NASEO 2016 Annual Meeting
Clean Energy Manufacturing Roadmap
A Case for Public and Private Partnerships

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Regional and National Response Division
Michigan Agency for Energy
Michigan-Northeastern Ohio Regional Roadmap Project
DOE State Energy Program Competitive Grant Award

A collaborative effort between Michigan and Northeast Ohio to:

- Identify advance energy efficiency building technologies, products, and services;
- Identify opportunities for catalyzing economic competitiveness within these sectors; and
- Create a roadmap to accelerate clean energy manufacturing and energy efficiency clusters in the region.
Stakeholder Engagement Strategy:

- Identified business sectors and demographics, technologies with high energy efficiency value and greatest economic development potential and return of investment in the region.

- Engaged technology end-users in “Listening Sessions” in Michigan and Ohio and social media to solicit input and support on objectives, scope of work, benefits, etc.

- Listened and revised work plans to create regional economical development strategies based feedback.
Michigan-Northeastern Ohio Regional Economic Development Strategies

Stakeholder Engagement Strategy:

- Used plan to identify and map strategic opportunities to facilitate competitive private-sector clean energy manufacturing and implementation of energy efficiency clusters in Michigan and Ohio.

- Our intent was to engage end users early in the process to influence manufacturing habits, product designs, technology adoption, access to capital, etc. and uptake in the market place.

- Create a Roadmap that reflects manufacturing in Michigan and Ohio.
Research Overview
Research Overview – Asset mapping methodology

List development
Cluster Development Methodology

**Market Research**
- Asset Identification
- Surveys & Interviews
- Technology Roadmapping

**Analysis**
- Value Chain/Supply Chain Identification & Analysis

**Economic Development**
- Strategic Convening
- Strategic Convening
- Identify Opportunities
- CLUSTER DEVELOPMENT
- Match Making
- Match Making

*Source: NextEnergy*
# Research Overview - Methodology

**Surveys & Interview**

## Data collection process

<table>
<thead>
<tr>
<th>LIST</th>
<th>RESEARCH</th>
<th>CONTACT SOURCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>MASTER LIST</td>
<td><strong>Primary Research Sources</strong></td>
<td>Internal Database</td>
</tr>
</tbody>
</table>
| | QUANTITATIVE SURVEYS  
Sample Size: 161 online, 49 in-person | Referrals |
| | QUALITATIVE INTERVIEWS  
Sample Size: 23 in-depth (1-2 hrs)  
276 at events | Data.com |
| | **Secondary Research Sources** | Other online name database |
| | Poll Everywhere during events  
(word clouds) |  |
| | News/Media/Blogs |  |
| | Company news/financial Info |  |
| | Trade groups |  |
| | University programs & research |  |

Source: NextEnergy
Research Overview - Survey Highlights

- The Energy Efficiency market is optimistic with 63% expecting to add employees in the next 12 months (only 1% reducing head count)
- Michigan has strong intellectual property and R&D with 11,267 patents claimed to have been identified by EEBT companies and
- Biggest challenges are identifying new customers and acquiring and retaining talent

**Challenges Facing Business**

[Bar chart showing various challenges and their respective percentages]

Sample Size: 144

Source: NextEnergy
Research Overview - Energy Efficiency Value Chain

Companies identified as part of the EEBT Value Chain in Michigan
Research Overview - Manufacturers in Energy Efficient Building Technology

Product Offerings of Energy Efficiency Manufacturers in Michigan

Focus areas for Energy Efficiency cluster work

Focus areas for Clean Energy cluster work
Energy Efficiency Build­ing-Roadmap Technologies
Energy Efficiency Value Chain

**Residential**
- Stakeholders: 107
  - NGOs: 54
  - Academic: 32
  - Incubators: 21
- Audit: 120
- Engineering: 240
- Manufacturers: 384
- Finance: 13

**Commercial**
- Stakeholders: 120
- Audit: 120
- Engineering: 240
- Manufacturers: 384
- Finance: 13
- Sales: 228
- Installers: 1822
- EM&Y: 10
- Lighting: 60
- HVAC: 49
- Software Sensors & Controls: 82
- Other: 325
- HVAC: 1488
- Electrical: 102
- Insulation/Weatherization: 160
- Window/Door/Air Sealing: 96
- Other Installer/Contractor: 240

**Utility Providers:** 46
# Energy Efficiency Value Chain

<table>
<thead>
<tr>
<th><strong>STRENGTHS</strong></th>
<th><strong>WEAKNESSES</strong></th>
<th><strong>OPPORTUNITIES</strong></th>
<th><strong>THREATS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• PA 295 has driven adoption of energy efficiency</td>
<td>• Energy efficiency programs fluctuation makes availability uncertain (on/off/on, etc.)</td>
<td>• Stronger/revised building codes could push energy efficiency</td>
<td>• State EO and renewable energy policies and legislation are in flux and difficult to plan for</td>
</tr>
<tr>
<td>• Utility EO programs push energy efficiency market</td>
<td>• Disparate, uncoordinated public programs and processes are difficult for contractors and others to navigate</td>
<td>• EPA Clean Power Plan provides opportunity to push new technologies (integrated energy efficiency, renewable energy, automated demand response, storage)</td>
<td>• Energy efficiency improvements compete with other capital expenditures</td>
</tr>
<tr>
<td>• Michigan Saves and PACE provide path to financing</td>
<td>• Customer awareness of energy efficiency technology, benefits, and financing options</td>
<td>• Incentivize and grow the contractor “army” of energy efficiency advocates</td>
<td>• Low energy prices mean energy efficiency ROI is less compelling on its own</td>
</tr>
<tr>
<td>• Strong contractor networks</td>
<td>• Contractors often sell the status quo, in order to not lose or complicate a sale</td>
<td>- Sales training for contractors</td>
<td></td>
</tr>
<tr>
<td>• Diverse ecosystem of energy efficiency assets in MI</td>
<td>• Silos for energy efficiency, renewable energy, and demand response leads to inefficient programs</td>
<td>- Energy efficiency sales tools</td>
<td></td>
</tr>
<tr>
<td>• Robust manufacturing, research, and engineering base</td>
<td>• Major national and global energy efficiency brands are not located in MI, particularly in HVAC and renewable energy markets</td>
<td>- Business model training and development support</td>
<td></td>
</tr>
<tr>
<td>• Strong supply chain has developed from automotive technology developers</td>
<td>• IP development in MI, yet sales in MI are challenging</td>
<td>• Streamlined EO program and processes</td>
<td></td>
</tr>
<tr>
<td>• Emerging IT and software ecosystem</td>
<td>• Many Tier 1 auto suppliers have energy efficiency in their product portfolios, providing opportunity for global markets</td>
<td>• Leverage partnership opportunities with innovators and manufacturers</td>
<td></td>
</tr>
<tr>
<td>• Many Tier 1 auto suppliers have energy efficiency in their product portfolios, providing opportunity for global markets</td>
<td>• Strong IP development channels</td>
<td>• Better Buy/Sell/Deploy financing options</td>
<td></td>
</tr>
<tr>
<td>• Solid education programs</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Lighting Supply Chain
Michigan

**MATERIALS**
- Plastics - BASF
- Si - Dow Corning
- SiC - Dow Corning
- Epoxy - Dow Chemical
- Phosphors - Dow Chemical

**ELECTRICAL COMPONENTS**
- ChipCO E415S
- PCB
- Aodeco Circuits
- Amptech
- Dibector Industrial/Electronics
- EBW Electronics
- Infineon
- Malibu
- Solnic Electronics
- Solartronics

**POWER SUPPLY**
- Bosch
- Elecronics
- Infineon
- Landmark Energy Development

**LIGHT ENGINE**
- BGW
- EBW Electronics
- Innoac

**WIRING ASSEMBLY**
- NewYorkI
- Specialties

**SMART LIGHTING**
- AIMH Nano
- Electro-Matic

**CONTROLS/SOFTWARE**
- AIMH Nano
- Arborlight
- Aumo Electronics
- Electro-Matic
- Illuminating Concepts
- Koncept
- Light Corp
- Lightyne
- Muxable Power Solutions
- Greatlamps Lighting, LLC
- Rollema

**PRODUCT LIGHT DESIGN**
- Arborlight
- Beal lights, Inc
- Donn Gerd
- EBW Electronics
- Estellon
- Everlast Lighting
- High Q Lighting
- Illuminating Concepts
- Imotec
- Landscape Forms
- LED Light, LLC
- LED Optical Solutions
- Light-Speed USA
- Magengiley
- Midwest Circuits
- Paramount
- Solar Street Lights USA
- Solradionic
- The Straightlighting Company
- Vueites Technologies

**MECHANICAL COMPONENTS**

**OPTICAL LENSES**
- CoreLED
- Eeles-Lite
- LuxeonFlow

**THERMAL MGT**
- Century Foundry

**ACTIVE COOLING**

**HOUSINGS**
- Port City Group
- MOUNTS
- Flush Bridge Co., Inc.
- POLES
- General Structures Inc.
- Lyra Poles
- Qualitas

**TESTING**
- Intertek
- TL1
Lighting Supply Chain
NORTHEAST OHIO

MATERIALS
- Graftech
- Nontextile Performance Antistatrics
- OMations
- Polycore
- Stin-Eze Silicones

ELECTRICAL COMPONENTS
CHP DIODE
- * * * PCB
  - Arrow Electronics
  - Liren Industries
  - RBB Systems
  - RPC Electronics
  - Tektron Systems, Inc.
  - Valtronic Technologies USA, Inc.
POWER DRIVER
- Dallas Systems
  - Valtronic Technologies USA, Inc.
  - Vertrue Lighting Int'l
  - Wireless Environment
LIGHT ENGINE
- * * *
WIRING ASSEMBLY
- Spargel Reno
  - Teamtools, Inc.
  - Tip Products
  - Western Reserve Wires Products

PRODUCT LIGHT DESIGN
- Advanced Lighting Technologies, Inc.
- Arrow Electronics
- ARID Technologies Inc.
- Blackrock
- Essential Research, Inc.
- Tera Lighting
- GE Lighting Solutions, LLC
- Lighting Innovations
- Lighting Services, Inc.
- Nottingham - Solar
- Smart Shopa
- Valtronic Technologies USA, Inc.
- Vincent Lighting Systems

MECHANICAL COMPONENTS
OPTICAL LENSES
- Global Lighting Technologies
- Kent Displays
- Lemtec
- Rambus Lighting
- Varitron Lighting Int'l

TECHNICAL MANAGEMENT
- Graftech

ACTIVE COOLING
- GE Lighting

WORKSHOPS
- Aerials Electroplating Company
  - Astro Manufacturing
  - Astro Shells Inc.
  - Automation Plastics
  - Extruded Aluminum
  - General Extrusions Inc.
  - GSH Industries
  - J and S Plastics
  - J&M Extrusions
  - Jako Manufacturing
  - Lumen & Associates
  - Neograde Corporation
  - Norcom Plastics
  - Nilledahl Plastics
  - Plastic Extrusion Technologies
  - Swan Enterprises
  - Technology House
  - Tyoga

SMART LIGHTING
SENSORS
- GE Lighting
- Greenrock Lighting
- Philips Lighting
- Rambus
- TCP Lighting

USER SOFTWARE
- Arrow Electronics
  - Commerical/Industrial
  - Cressida
  - Closing Air

TESTING/VALIDATION
- CSA Group
- Lighting Innovations
- Tack Tail Energy Innovation Center

BUILT ENVIRONMENT
- Back Lighting
- Channel LED
- Energy focus
- ETI Solid State Lighting
- Eye Lighting
- GE Lighting Solutions LLC
- Global Lighting Technologies
- Green Rock lighting
- Hitachi lighting
- King Lighting/SunLex
  - Luminar, Inc.
  - Megalight, Inc.
  - Rambus
- Stronglight Lighting USA
  - STREIS Inc.
  - Technical Consumer Products, Inc.
    - The L.D. Kibler Co.
    - US Lighting Group
  - Valtronic Technologies USA
  - Wireless Environment LLC

KEY
- * * * No company present
Key Findings – Lighting Supply Chain

- A significant portion of the Value Chain is comprised of contractors
- EE programs in Michigan and Ohio were difficult to compare
- Financing for R&D is a challenge and lack of awareness of capital
- Strong innovation, engineering, manufacturing base
- Strong need for concise legislation and policies to drive adoption
- Michigan has both “upstream” R+D, “downstream “deployment”
- Sub component manufacturing occurs overseas
### Outreach Event - Informing the Marketplace

#### CLEAN ENERGY ROADMAP PROJECT

##### EVENT METRICS

<table>
<thead>
<tr>
<th>EVENT</th>
<th>YEAR</th>
<th>SECTOR (Industrial, Residential, Commercial)</th>
<th># of attendees</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michigan Advanced Lighting Conference</td>
<td>2015</td>
<td>ALL</td>
<td>300</td>
<td>Plan and host</td>
</tr>
<tr>
<td>Ohio lighting event (TBD)</td>
<td>2015</td>
<td>ALL</td>
<td>TBD</td>
<td>Plan and host</td>
</tr>
<tr>
<td>V2B Mashup</td>
<td>2015</td>
<td>ALL</td>
<td>100</td>
<td>Plan and host</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>EVENT</th>
<th>YEAR</th>
<th>SECTOR (Industrial, Residential, Commercial)</th>
<th># of attendees</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED Lighting in Northeast Ohio: Exploring Mutual Opportunities for Success</td>
<td>2015</td>
<td>ALL</td>
<td>40</td>
<td>Plan and host</td>
</tr>
<tr>
<td>DTE Energy / ESD Energy Conference &amp; Exhibition</td>
<td>2015</td>
<td>ALL</td>
<td>800</td>
<td>Networking</td>
</tr>
<tr>
<td>MI Commercial &amp; Industrial Conference - Upper Peninsula</td>
<td>2015</td>
<td>ALL</td>
<td>150</td>
<td>Presentation</td>
</tr>
<tr>
<td>MI Commercial &amp; Industrial Conference - Lower Peninsula</td>
<td>2015</td>
<td>I/C</td>
<td>250</td>
<td>Networking</td>
</tr>
<tr>
<td>MI CHP Conference</td>
<td>2015</td>
<td>I/C</td>
<td>100</td>
<td>Networking</td>
</tr>
<tr>
<td>MEEA Annual Meeting</td>
<td>2015</td>
<td>ALL</td>
<td>100</td>
<td>Presentation</td>
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<tr>
<td>Midwest Energy Solutions Conference</td>
<td>2015</td>
<td>ALL</td>
<td>630</td>
<td>Presentation</td>
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<tr>
<td>Michigan Advanced Lighting Community Event</td>
<td>2015</td>
<td>ALL</td>
<td>80</td>
<td>Plan and host</td>
</tr>
<tr>
<td>Smart Energy Summit</td>
<td>2015</td>
<td>C</td>
<td>250</td>
<td>Matchmaking</td>
</tr>
<tr>
<td>Manufacturing in America</td>
<td>2015</td>
<td>I</td>
<td>2300</td>
<td>Networking</td>
</tr>
<tr>
<td>MI Commercial &amp; Industrial Conference - Upper Peninsula</td>
<td>2014</td>
<td>ALL</td>
<td>150</td>
<td>Presentation</td>
</tr>
<tr>
<td>MI Commercial &amp; Industrial Conference - Lower Peninsula</td>
<td>2014</td>
<td>I/C</td>
<td>250</td>
<td>Presentation</td>
</tr>
<tr>
<td>DTE Energy / ESD Energy Conference &amp; Exhibition</td>
<td>2014</td>
<td>ALL</td>
<td>800</td>
<td>Networking</td>
</tr>
<tr>
<td>Michigan Energy Efficiency Expo</td>
<td>2014</td>
<td>ALL</td>
<td>200</td>
<td>Exhibited &amp; Sponsored</td>
</tr>
<tr>
<td>Michigan Advanced Lighting Conference</td>
<td>2014</td>
<td>I/C</td>
<td>219</td>
<td>Plan and host</td>
</tr>
<tr>
<td>Energy Innovation Business Council Networking Event</td>
<td>2014</td>
<td>ALL</td>
<td>75</td>
<td>Presentation</td>
</tr>
</tbody>
</table>

**TOTALS**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Total number of project events to date</td>
<td>16</td>
</tr>
<tr>
<td>Total number of future planned events</td>
<td>3</td>
</tr>
<tr>
<td>Total number of event attendees</td>
<td>11,848</td>
</tr>
</tbody>
</table>
Robert Jackson, Director
Regional and National Response Division
Michigan Agency for Energy