Connecticut DEEP

Solid and Hazardous Waste Advisory Committee

June 26, 2017

Hartford, CT




Charles Ruffing, Ph.D., Executive Director
NYS Pollution Prevention Institute
Golisano Institute for Sustainability

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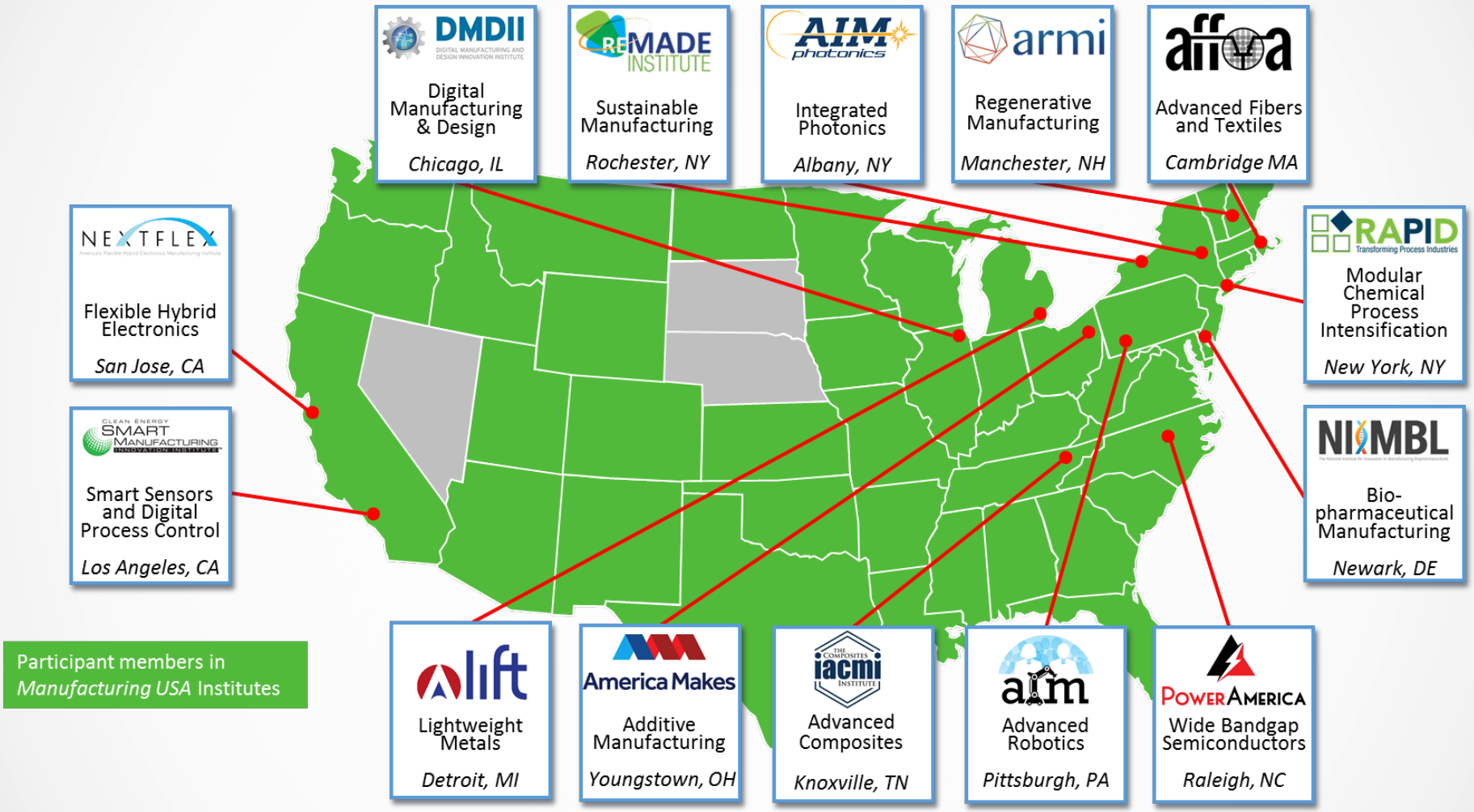
Manufacturing USA



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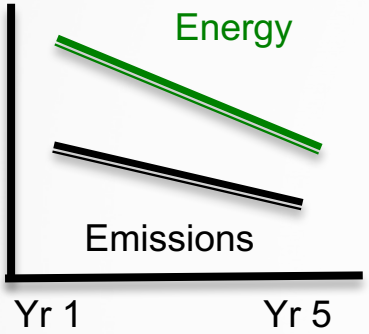
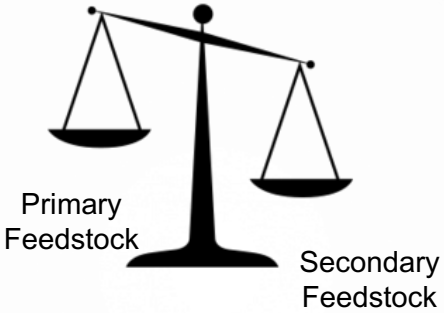
REMADE Institute Focus – Early stage applied R&D
to reduce embodied energy & emissions



Reduce Primary Material Use



"Better than Cost and Energy Parity"

Widespread Application of New Technologies

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REMADE Institute Framework

5 TECHNOLOGY NODES

SYSTEM ANALYSIS INTERGRATION

- DESIGN FOR REUSE & DISASSEMBLY
- MANUFACTURING PROCESSES
- REMANUFACTURING/ EOL REUSE
- RECYCLE & RECOVERY

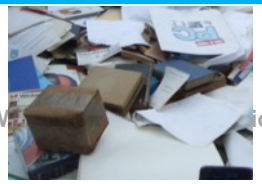
5-YEAR INSTITUTE GOALS

- Reduce primary feedstock consumption in manufacturing by **30%**
- Achieve **25%** reduction in embodied energy of targeted materials
- Achieve cost parity for secondary materials
- Improve energy efficiency of secondary material processing by **30%**
- Increase size of remanufacturing industry by **100%**

4 MATERIAL CLASSES

Metals **Polymers** **E-waste** **Fiber**



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REMADE Institute Members

26 Leading Universities

- R·I·T
- Georgia Institute of Technology
- University of Illinois
- Yale
- Colorado School of Mines 1874
- Northwestern University
- Washington State University
- WPI
- Virginia Tech
- Clarkson University
- Iowa State University
- UCSB
- UMass Lowell
- Massachusetts Institute of Technology
- The University of Utah
- Oklahoma State University
- Wisconsin
- Ohio State
- University of New Hampshire
- University of Pittsburgh
- UWM University of Wisconsin Milwaukee
- Texas Tech University
- Carnegie Mellon University
- University of California Irvine
- Miami

44 Industry Leaders & 26 Associations

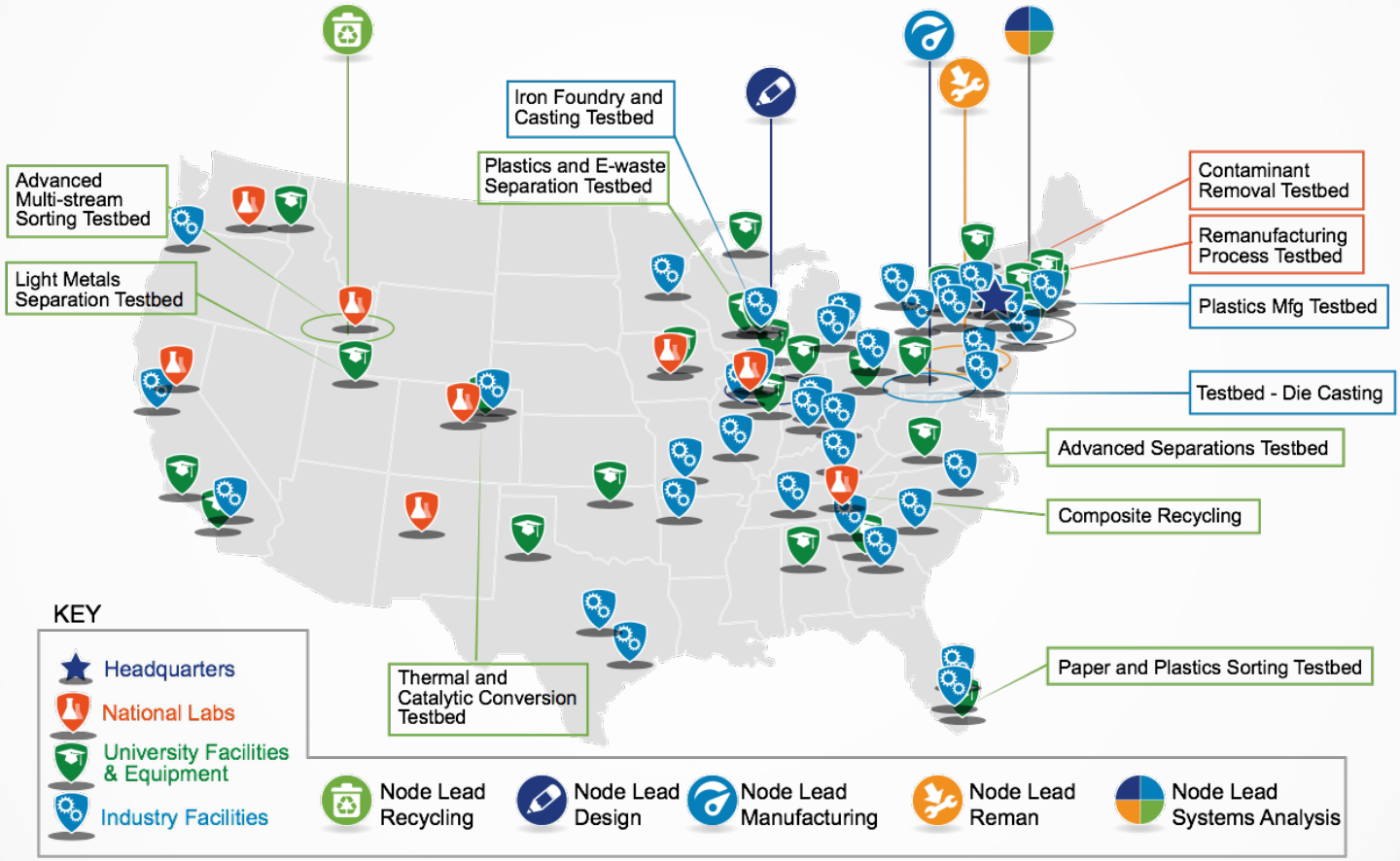
- CAT
- Staples
- Sealed Air
- Xerox
- Cummins
- Michelin
- Celanese
- Davies Office
- Dell
- Nike
- Kohler
- Delphi Automotive Systems
- John Deere
- Umicore
- Corning
- Ellen MacArthur Foundation
- Shaw Floors
- Tessy Plastics
- Sims Metal Management
- antea group
- American Chemistry Council
- Phinix
- apra
- Remanufacturing Industries Council
- American Forest & Paper Association
- ncms National Center for Manufacturing Sciences
- ITC International Imaging Technology Council
- ISRI Voice of the Recycling Industry
- iNEMI International Electronics Manufacturing Initiative
- sme Making the future. Together
- MERA

7 National Labs

- Argonne National Laboratory
- INL
- Oak Ridge National Laboratory
- Pacific Northwest National Laboratory
- The Ames Laboratory, Creating Materials & Energy Solutions, U.S. Department of Energy
- NREL National Renewable Energy Laboratory
- Sandia National Laboratories

Testbeds to Aid Technology Transition

12 geographically distributed testbeds* provide mechanism to scale up early stage applied R&D



* Early stage R&D that enables validation in a relevant environment and is applicable to the four targeted material classes

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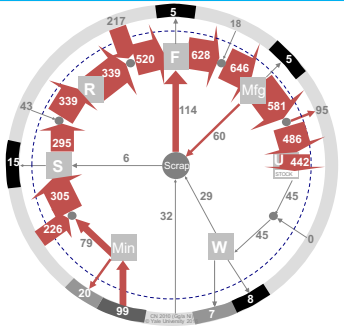
Development of Widespread Technologies



Information Collection & Standardization Tools[1]

Design Tools for Reman, Reuse, Disassembly,

Rapid Sorting of Material Streams

Separation of mixed materials

Removal of Trace Contaminants

Reprocessing of Recovered Materials

Directed towards innovations that will

- Dramatically reduce the energy required to manufacture key materials, and
- Improve overall manufacturing energy efficiency through increased material reuse, recycling and remanufacturing.

1 Example of Ni MFA in 2010

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REMADE Institute Membership

- 3 Tiers of Industry Memberships for both Large and SMEs
  - Principal members (Tiers 1 & 2) commit to annual cash and cost share contributions in return for access to IP and federal funding
  - Tier 3 is an observer level. Nominal annual fee provides access to annual meetings, technology roadmaps, networking, workforce training

- 3 Tiers of Academic Memberships require annual contributions of cost share (i.e., expert/researcher time, materials, test-bed usage) toward REMADE projects and technical priorities. Principal members have access to Institute IP and federal funding

- No cost membership for relevant industry associations, not-for-profits and governments . Benefits include access to annual meetings, technology roadmaps, networking, workforce training

- No cost membership for 7 national labs which will contribute expert/researcher time, materials, test-beds. Benefits include access to annual meetings, technology roadmaps, networking, workforce training

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Questions and Answers

Additional questions can be emailed to: info@smialliance.org

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