

*Elevating Maintenance and
Reliability Practices
The Financial Business Case*

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Agenda

- Attempt to put the Technical & Engineering aspects of Maintenance & Reliability into Business Terms
 1. Discuss the Current state of Maintenance and Reliability, Awareness at the C-level, & What Good Looks Like at Top Performers
 2. Performance Yet to be Achieved – Even by the Top Performers
 3. Statistics Showing the Potential Benefits in the US and World-wide
 4. What the Business Case Might be for Your Corporation

Current State of Reliability

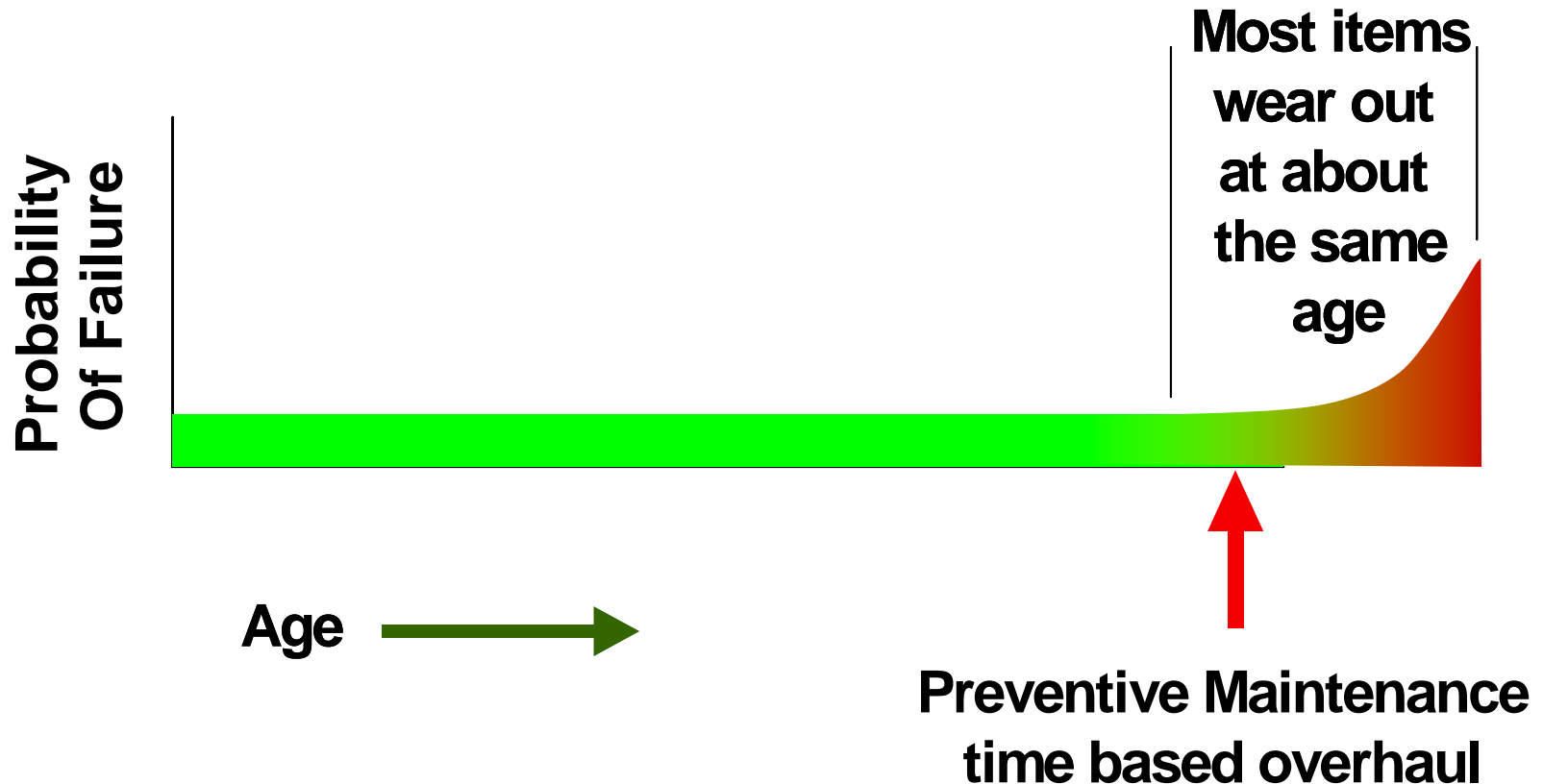
- 5 Years Ago
 - Little Awareness at the Corporate Executive Level
 - No Consensus about What Good Looks Like
 - No True Success Stories
- Today
 - A Few Success Stories from Early Adopters
 - Characteristics of Early Adopters Are Remarkably Similar
 - Maintenance spend below 2-3% of RAV
 - Significant use of PdM on the majority of the candidate equipment population
 - LESS time-based invasive PM

Current State of Reliability

The Depth to Which Top Performers are Using PdM Technologies

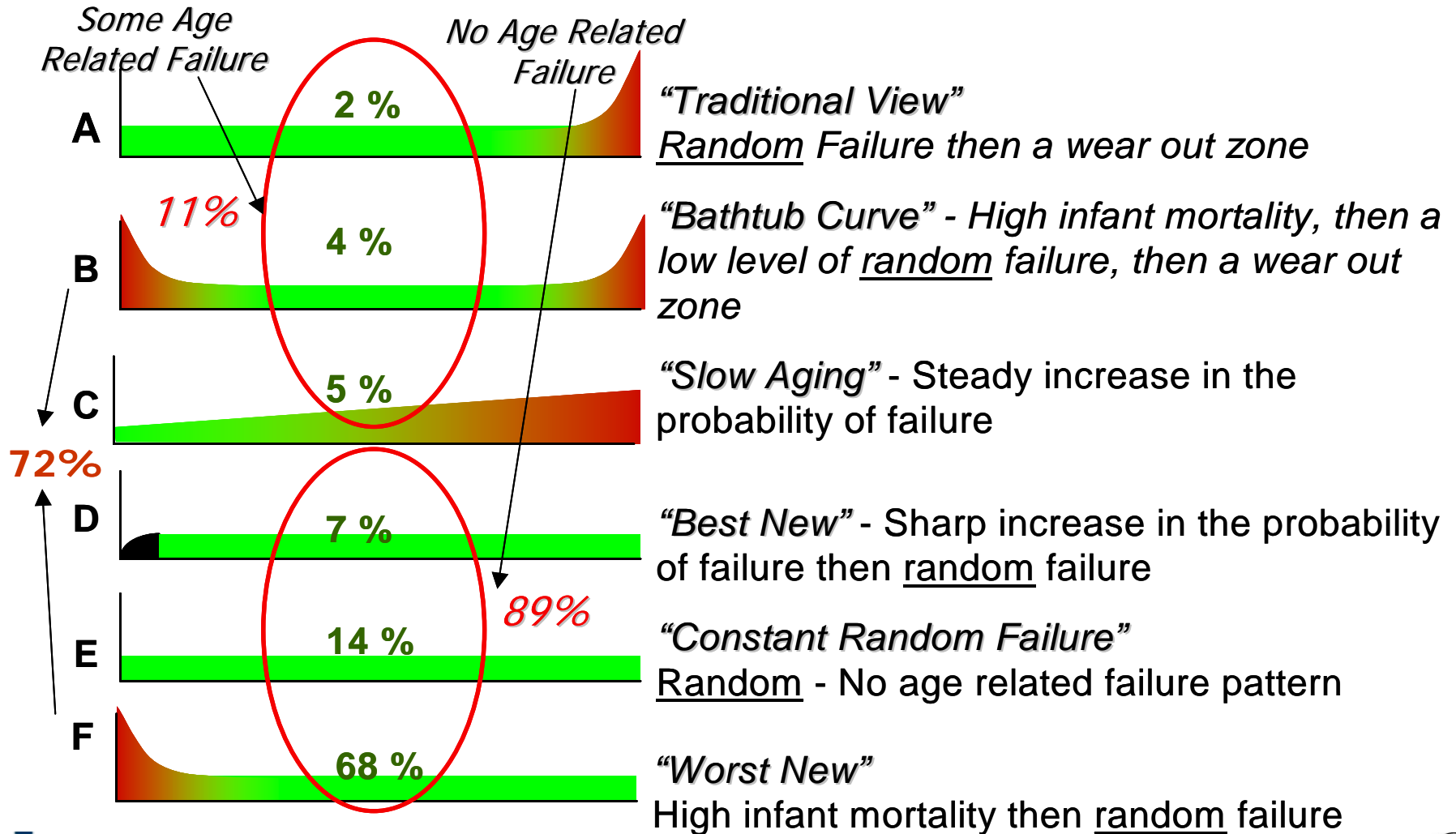
- Vibration on 63% - 95% of Rotating Machines
 - Not just critical equipment!
- IR on 91% - 100% of Electrical Equipment
 - 58% - 79% of mechanical equipment!
- Extensive & Comprehensive Lubrication Analysis
- Extensive use Motor Circuit/Current Evaluation
- Extensive use of Ultrasonic & other NDT
- Only 20-25% of Equipment Covered by Traditional, Time-based Invasive PM

Traditional Time Based PM



Taken from RCMII by John Moubray

Phenomenon of Infant Mortality



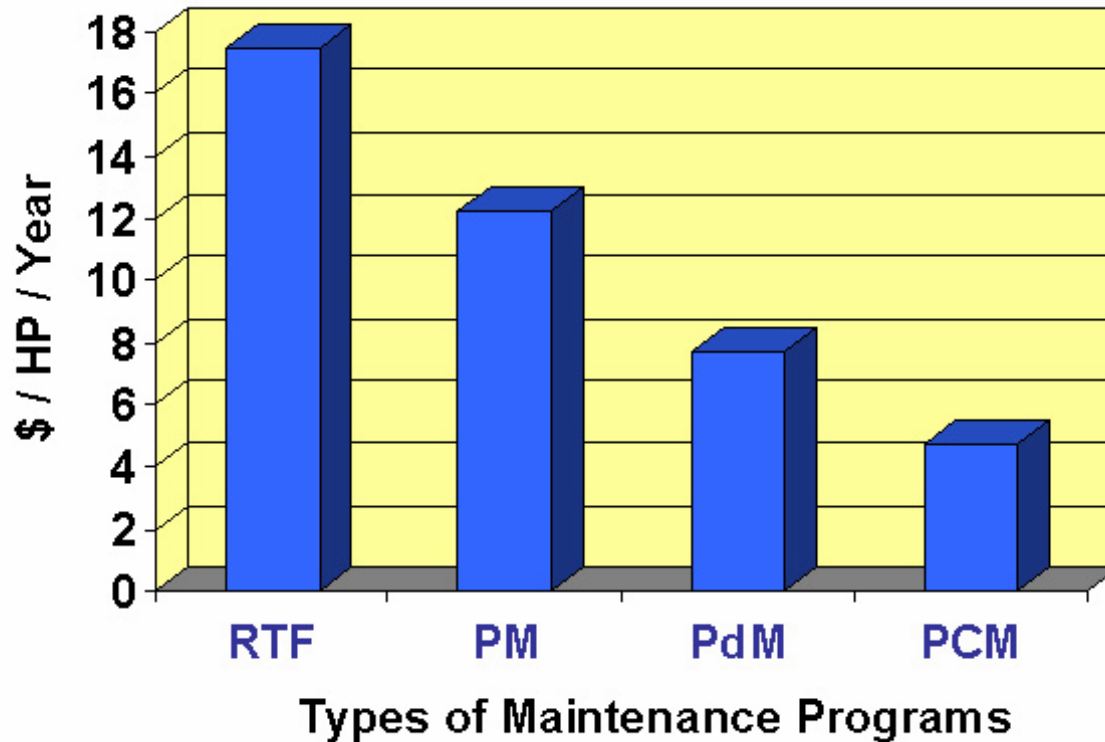
Top Performer Characteristics

- PdM Technologies drive about 80% of daily work
 - Over 50% daily work order hours are related to PdM
 - 15% collecting & analyzing condition information
 - 35% performing PdM “Results” Corrective Work (PdMr)
 - About 30% of daily work orders are related to PM
 - 15% collecting & analyzing condition/operating parameters
 - 15% performing PM “Results” corrective Work (PMr)
- Less than 20% of daily work orders are initiated via traditional work requests from equipment operators
- Objective and Early Work Identification Begins the Chain of Events Necessary to Elevate Practices and Performance
 - Increased Wrench Time (>50% vs. US Average of 28%!)
 - Reduced Costs (Less Labor, Materials, Collateral Damage, DT)

Cost of Maintenance

Cost of Maintenance

EPRI Power Generation Study (Modified)



Lessons Learned From Top Performers

- More PdM - less PM
 - Deep and Wide
 - Objective, Early Work Identification
 - Planning & Scheduling “Results” Work Orders
- A Holistic, Integrated Approach
 - You Can’t Piecemeal Your Way to Prosperity
- Pay Attention To Culture Change
 - More than Half the Battle!

Performance Yet to Achieve

- Despite Success Stories, Uniform Elevation of Practices “Enterprise-wide” Has NOT Occurred!
 - Plant or Business Unit Success
 - Not Institutionalized, Not Sustainable
- Any Examples to Guide Us?

–SAFETY

Performance Yet to Achieve

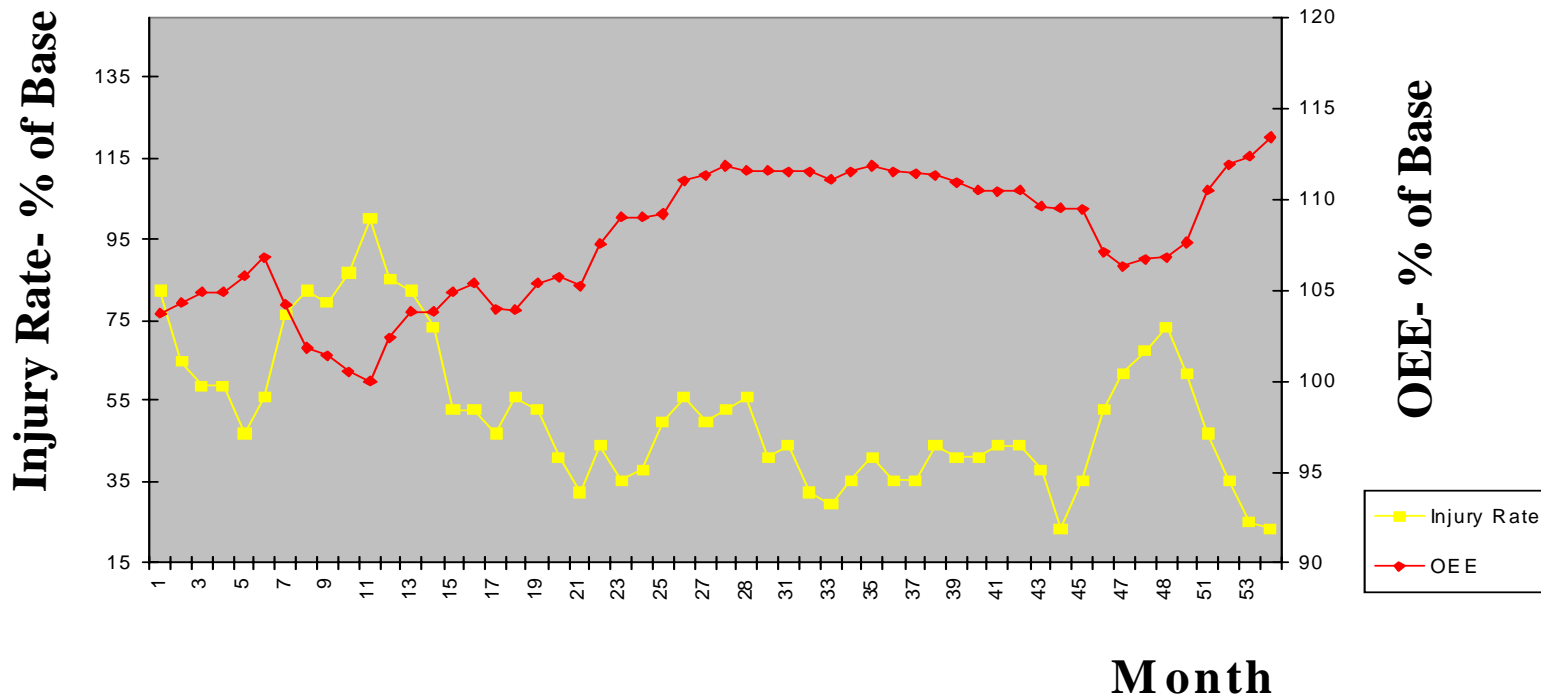
- 15+ Years Ago Safety Was The Responsibility of a Department or Few Individuals
- Today, Safety is Knitted Into the Fabric of the Company; It is a Part of the Culture; It is EVERYONE'S Job!
- How Did That Happen?

Performance Yet to Achieve

- Safety Was Shown to be Related to Almost EVERYTHING the Company Did
 - Insurance Premiums
 - Lost Time Accidents
 - Costs of Lost Time
 - Etc.

Performance Yet to Achieve

Figure 1A: Injury Rate v. OEE over Time - Company A



Ron Moore of The RM Group, Inc.

Performance Yet to Achieve

- We Must Link RELIABILITY to EVERYTHING the Company Does!!
 - Lean
 - TPM
 - Six Sigma
 - Quality
 - Market Share Increase
 - Cost Structure Reduction
 - Shareholder Value
 - Increase in Sales
 - Asset Utilization

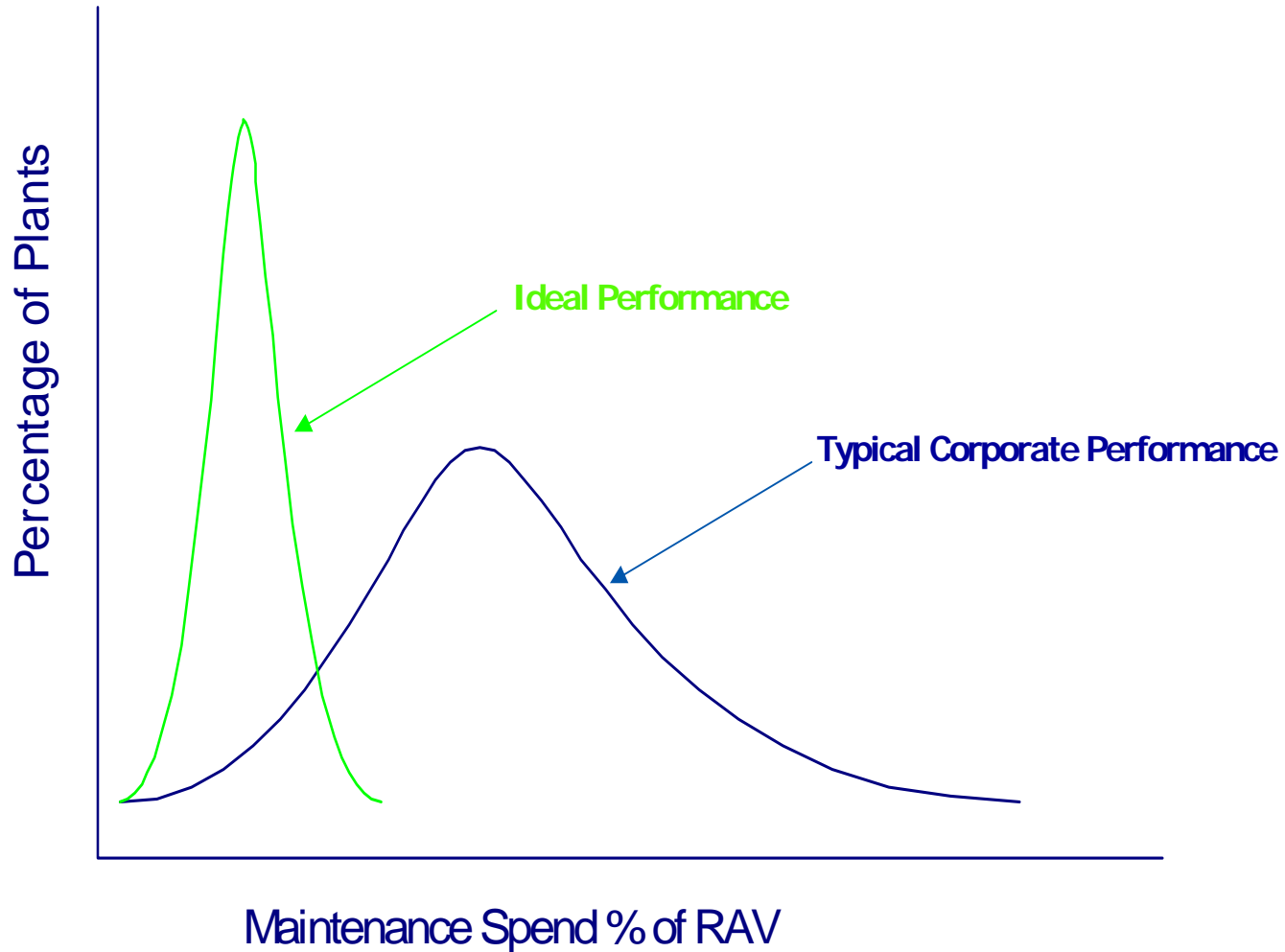
Executive Quotes

- Mr. Dave O'Reilly, Chairman & CEO of Chevron Corporation, said in a recent letter to employees:
“Reliability, like safety, is a critical element of operational excellence and requires our constant attention.”
- Mr. Mike Harding, Vice President of Operations at Anheuser-Busch, said in a recent public speech to the Society of Maintenance and Reliability Professionals:
“As goes Maintenance, so goes the business.”

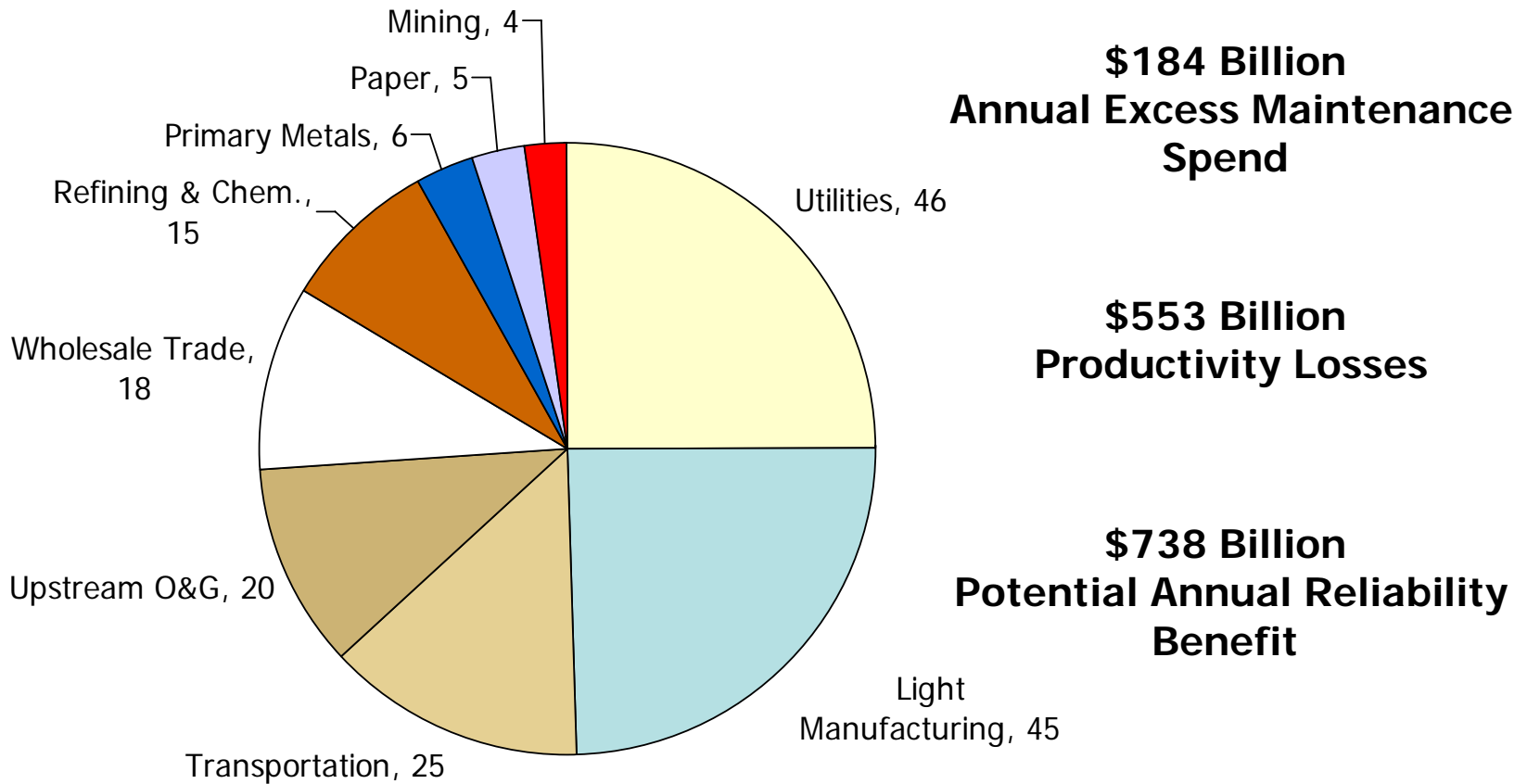
Impediments - Enterprise

- Lack of Executive Initiating Sponsorship
 - Lack of Executive Sustaining Sponsorship
 - Lack of Defined Standards
 - Lack of Consistent Basis for Measurement
 - No Ties Between Performance and Compensation
 - Lack of Systems to Efficiently Leverage Work Done at One Plant to Other Plants
-
- *Uniform Elevation? Reduce Variation!*

Variation of Spend



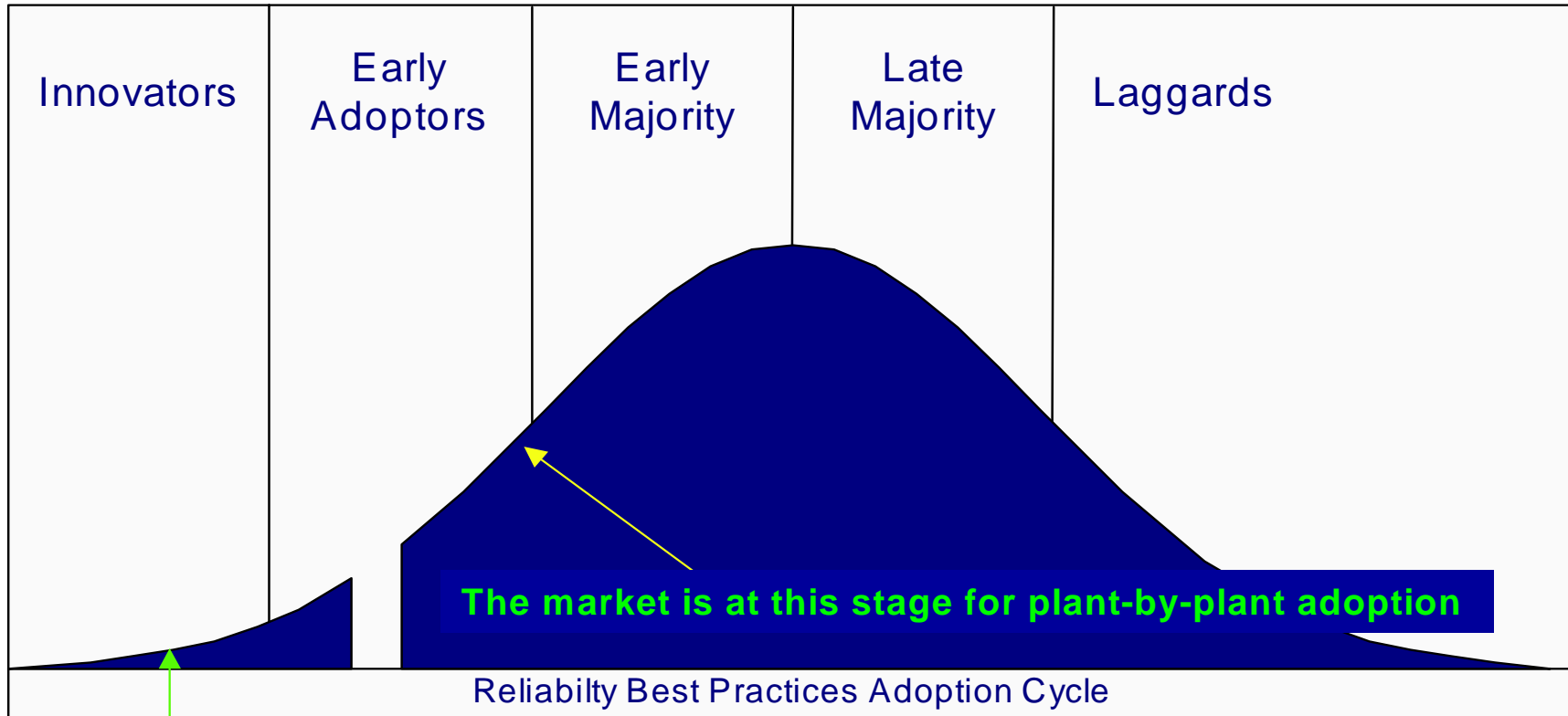
How Big Are the Benefits?



Calculated from Department of Commerce Current-Cost Net Stock of Private Fixed Assets in 2003 (Total \$4.9 Trillion)

Reliability Adoption Life Cycle

Reliability represents a substantial ROI opportunity for 75% of plants in equipment intensive industries. Greatest ROI will come from a corporate wide approach.



The market is at this stage for fleet-wide adoption, though little risk market chasm exists

Major Benefit Categories

- Maintenance Spend Reduction
 - Target: 2-4% of RAV
- Inventory Reductions
 - Target: 0.5-1.5% of RAV
- Energy Consumption Reduction
 - 3-14% Less
- Increased Uptime
 - Eliminate Unscheduled Maintenance Downtime
 - Reduce Scheduled Maintenance Downtime
 - Plants with Predominantly Traditional PM - by 30-60%
- Improved Quality
 - 5-16% reduction in total scrap value
 - 1-5% reduction in Rejects>Returns

Categories of Investment

- Development of Corporate Standards
- Development of Roll-out & Implementation Strategy
- Creation/Improvement of Foundational Information
- Objective Criticality Ranking of Equipment
- Methodical Analysis of Failure Modes – RCM/FMEA
- PM/PdM Optimization
- Create Balanced Metrics Measurement System
- Training & Awareness
- Culture Change & Reward System Alignment
- Compliance Monitoring & Continuous Improvement

Summary

- We Know What Good Looks Like
- We know that the top performers achieved their success using remarkably similar practices
- We know that you can't piecemeal your way to prosperity
- We know that even the top performers have been unable to uniformly elevate their maintenance and reliability practices across the entire enterprise

Summary

- We believe the size of the opportunity is \$¾ Trillion annually in the U.S. alone, and could exceed \$2 Trillion world-wide!
- We know the direct benefits will come from maintenance spend reduction, spare parts inventory reduction, reduced energy consumption, improved quality, reduced scrap and increased throughput/asset utilization.

Summary

- We Believe there is a Correlation Between Success of ANY Corporate Improvement Initiative ---- and Improved Reliability Practices
 - Unlock Hidden Benefits in These Other Initiatives That Are Not Achievable Without Reliable & Stable Physical Assets!

Summary

- Finally, We KNOW the Financial Business Case is HERE, and the Awareness in Your Executive Suite is Emerging
- Be Confident! Your Role Can Play a Significant Part in Your Company's Success!

Questions?

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