This report contains “forward-looking statements” within the meaning of Section 21E of the Securities Exchange Act of 1934. All statements, other than statements of fact, that address activities, events or developments that we or our management intend, expect, project, believe or anticipate will or may occur in the future are forward-looking statements. Forward-looking statements are based on management’s assumptions and assessments in light of past experience and trends, current economic and industry conditions, expected future developments and other relevant factors. They are not guarantees of future performance, and actual results, developments and business decisions may differ from those envisaged by our forward-looking statements. Our forward-looking statements are also subject to risks and uncertainties, which can affect our performance in both the near- and long-term. We identify the principal risks and uncertainties that affect our performance in our Form 10-K and other filings with the Securities and Exchange Commission.
Performance Materials & Technologies
Andreas Kramvis
President & CEO, PMT
PMT Overview

• Great First Half Of 2012
  - 1H Sales Up 14%, Segment Profit Up 18%; Segment Margin 21.2%

• More Difficult UOP Comps In 2H12
  - Catalyst and Licensing Sales Expected to Return to More Moderate Levels

• Confident In FY Outlook, Overdriving Long-Term Targets
  - Well Aligned to Macro Growth Trends

• Operational Excellence A Cornerstone Of Ongoing Success
  - Plants Executing Well, Investing in Future High Return Opportunities

• Technology Leadership Key To PMT Value Proposition
  - Strong Traction From New Product Introductions, Rich Pipeline Fuels Growth
Performance Materials And Technologies

Financials

<table>
<thead>
<tr>
<th>Year</th>
<th>Sales ($B)</th>
<th>Segment Margin %</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>$4.1</td>
<td>14.6%</td>
</tr>
<tr>
<td>2010</td>
<td>$4.7</td>
<td>15.8%</td>
</tr>
<tr>
<td>2011</td>
<td>$5.7</td>
<td>18.4%</td>
</tr>
<tr>
<td>2012E</td>
<td>~$6.1 - $6.3</td>
<td>~18.4%</td>
</tr>
</tbody>
</table>

Recent Highlights

- Delivered Record Performance In 2011 - Segment Profit, Segment Margin, Cash
- Established New Game-Changing Technologies
- Improved Plants With Many Running At Record Levels
- Expanded Global Presence And Sales

Business Units

UOP

Advanced Materials

Geographic Mix

North America

Latin America

EMEA

Asia Pacific

Note: 2011 Sales

Ahead Of Long-Term Targets
A Transformed Business

Now
- Record Profitability
- Strong Mix of Growth Businesses with Strong Position in a Range of Good Industries
- Differentiated Product Line
- Robust NPI Pipeline with Game-Changing Technologies
- Strong Management and Processes
- Global Player, with 58% of Sales Outside U.S.

Then
- Barely Profitable
- Bad Mix of Businesses
- Undifferentiated Products, Competing on Price
- Limited IP Protection and Technology Focus
- Underperforming Management
- Over 76% of Sales in U.S.

Segment Margin

<table>
<thead>
<tr>
<th>Year</th>
<th>Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>1.7%</td>
</tr>
<tr>
<td>2002</td>
<td>2.8%</td>
</tr>
<tr>
<td>2003</td>
<td>4.3%</td>
</tr>
<tr>
<td>2004</td>
<td>5.3%</td>
</tr>
<tr>
<td>2005</td>
<td>7.9%</td>
</tr>
<tr>
<td>2006</td>
<td>12.3%</td>
</tr>
<tr>
<td>2007</td>
<td>13.5%</td>
</tr>
<tr>
<td>2008</td>
<td>13.7%</td>
</tr>
<tr>
<td>2009</td>
<td>14.6%</td>
</tr>
<tr>
<td>2010</td>
<td>15.8%</td>
</tr>
<tr>
<td>2011</td>
<td>18.4%</td>
</tr>
</tbody>
</table>
Outlook By Business

Advanced Materials

(Sales $B, Organic YoY %)

- Good Growth, Volume Leverage From R&C
- 2H Short Cycle Growth Improves
  - Easier 2H Comps From Lower PY Pricing

UOP

- Petrobras FEED Project Completion In 4Q
- Catalyst Sales Return To More Moderate Levels
  - Confluence of Cycles Driving Outsized Growth

Tough UOP Comps 2H12
Strong Management Driving Results

<table>
<thead>
<tr>
<th>Differentiator</th>
<th>Mechanism</th>
<th>Annual Segment Margin, PMT vs. Industry Peers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analytical Capabilities and Innovation Engine</td>
<td>Technology Investments and VPD™ Process</td>
<td></td>
</tr>
<tr>
<td>Plant Performance and Process Technology</td>
<td>HOS and Plant Strategic Plans</td>
<td></td>
</tr>
<tr>
<td>Sales and Marketing Excellence</td>
<td>Global Demand Capture and Sales Force Deployment</td>
<td></td>
</tr>
<tr>
<td>Operating Approach and Leadership</td>
<td>Business Decision Week</td>
<td></td>
</tr>
</tbody>
</table>

![Graph showing annual segment margin, PMT vs. Industry Peers from 2005 to 2011. The graph compares Honeywell, Specialty, and Diversified segments.](image-url)
# Transformed New Product Introductions

**Specialty Materials**

*10 Years Ago*

- Limited Metrics
- Stage Gates, But No Business Ownership
- Technology, Rather Than Business, Process
- No Management of Entire Portfolio
- Little Data on R&D and NPI Performance
- Poor Ability to Forecast Sales Impact From NPI
- Little Investment in Game-Changing Technologies

**PMT**

*Today*

- Good Metrics
- Business Leaders Engaged at the Highest Level – CEO and VP/GMs
- True Cross-Functional Engagement
- Value Propositions Guiding Decision Making
- Top-Level Management of Portfolio Ensures Prioritization of Resources
- Enhanced Ability to Forecast Sales Impact From NPI
- Investing in Game-Changing Technologies

---

**Processes And Portfolio Keys To Success**
People

The Right People….   … In The Right Places Globally

• 1,100 Scientists
• ~400 Ph.D.s
• 2,800 Process Engineers
• 3,915 Patents Globally
• 19 Current Inventors with More Than 50 Issued Patents

• 8 Technology Centers of Excellence
• Newest Facilities in India and China, Developing Products/Applications for Local/Global Markets
• Increased Global Process Engineering Capabilities

Recognized Researchers In Their Fields

2012: Dean Rende – Gordon E. Moore Medal
2012: Ben Christolini – ACS Earle B. Barnes Award for Leadership in Chemical Research Management
2011: Gavin Towler – AIChE Fuels & Petrochemicals Division Award
2010: UOP-ENI Green Jet & Diesel team – AIChE Sustainable energy award
2010: Jeff Bricker – ACS National Award for Creative Invention
2009: Rajiv Singh – ACS Schoellkopf Medal Award
2008: Ian Shankland – Perkin Medal
2005: UOP – National Medal of Technology

“Punching Above Our Weight”

• PMT Ranks No. 4 in its Sector for Innovation, Placing it Among Companies of Much Larger Scale and Sales
• Issued Patents At Record Levels
• Invention Disclosures At Record Levels

People A Key Differentiator
Truly Global

- New/Expanded Regional Technical Sales and/or Support
- New/Expanded Technology Development Capabilities
- New/Expanded Procurement Capabilities
- New/Expanded Project Engineering Capabilities

India Technology Center

- Expands Global Research Capabilities For:
  - Refining, Petrochemical
  - Low-Global-Warming Products
  - Nylon and Additives Applications

- First UOP Pilot Plants Outside U.S.

- Close-To-Customer Technology Development

Approaching 50% Of Sales From High Growth Regions In 2012
Summary

- Strong Operating Margins, Outperforming Peers
- Efficient Management Structure, Disciplined Process
- Robust New Product Pipeline, Growing Globally
- Entering High ROI Investment Cycle Due to High Win Rates and Technology Acceptance
UOP Overview

Financials

(Sales $B)

<table>
<thead>
<tr>
<th>Year</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>$1.6</td>
</tr>
<tr>
<td>2012E</td>
<td>$2.1 - 2.2</td>
</tr>
</tbody>
</table>

10-12% CAGR

Products / Markets

- Petrochemicals
- Gas & Hydrogen
- Manufacturing Adsorbents and Aluminas
- Refining

Geographic Mix

<table>
<thead>
<tr>
<th>Region</th>
<th>Sales ($B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latin America</td>
<td>$1.6</td>
</tr>
<tr>
<td>North America</td>
<td>$2.1 - 2.2</td>
</tr>
<tr>
<td>Asia Pacific</td>
<td>$2.1 - 2.2</td>
</tr>
<tr>
<td>EMEA</td>
<td>$2.1 - 2.2</td>
</tr>
</tbody>
</table>

Technology Focus Areas

- **Process Technology and Equipment**
  Licensing, Services And Equipment For Refining, Petrochemical Industries
- **Catalysts, Adsorbents and Specialties**
  Materials For Process Technology And Manufacturing
- **Gas Processing and Hydrogen**
  Technology For Natural Gas Clean-up And Production And Purification Of Hydrogen
- **Renewable Energy and Chemicals**
  Process Technology For Transportation Fuels And Chemicals

Industry-Leading Technology And Solutions
What UOP Does

UOP Creates Knowledge Via Invention And Innovation And Applies It To The Energy Industry

- 1,800 Scientists and Engineers
- 2,600 Active Patents
- Expertise
- Experience
- Process Technology
- Catalysts
- Adsorbents
- Equipment
- Services

Refining
Petrochemicals
Natural Gas
Renewables

More Than 60% Of The Worlds Gasoline And 85% Of Biodegradable Detergents Are Made Using UOP Technology
Customer Project Lifecycle

Market Demand

Decision Point for Customer on Which Technology and Configuration to Use to Meet Market Demand

Study And Basic Engineering Design
$0.5-1B

Engineering, Procurement and Construction

Detailed Design And Construction
$6-8B

Commissioning
$1-2B

Ongoing Asset Maintenance; Studies & Revamps

First Load of Catalysts and Adsorbents; Mechanical Checkout; Start-up

Catalysts and Adsorbents Reloads; Studies and Revamps

Customer Asset Life Cycle

250K Barrels Per Day (BPD) Average Refinery ($10B Capex)

Major Spend; Partners Are Important
Multiple Revenue Points

<table>
<thead>
<tr>
<th>Project Concept</th>
<th>Study and Basic Engineering Design (1-3 years)</th>
<th>Design and Construction (3-4 years)</th>
<th>Commissioning (12-18 months)</th>
<th>Ongoing Services, Revamps, Studies (30-40 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UOP Licenses</td>
<td>UOP Provides Specialized Equipment as Needed</td>
<td>UOP Provides Initial Catalyst / Adsorbents Fill; Start-up and Commissioning Services and Training</td>
<td>UOP Provides Catalyst / Adsorbents Reloads; Ongoing Training and Services; Potential for Asset Revamp</td>
<td></td>
</tr>
<tr>
<td>Process Technology; Completes Design Package; Provides Project Management</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UOP Provides Specialized Equipment as Needed</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Asset Life</th>
</tr>
</thead>
</table>

UOP Revenue

- $50 - $80M
- $60 - $80M
- $15 - $30M
- $300 - $500M
UOP Financial Landscape

Revenue

- Robust Backlog Drives Future Growth
- Revenue Can Be Lumpy Qtr To Qtr
- Product Line Mix Variability
  - Licensing vs. Equipment
- Petrobras FEED Ending In 2012

Order Backlog

Record Backlog Drives Multi-Year Growth

Record Backlog

Q1 '10
Q2 '10
Q3 '10
Q4 '10
Q1 '11
Q2 '11
Q3 '11
Q4 '11
Q1 '12
Q2 '12
$2.1B
Global Customer Base

Note: Presence of company logo does not constitute an endorsement

UOP Serves The World
Why Customers Choose UOP?

- Recognized Leader In Process Technology With History Of Reliability And Excellence
- Strong Portfolio Of Patent-Protected Technologies
- Deep Customer Intimacy
- Continuous R&D To Improve Process / Product Offerings

2003 National Medal of Technology Recipient

“For more than 85 years of sustained technical leadership and innovation for the petroleum refining and petrochemical industries; and for the invention and commercialization of adsorbents, catalysts, process plants, and process technology.”
Winning With Customers

• **Petrobras**: Providing All Of The Process Technology For Two New Maximum Diesel Refineries, As Well As Front-End Engineering And Design

• **Oleflex™**: Won 12 Projects To Produce Propylene From Natural Gas Liquids

• **MTO**: Beachhead Win In China In 2011 And Two More Licenses Now Sold

• **Uniflex™**: First License Sold And High Customer Interest For Bottom-Of-The-Barrel Upgrading Technology

• **IONSIV™**: Applying Materials Expertise To Nuclear Decontamination (Fukushima)

• **Separex™**: Executing Eight FPSOs For Offshore Natural Gas Clean-Up
# UOP Positioning In Energy Supply Chain

<table>
<thead>
<tr>
<th>Input</th>
<th>UOP Technologies</th>
<th>End Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Oil</td>
<td>Process Technology, Catalysts, Equipment And Services For <strong>Fuel</strong> And <strong>Petrochemical Feedstock</strong> Production.</td>
<td>• Gasoline \n• Diesel \n• LPG \n• Petrochemical Feedstock</td>
</tr>
<tr>
<td>Raw Natural Gas</td>
<td>Technologies And Services To <strong>Clean</strong> Natural Gas Prior To Distribution; Technology To Produce <strong>Key Petrochemicals</strong> From Natural Gas Liquids</td>
<td>Natural Gas For Residential, Commercial And Power; Petrochemicals</td>
</tr>
<tr>
<td>Biomass, Natural Oils</td>
<td>Process Technology, Catalysts, Equipment And Services To Produce <strong>Real Fuels</strong> From A Range Of <strong>Biofeedstocks</strong>, From Forest Residuals To Algae.</td>
<td>• Honeywell Green Diesel™ \n• Honeywell Green Jet Fuel™ \n• Oil For Electricity Generation And Transportation Fuels</td>
</tr>
</tbody>
</table>

**Unique Technologies To Boost Supply Of Key Products**
Refining
Rajeev Gautam
President & CEO, UOP
Refining Landscape – Our Position

UOP Business Area

C4-C6 Isomerization Leading Position

Catalytic Reforming Leading Position

Hydrotreating Leading Position

Hydrocracking Leading Position

Fluid Catalytic Cracking Leading Position

Bottoms Upgrading Leading Position

Alkylation Leading Position

Hydrogen Leading Position

End Products

Gasoline

Jet Fuel/Kerosene

Diesel

Fuel Oil

Petrochemical Feedstocks

Crude Oil

Fractionation

Impure H2
Refining Sector Drivers

Refining Opportunity

- Capacity Replacement
- Regional Factors
- Changing Product Mix
- Environ. Reg.

Demand, M BPD

Refining Growth

4 - 5% Growth

Bottom Of The Barrel In BRIC

Significant Demand For Upgrading Technology

Increasing Need For Bottoms Upgrading

Residual Fuel Oil (CAGR - 0.6%)

Refining Capacity Shift To HGR

9 Million Barrels/Day Additions Between 2013-2017

Equivalent Of 36 New Refineries

Fuel Mix Shifting To Diesel – Hydrocracking

40 To 60 Hydrocracking Units Over The Next Five Years

Global Demand, M BPD

Source: © IHS Purvin & Gertz

Shifts In Technology, Demand Drives Refining Growth
Boosting Diesel Yield

### Diesel Demand > Other Fuels

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Forecast Product Demand 2012-2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline</td>
<td></td>
</tr>
<tr>
<td>Diesel</td>
<td>$2,000</td>
</tr>
<tr>
<td>Kero / Jet</td>
<td>$1,000</td>
</tr>
<tr>
<td>Naphtha</td>
<td>$8,000</td>
</tr>
<tr>
<td>Residual Fuel Oil</td>
<td>$5,000</td>
</tr>
</tbody>
</table>

**Source:** © IHS Purvin & Gertz

### UOP Technology Leadership

- **UOP Unicracking™** is highest yield, lowest sulfur diesel technology
  - > 200 units globally
- **UOP Unionfining™** improves quality to meet more stringent fuel regulations
  - > 300 units globally
- **Hydrocracking And Hydrotreating Catalysts** optimize yields and profitability

### Regulation Driving Reduced Sulfur Content

![Graph showing sulfur content over time with various regions represented](source: HART World Refining Fuels Update)

- **Increase in Feedstock Value ($/MT)**: **$270**
- **Incremental Conversion to Higher Value Fuels**: **60%**
- **Customer Value Created**: **$2.3B**

**Source:** HART World Refining Fuels Update
Upgrading Lower Quality Crude

UOP Investor Day – August 2, 2012

Heavy Crude Increasing As Feedstock

UOP Technology Leadership

- **UOP Uniflex™** Delivers **Industry Leading Conversion (90%+)** To Transportation Fuels While Minimizing Residue By-products

- **UOP Residue FCC Process** Cost-Effectively Converts Moderate To Severely Contaminated Feedstocks Into Gasoline

Ability To Refine Provides Margin Lift

Actual Customer Result

- Increase in High-Value Fuel Conversion: 4-6%
- Increase in Refiner Margins: 50%
- Customer Value Created: $300M
Optimized Refinery Configuration

Complex Refinery Advantage

Less Complex, Small: ~$2
More Complex, Large: ~$4
High Demand: ~$5

Source: International Energy Agency

UOP Capabilities

Configuration

Training & Start-Up

State-Of-The-Art Technology

Front-End Engineering Design

Optimized Design

Optimized For Dynamic Inputs and Outputs

✓ Feedstock Type, Quality and Cost
✓ Output Demand and Price
✓ Regulatory Changes
✓ Environmental Footprint
✓ Schedule and Project Cost

Actual Customer Result

Increase in Refinery Margins vs. Base Design: 20%

Reduction in Construction Cycle Time: 1 yr

Customer Value Created: $2B
Petrochemicals

Mike Millard
VP GM, Catalysts, Specialties, and Adsorbents
Adding Value To Gas And Crude Oil

UOP Well-Positioned With Range Of Technologies To Help Customer Convert Range Of Feedstocks To Higher-Value Products

Petrochemicals A Margin Lift Opportunity
UOP Petrochemical Landscape

UOP Business Area

Aromatics Complex (Leading Position)
- Catalytic Reforming
- Parex
- Isomar

Styrene Production (Leading Position)
- Ethyl-Benzene
- Styrene

Phenol Production (Leading Position)
- Cumene
- Phenol

"On-Purpose" Propylene (Leading Position)
- Oleflex

Detergent Production (Leading Position)
- Molex
- Pacol
- Detal

Intermediates
(Building Blocks for Polymers)

- p-Xylene (Polyester)
- Styrene (Polystyrene)
- Phenol (Polycarbonate)
- Propylene (Polypropylene)
- Linear-Alkyl Benzene

End Products

Plastics and Chemicals

Synthetic Detergents

Strength In Plastics Building Blocks, Detergents
**Para-xylene Demand**

- **7% Growth**

- **Sector Drivers**
  - *Para*-xylene Used To Manufacture Clear Plastic Water Bottles, Polyester, etc.
  - Demand Driven By EM, Primarily China (11% CAGR) And Mid-East (13% CAGR)
  - Additional 12 Million MT Of Capacity Required By 2016 (~15 plants)

**Propylene Supply/Demand**

- **10% Growth** for on-purpose propylene

- **Sector Drivers**
  - Propylene (Olefins) Are Used In The Production Of Polymers Used For Plastics
  - Demand Driven By EM Growth In Packaging And Automotive
  - Traditional Supply Sources Decreasing Due To Use Of Ethane Cracking (vs. Naphtha) In ME
  - Additional 14 Million MT Of Capacity Required By 2016 (~25 plants)
Boosting Petrochemical Yield

Strong Demand For Para-xylene

Polyester Fibers
Globalization And Shift To Synthetics From Natural Fibers

P.E.T. Bottles
Globalization And Penetration Into Existing Non-plastic Applications

UOP Technology Leadership

✓ World Leader In Para-Xylene Technology With Large Global Installed Base
✓ Continuous Upgrade Of Catalyst To Improve Customer Economics
✓ Lowest Cost, Most Energy-efficient Para-xylene Technology With Largest Single Train In Operation

Margin Lift For Customers

Market Value $

$600 / ton
$450 / ton

Crude Oil
Transportation Fuels
Para-xylene (P-X)

Actual Customer Result

Increase in Feedstock Value ($/MT)
$450

Improvement in Energy Efficiency
30%

Customer Value Created
$450M
Meeting Propylene Demand

Unique UOP Path To Propylene

Traditional Route to Propylene
Crude → Naphtha or Gas Oil → Propylene

Unique UOP Oleflex Technology
Gas Field → Propane → On-purpose Propylene

Margin Lift For Customers

~$550 / ton

UOP Technology Leadership

✓ World Leader In On-purpose Propylene (Oleflex™) Technology With Largest Installed Base

✓ Lowest Cost, Most Energy-efficient Technology With Largest Single Train In Basic Engineering Design

Actual Customer Result

Increase in Feedstock Value ($/MT) $550
Improvement in Energy Efficiency 30%
Customer Value Created $200M

Honeywell
Innovation Drives Customer Return

Innovation Drives Value for Customer and Revenue for UOP

R-264 Platforming Catalyst
- +18% more feed
- Now in 50+ operating units

ADS-37 Adsorbent
- +6% PX capacity
- Now in 31 operating units

I-400 Catalyst
- +20% throughput
- Now in 10 operating units

I-350 Catalyst
- Improved stability
- Now in 5 operating units

TA-20HP Catalyst
- Greater stability, better Bz
- Now in 3 units

TA-30 Catalyst
- Successful commercialization
- Higher stability and ring retention

Largest Single Train
- UOP Parex™ unit started-up
- Energy Efficiency
- In design and construction

ADS-47 Adsorbent
- Over 20% throughput
- Commercialized in Oct 2011

I-400 Catalyst
- Improved stability
- Now in 5 operating units

High Capacity Revamp
- +6-10% PX capacity
- 7 units revamped

TA-20HP Catalyst
- Successful commercialization
- Higher stability and ring retention

Competitive Edge Through High Value Asset Management

Customer ROI

Base ROI

+15% ROI

Net energy required
Reduced by 1/3 vs.
Best 2009 designs

+22% ROI

Additional 14%+
Energy Reduction vs
Best 2010 design

+30% ROI

High Yield Catalysts
- R-284 UOP Platforming™ Catalyst
- New UOP Isomar™ Catalyst
- New UOP Tatoray™ Catalyst
**Innovation: New Routes To Olefins**

### Next-Gen UOP Path to Olefins

<table>
<thead>
<tr>
<th>Traditional Route to Olefins</th>
<th>Unique UOP MTO Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude → Naphtha or Gas Oil → Olefins</td>
<td>Coal → Methanol → Olefins</td>
</tr>
</tbody>
</table>

### Margin Lift for Customers

<table>
<thead>
<tr>
<th>Market Value $</th>
<th>Coal</th>
<th>Methanol</th>
<th>Olefins</th>
</tr>
</thead>
<tbody>
<tr>
<td>~$1300 / ton</td>
<td></td>
<td>~$590 / ton</td>
<td></td>
</tr>
</tbody>
</table>

### UOP Technology Leadership

- **✓ UOP Pioneering Methanol-to-Olefin (MTO) Technology To Produce Olefins From Feedstocks Other Than Petroleum**
- **✓ Successful Demonstration** Plant in Belgium with Partner Total Petrochemicals

### Actual Customer Result

<table>
<thead>
<tr>
<th>Increase in Feedstock Value ($/MT)</th>
<th>$590</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduction in Production Costs</td>
<td>40-60%</td>
</tr>
<tr>
<td>Customer Value Created</td>
<td>$450M</td>
</tr>
</tbody>
</table>
Innovation: Nuclear Contamination Clean-Up

IONSIV™ Selective Media

- **Crystalline Materials**
  Selectively Remove Radioactive Ions From Liquids

- **Outperforms Competing Technology By 50 To 100 Times**

- **Lowest Amount Of Waste Generated, Which Minimizes Project Costs**

- **Opportunities To Apply Technologies, Successes At Fukushima To Plants, Operations Elsewhere**

Fukushima Application

**Simplified Active Water Retrieve And Recovery System (SARRY)**

- Large Quantities Of Radioactive Seawater From Reactor Cooling After Earthquake
- Challenging Water Composition
- Highly Successful Project – Nearly 60M Gallons Of Water Treated With 160M Gallons Yet To Be Treated
Gas Processing
Rebecca Liebert
VP GM, Gas Processing and Hydrogen
Global Gas Supply And Demand

North America Remains Separate From Global Markets – But Export Projects Gaining Momentum

South America Is Developing Large Associated Gas Reserves – Imports Continue

Abundant Shale Supply

Strong European Demand

Liquefaction Supply Surge

Strong Demand Growth Across Asia

Significant Resources

Japanese Crisis – Strong Incremental LNG Demand

Large Gas Reserves Ready for Harvest

Emerging Gas Sources, Clean Energy And Changing Regional Flows Require Technology And Innovation To Maximize Gas Monetization
UOP Position In Natural Gas Value Chain

UOP Offerings

Natural Gas Extraction

- Dehydration
- Mercury Removal
- Acid Gas Removal (CO2, H2S)
- Acid Gas
- Sulfur Recovery
- Liquids Recovery
- Fractionation
- Liquefaction
- Sulfur
- Dry Sweet Gas
- LNG
- Raw Natural Gas Liquids
- Ethane
- Propane
- Mixed Butanes
- Natural Gasoline

✓ MOLSIV™
✓ Adsorbents
✓ Separex™ Membrane Systems
✓ Amine Guard™ FS Process
✓ Selexol™ Process
✓ Twister™ Supersonic Separator
✓ Orloff Processes

UOP Petrochemical Technology To Further Convert/Upgrade NGLs

UOP Has Cleanup And Separation Solutions For All Conditions
UOP Separex™ Membrane Systems

Onshore Systems

- Proven, Spiral-Wound Membrane-Based Systems
- Separate And Remove CO₂ From Natural Gas
- Modules Allow For Very Low Installation Cost
- Easy To Operate; High Reliability
- Operates Dry – No Flammable Liquid Inventories, Refrigerants or Chemicals

New Offshore Technology For FPSOs

- UOP Value vs. Conventional Solution:
  - CAPEX: Reduced Footprint & Weight
  - OPEX: High Uptime And Reliability Maximizes Gas Monetization
  - Environmental: Eliminates Use Of Solvents Offshore
- High Demand From Large Offshore Finds
- Currently Executing 8 Systems For Petrobras FPSOs For Offshore Brazil

Established Position, Innovating New Applications
Natural Gas Liquids (NGL) Recovery

"Wet" Gas And NGLs

Typical Wet Gas Play
- 10-30% NGLs By Volume
- NGLs Valuable Feedstock For Petrochemicals
- Higher Value Compared To Methane ("Dry" Natural Gas)

<table>
<thead>
<tr>
<th>NGL Product</th>
<th>Typical NGL Content</th>
<th>Value Compared to Methane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethane</td>
<td>45%</td>
<td>1.9X ↑</td>
</tr>
<tr>
<td>Propane</td>
<td>29%</td>
<td>3.0X ↑</td>
</tr>
<tr>
<td>n-Butane</td>
<td>10%</td>
<td>3.8X ↑</td>
</tr>
<tr>
<td>i-Butane</td>
<td>5%</td>
<td>3.6X ↑</td>
</tr>
<tr>
<td>Natural Gasoline</td>
<td>11%</td>
<td>4.3X ↑</td>
</tr>
</tbody>
</table>

UOP Offerings

Orloff: Deep Liquids Recovery
- IP-Protected Technology
- Selective Separation To Maximize Value
- Highly Energy Efficient
- Highly Scalable

Twister: Mild Liquids Recovery
- Supersonic Vortex Separation
- Compact, Low-Weight Systems Ideal For Offshore Applications
- No Moving Parts: Lower Costs And Downtime; Higher Reliability

NGL Value Drives Investment In Separation Tech
Renewables
Jim Rekoske
VP GM Renewable Energy and Chemicals
Renewable Energy & Chemicals

- Building On UOP Technology And Expertise

- Produce **Real** Fuels (Gasoline, Diesel, Jet) Instead Of Fuel Additives / Blends (Ethanol, Biodiesel)

- Leverage Existing Refining / Transportation Infrastructure To Lower Capital Costs, Minimize Value Chain Disruptions, Reduce Investment Risk

- Create Integrated Biorefineries Which Utilize Entire Biomass: Seed Oil, Seed Cake & Waste Biomass / Residue

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**Tomorrow’s Energy Sources**
Renewables Portfolio

**Honeywell Green Diesel™**
- Superior Technology **Produces Real Diesel**, Not An Additive
- **Drop-In Replacement** For Existing Automotive Fleet
- Uses Existing Refining And Pipeline Infrastructure
- Excellent Blending Component

**Honeywell Green Jet Fuel™**
- Meets **Stringent Requirements** For Jet Flight
- **Successful Demonstration Flights** With Major Airlines, Engine Makers; Supply Contract With U.S. Navy And Air Force
- **ASTM Approval** Granted For Use In Commercial Flights

**Fuel From Biomass**
- **Rapid Thermal Process (RTP®)** Turns **Waste Biomass To Pyrolysis Oil**
- Immediate Use For Power Generation And Fuel Oil Substitution
- Working To **Upgrade Pyrolysis Oil** To Fuels/Chemical Feedstocks
Continuous Progress

Integrated Bio-Refinery

• Pilot-Scale Conversion Of Biomass Into Liquid Transportation Fuels

• Backed By A $25M Award From The U.S. Department of Energy

• Phase 1 Start-Up June 2012; Full Operation 1Q 2014

Recent Business Wins

New Licenses

• Diamond Green Diesel – Valero / Darling JV To Produce Green Diesel

• Emerald Biofuel To Produce Green Diesel

RTP® Projects

• Premium Renewable Energy, Malaysia

• Green Fuel Nordic, Finland

Largest Supplier Of Biofuels To U.S. Military To Date
Technology Overview
Gavin Towler
VP, Technology
UOP R&D Overview

Experienced, Multidisciplinary Team
- 1,800 Scientists And Engineers In UOP
- 650 Employees In R&D: ChE, ME, Chemists, Technicians
- More Than 2,600 Patents, 354 Inventors
- 98 Inventors With >10 Patents, 40 With >25

Extensive Facilities, Global Footprint
- More Than 150 Pilot Plants And Semi-works Plants For Rapid Scale-up And Commercialization
- Characterization And Combinatorial Methods For Discovery
- More Than A Half Billion Data Points/Day, 350,000 Offline Analyses/Year
- Demonstration Units At Customer Sites
- More Than 100 Outside Innovation And Alliance Relationships
- Global Reach: Tech Centers In India, China, Saudi Arabia

Strong Competitive Advantage
Science Capabilities For Discovery

- Materials Analysis Provides Competitive Advantage
- Molecular-Scale Insights Into Material Composition And Properties
- Impacts Ability To Innovate New Catalysts And Other Materials To Meet Future Customer Needs

- Catalyst Pills (10^-3 m)
- Single Pellet Tomography: “CAT Scans” for Catalysts (10^-6 m)
- Crystallite Morphology: HR SEM (10^-8 m)
- Metals: AC-STEM (10^-10 m)
- Density Functional Theory Simulation (10^-12 m)
- High Throughput Screening

Highlights
Technology Scale-Up Capabilities

Pilot Plants Analytical & Informatics

UniSim Simulation Process Synthesis & Economics

New Processes

Computational Fluid and Particle Dynamics

Cold Flow Modeling Multiphase Flow

New Equipment

New Material Synthesis Lab Scale Prototypes

Semi-Works Plant Crystallization and Forming

New Catalysts & Adsorbents

Driving Steady Pipeline Of New Products