

Breakout Session **Materials, Water and Energy Management**

Focus question #1: VISION AND GOALS

Materials

- Renewable feedstocks reach 25% - 5 year goal
- Reduce landfilled materials from manufacturing by 50% - 5 year goal

Water

- Reduce industrial water usage by anywhere from 10% to 100% (zero liquid discharge)

Energy

- Reduce industrial energy consumption by 75% (more renewables, more efficient operations, smart design)
- Efficient use of variable sources, harnessing thermal and mechanical energy

Process Design

- Inter-disciplinary integration of different processes

Management/Planning

- Integrated management of water-energy-materials nexus to address sustainability concerns.
- Increased use of systematic/life cycle analysis tools for management decision making, incorporating economic and environmental criteria.

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Focus question # 2: **CHALLENGES & BARRIERS**

Technology Knowledge - lack of integrated process optimization

Collaboration - dilution of benefits in the supply chain, lack of visibility affecting decision making, sharing of information/integration across dissimilar industries

Data/Information – lack of energy/water tracking (e.g., sometimes only at utility meter scale), and data resolution

Water - no examples of zero liquid discharge facilities/processes

Human Resources - technologies are scaled to larger manufacturers, small manufacturers are not adopting

Management – corporate leadership/buy-in can be insufficient

Technology Cost – high capital investment with long payback (embedded investment in existing infrastructure)

Materials – Ineffective materials development pipeline

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Focus Question #3: R&D NEEDS

1) Materials for sustainability development

- Increase material circularity (recycle/reuse by 50%)
- Lower development cycle time on high perf./sustainable materials

2) Aqueous, organic and other liquids conservation and reuse

- Fluid produces design for recycle and reuse
- Fluid treatment processors tailoring new processes

3) Return on investment/cost benefit analysis to properly value sustainability and innovation

- Demonstrate drop-in technology that reduces cap(x) and payback time.

4) Energy Materials Water Integrated process optimization

- New software tools that integrate and flow energy, water, materials flow