipe Applications, Consumer Durables, Automotive, and Infrastructure Markets

2020: Net Sales: *$20.2B (36% of Total)*; Operating EBIT: $2.904B; Equity Earnings: $162M; 16% Decline from 2018 Sales

Hydrocarbons & Energy

Produces Ethylene for Use in Packaging and Specialties Products Segment

Key Markets

Applications and Markets
- Purchaser of Feedstocks
- Energy for Use in Global Operations
- Production of Hydrocarbon Monomers for Use in Dow Chemicals' Derivative Businesses

Competitors
- Chevron Phillips Chemical
- ExxonMobil
- INEOS
- LyondellBasell
- SABIC
- Shell
- Sinopec

Major Products
- Ethylene
- Propylene
- Benzene
- Butadiene
- Octene
- Aromatics Co-Products
- Other Utilities
- Power
- Steam

Packaging and Specialty Plastics

Industry's Broadest Polyolefin Product Portfolio for Plastics

Key Markets

Applications and Markets
- Adhesives
- Automotive
- Caps, Closures and Pipe Applications
- Construction
- Cosmetics
- Electrical Transmission and Distribution
- Food and Supply Chain Packaging
- Footwear
- Health and Hygiene
- Housewares
- Industrial Specialty Applications Using Polyolefin Elastomers, Ethylene Copolymers, and Ethylene Propylene Diene Monomer (EPDM) Elastomers
- Irrigation Pipe
- Photovoltaic Encapsulants
- Sporting Goods
- Telecom Infrastructure
- Toys and Infant Products

Competitors
- Borealis
- ExxonMobil
- INEOS
- Lanxess
- LyondellBasell
- NOVA
- SABIC

Major Products
- Acrylics
- Bio-Based Plasticizers
- Copolymers
- Elastomers
- Ethylene Copolymer Resins
- EPDM
- Ethylene Vinyl Acetate
- Methacrylic Acid Copolymer Resins
- Polyethylene
- High Density Polyethylene
- Low Density Polyethylene
- Polyolefin Plastomers
- Resin Additives and Modifiers
- Semi-Conductive & Jacketing Compound Solutions
- Wire and Cable Insulation

INDUSTRIAL INTERMEDIATES AND INFRASTRUCTURE

Produce and Market Ethylene Oxide and Propylene Oxide Derivatives to Serve Appliances, Coatings, Adhesives, Lubricants, Building and Construction, Infrastructure, and Oil and Gas Market Segments

2020: Net Sales: *$13.44B (13% of Total)*; Operating EBIT: $845M; Equity Earnings: -$241; 13% Decline from 2018 Sales

Industrial Solutions

Produces Intermediate Chemicals Needed for Manufacturing Processes (e.g., Minimize Friction and Heat, Manage Oil and Water Interface, Facilitate Dissolvability, and Enable Product Identification)

Key Markets

Applications and Markets
- Agriculture Crop Protection
- Aircraft Deicing
- Solvents for Coatings
- Heat Transfer Fluids for Concentrated Solar Power
- Construction
- Solvents for Electronics Processing
- Food Preservation
- Fuel Markers
- Home and Personal Care
- Infrastructure Applications
- Lubricant Additives
- Paper, Transportation and Utilities
- Products for Energy Markets, e.g., Exploration, Production, Transmission, Refining, Mining, and Gas Processing to Optimize Supply, Improve Efficiencies and Manage Emissions

Competitors
- BASF
- Eastman
- Hexion
- Huntsman
- INEOS
- LyondellBasell
- SABIC
- Sasol
- Shell

Major Products
- Acetone Derivatives
- Butyl Glycol Ethers
- VERSENE Chelants
- Ethanolamines
- Ethylene Oxide
- UCON Fluids
- Glycol Ethers
- UCARTHERM Heat Transfer Fluids
- UCAR Deicing Fluids
- Isopropano-lamines
- Low-VOC Solvents
- Methoxypoly-ethylene Glycol
- Higher Glycols
- CARBOWAX SENTRY Polyethylene Glycol
- TERGITOL and TRITON Surfactants
- Methyl Isobutyl
- Polyalkylene Glycol
- Demulsifiers
- Scale Inhibitors
- Drilling and Completion Fluids
- Heat Transfer Fluids
- Rheology Modifiers
- Surfactants
- CARBOWAX SENTRY Polyethylene Glycol
- CARBOWAX SENTRY Polyethylene Glycol
- Specialty Amine Solvents
- TERGITOL and TRITON Surfactants
- Water Clarifiers
- Frothing Separating Agents

Polyurethanes & Construction Chemicals

Polyurethanes, Chlor-Alkali and Vinyl, and Construction Chemicals

Key Markets

Applications and Markets
- Aircraft Deicing Fluids
- Alumina
- Pulp and Paper
- Appliances
- Automotive
- Bedding
- Building and Construction
- Flooring
- Footwear
- Heat Transfer Fluids
- Hydraulic Fluids
- Infrastructure
- Packaging
- Textiles and Transportation
- Construction
- Caulks and Sealants
- Cement-Based Tile Adhesives
- Concrete Solutions
- Elastomeric Roof Coatings
- Industrial Non-Wovens
- Plasters and Renders
- Roof Tiles and Siding
- Sport Grounds and Tape Joint Compounds

Competitors
- Arkema
- Ashland
- BASF
- Covestro
- Eastman
- Huntsman
- INEOS
- Olin
- Owens-Corning
- Yantai Wanhua

Major Products
- Aniline
- Caustic Soda
- Ethylene Dichloride
- Methylene Diphenyl Diisocyanate
- Polyether Polyols
- Propylene Oxide
- Propylene Glycol
- Polyurethane Systems
- Toluene Diisocyanate
- Vinyl Chloride Monomer
- DOW Latex Powder
- AQUASET Acrylic Thermosetting Resins
- RHOPLEX and PRIMAL Acrylic Emulsion Polymers
- WALOCEL Cellulose Fibers

PERFORMANCE MATERIALS & COATINGS

Uses Dows Acrylics-, Cellulosics- and Silicone-Based Technology Platforms to Serve Architectural and Industrial Coatings, Home Care, and Personal Care End Markets

2020: Net Sales: $8.92B *(51% of Total)*; Operating EBIT: $918M; Equity Earnings: $5M; 9% Decline from 2018 Sales

Coatings & Performance Monomers

Enhance Performance of Paint and Coatings, and Acrylics-Based Building Blocks to Produce Personal and Home Care Products

Key Markets

Applications and Markets
- Acrylic Binders for Architectural Paints and Coatings
- Industrial Coatings and Paper
- Adhesives
- Dispersants
- Impact Modifiers
- Inks and Paints
- Opacifiers and Surfactants for Architectural and Industrial Applications
- Plastic Additives
- Processing Aids
- Protective and Functional Coatings
- Rheology Modifiers

Competitors
- Arkema
- BASF
- Celanese
- Evonik
- LyondellBasell
- Wacker Chemie

Major Products
- ACOUSTICRYL Liquid-Applied Sound Damping Technology
- Acrylates
- ACROSOL Rheology Modifiers
- AVANSE Acrylic Binders Dichloride
- EVOQUE Pre-Composite Polymer
- Foam Cell Promoters
- FORMASHIELD Acrylic Binder
- High Quality Impact Modifiers
- MAINCOTE Acrylic Epoxy Hybrid
- Methacrylates
- Processing Aids
- RHOPLEX Acrylic Resin
- TAMOL Dispersants
- Vinyl Acetate Monomers
- Weatherable Acrylic Capstock Compounds for Thermoplastic and Thermosetting Materials

Consumer Solutions

Performance Silicone for Consumer Goods, Acrylics for Home and Personal Cleaning, and Silicone Feedstocks for Adhesion, Surface, and Dispersing

Key Markets

Applications and Markets
- Personal Care, Color Cosmetics, Baby Care, Home Care and Specialty Applications with a Key Focus on Hair Care, Skin Care, Sun Care, Cleansing, as well as Fabric, Dish, Floor, Hard Surface and Air Care Applications
- Commercial Glazing
- Electrical and High-Voltage Insulations
- Lamp and Luminaire Modules Assembly
- Oil and Gas
- Paints and Inks
- Release Liners
- Specialty Films and Tapes
- Sporting Goods
- 3D Printing

Competitors
- Elkem
- Momentive
- Shin-Etsu
- Wacker Chemie

Major Products
- Adhesives and Sealants
- Antifoams and Surfactants
- Coatings and Controlled Release
- Coupling Agents and Crosslinkers
- EVOLV3D Printing Technology
- Fluids, Emulsions and Dispersions
- Formulating and Processing Aids
- Granulation and Binders
- Oils
- Polymers and Emollients
- Opacifiers
- Reagents
- Resins, Gels and Powders
- Rheology Modifiers
- Rubber
- Silicone Elastomers
- Solubility Enhancers
- Aerospace Composites
- Surfactants and Solvents
- SILASTIC Silicone Elastomers
- DOWSIL Silicone Products

Ecosystem Flows

Ethylene and Propylene Sales | **Electricity Sales** | **Natural Gas and Electric Power Supplies** | **Plastic Packaging and Specialty Products Sales (e.g., Plastic Bottles, Bags, Clamshell Containers, and Drinking Straws)** | **Ethylene and Propylene Supplies** | **Ethylene Oxide and Propylene Oxide Derivatives, Polyurethane, and Construction Chemicals Sales** | **Raw Materials Supplies for Polyurethane and Construction Chemicals** | **Raw Materials Supplies for Coatings and Performance Monomers** | **Ethylene Oxide and Propylene Oxide Derivatives, Polyurethane, and Construction Chemicals Sales** | **Raw Materials Supplies for Consumer Solutions**

- Downstream Derivative Businesses of Dow Chemical Company
- Electric Utilities
- Plastics Customers: Automotive
- Food and Specialty Packaging
- Consumer Durables
- Health and Hygiene
- Infra-structure
- Caps, Closures and Pipe Applications
- Industrial and Consumer Packaging
- Chemicals Customers
- Home and Personal Care
- Food Preservation
- Building and Construction Companies
- Agricultural Companies
- Airlines
- Transportation
- Performance Materials & Coatings Customers
- Home and Personal Care
- Oil and Gas Businesses
- Sporting Goods
- Paper Producers
- Paint and Ink Companies

Energy Suppliers
- Power Generation Companies
- Natural Gas Producers

Raw Materials Suppliers
- For Industrial Solutions: Ethylene, Propylene
- For Polyurethanes & Construction: Aniline, Propylene Styrene, Aqueous Hydrochloric Acid, Benzene, Carbon Monoxide, Cellulose Chlorine, Cell Effluent, Electric Power, Ethylene, Hydrogen Peroxide

Raw Materials Suppliers
- For Coatings & Performance Monomers: Acetic Acid, Acetone, Acrylic Acid, Propylene, Methyl Methacrylate, Butyl Acrylate, Styrene
- For Consumer Solutions: Hydrochloric Acid, Cellulose Chlorine, Silicon Metal, Platinum, Silica, Methanol, Cell Effluent

Outside Relationships

Customers | Suppliers | Capital | Regulators

Customers
- Securities Regulation and Stock Exchange Listing Rules
- Common Stock Repurchases
- Equity Capital
- Property and Casualty Insurance and Reinsurance
- Professional Services
- Membership in American Chemistry Council
- Pyrolysis Oil Feedstock Supplies (Used for Food Packaging)
- Renewable Naphtha Feedstock Supplies (Used to Produce Polyethylene for Food Packaging)

Capital
- Significant Shareholders
  - Institutional *67.75%*
  - The Vanguard Group *7.67%*
  - Capital Research & Management *6.96%*
  - SSgA Funds Management *4.88%*
  - BlackRock Fund Advisors *4.19%*
  - Geode Capital Management *1.47%*

Suppliers
- Liana Limited Subsidiaries (Captive Insurance Company)
- Professional Services
  - Deloitte & Touche (Audit Services)
  - Kirkland & Ellis (Litigation)
  - Orrick (Litigation)
  - Interpublic Group (Advertising)
- American Chemistry Council, including ExxonMobil, Chevron and Shell (Lobbying Services regarding Use of Plastics and Plastics Waste)
- Key Recycling Collaborations
  - Fuenix Ecogy Group (Plastic Waste Recycling)
  - UPM Biofuels (Plastic Waste Recycling)

Regulators
- Securities Regulators
  - US Securities and Exchange Commission
  - New York Stock Exchange

Key Company Data (as of 12/31/2019)

Operating Results
- Net Sales: $42.95B
- Cost of Sales: $36.7B
- SG&A: $1.59M
- Net Income: -$1.36B

Sales in US and Canada (36%), Europe Middle East & India (34%), and Asia Pacific and Latin America (30%)

Resources
- 36,500 Employees
- 109 Manufacturing Sites and in 31 Countries
- R&D Expense: $765M
- Patents (3,700 US; and 19,100 Foreign)

Cash Flow Items
- From Operations: $5.93B
- From Investing: -$2.19B
- From Financing: -$4.09
- Capex: -$1.96B
- Year End Cash: 2.37B

Share Information
- NYSE Symbol: DOW
- Share Price: $53.83 (12/17/2020)
- Market Cap: $41.298B (12/18/20)
- Annual Dividend: $2.10
- EPS: -$1.84

Balance Sheet Items
- Total Assets: $60.52B
- Current Assets: $16.82B
- Investments: $5.06B
- Property: $21.00B
- Intangibles: $17.66B
- Total Liabilities: $46.43B
- Current Liabilities:$10.68B
- Long Term Debt:$15.98B
- Total Equity: $14.09B

Metrics
- 78% Pro Forma Operating EBITDA-to-Cash Flow Conversion Ratio
- Completed $1.365B Cost Synergy Program; 2020 Operating Expense Reduction Target of $500 million
- Paid down $3B in debt in 2019

Recent/Interesting Developments
- Dow Inc. wholly owns The Dow Chemical Company. They were spun off DowDuPont in April 2019, at which time Dow became a public company and was added to the 30-company Dow Jones Industrial Average
- In July 2020, Dow announced it will cut its workforce by 6%
- Dow's third quarter 2020 revenue of $9.712 billion declined 10% year over year
- 90% of the products consumers use contain plastic

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