



NYSERDA

Inventory of Supply Side Organizations in New York's Clean Energy Economy

December 2016

Methodology

The project's primary objective was to create a detailed inventory of the supply-side clean energy economy in NYS

The primary purpose project is to support the development of New York's clean energy economy. The objectives included:

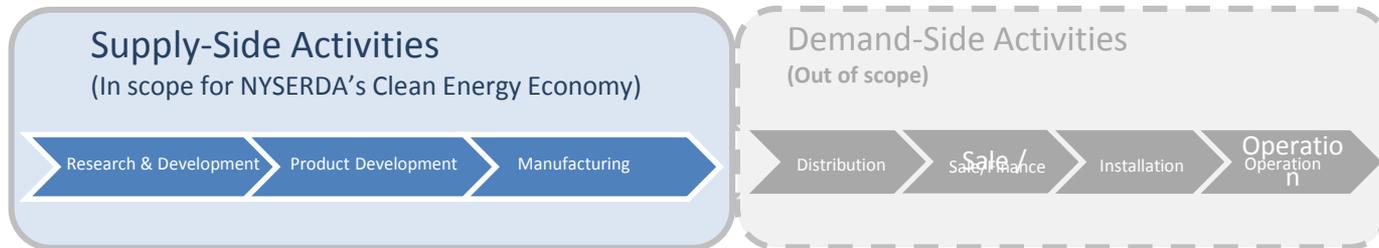
1. Create a **data-driven inventory** to characterize the supply-side clean energy economy in NYS
2. Identify **key attributes about each organization** in the inventory
3. Identify **opportunities to accelerate growth** in New York's clean energy economy to help NYSERDA strategically deploy resources

Organizations were first evaluated based on four criteria to determine if they should be included in the inventory

Organizations were included in the inventory if they met the following four criteria:

1. Located in NYS
2. Operate on the supply-side of the economy (R&D, product development, and manufacturing)
3. Active in one of the eight sectors of the the clean energy economy
4. Currently in business

Researchers collected data on supply-side service providers as well (test facilities, contract engineers, incubators, and proof of concept centers). Organizations and companies that conduct sales and distribution were considered out of scope for this project.



Researchers collected detailed information on 591 clean energy organizations active on the supply-side in NYS

- **2,100 organizations reviewed by project team for inclusion in the inventory**
 - Preliminary List based off of NYSERDA, NYPA, NY-BEST, SBIR, and other sources
- **591 entries completed based on criteria**
 - **The organizational data collected includes:**
 - Product types researched or manufactured by detailed sector classification
 - Value chain positions
 - Supply-side service offerings
 - Organization type, year of establishment, and contact information for key personnel
 - Location data (for NYS offices and facilities)
 - Revenue and employment information
 - Investment information
 - **A survey sent to organizations in the database received 137 responses and collected information on:**
 - Technical competencies
 - Use of subcontractors
 - In-house intellectual capital

Organizations

The majority of the organizations identified were for-profit, privately held companies

- The inventory includes
 - For-profit corporations
 - Universities and other academic institutions
 - Other non-profit institutions
 - Government institutions

Organization Type	Count	Percent
For-Profit Company - privately held	423	72%
For-Profit Company - publicly held	81	14%
University / Academic Institution	68	12%
Non-Profit	14	2%
Government	5	1%

N=591

- Some of these organizations provide supply side services instead of (or in addition to) clean energy products. These include:
 - Clean energy incubators
 - Proof-of-concept-centers
 - Testing facilities
 - Contract engineering providers based in New York State

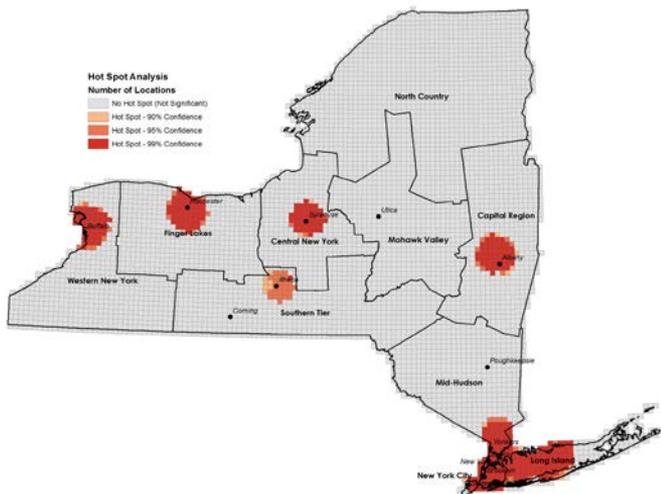
Service Provider Types	Count*	Percent
Incubators	28	5%
Proof of Concept Centers	14	2%
Contract Manufacturers	55	9%
Test Facilities	28	5%
Engineering Consultants	59	10%

N=144

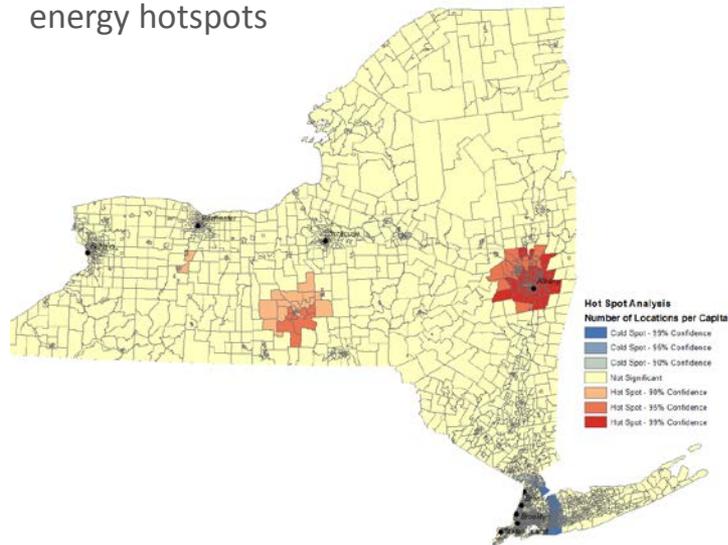
*Organizations may offer more than one service. There are **144 unique service providers** in the data set.

Geospatial analysis confirms major geographic hubs of supply-side clean energy activity in regions and cities

Clean energy activity generally tracks to population centers, with hot-spots emerging in all major cities in the state



However, when controlled for population, Albany and Ithaca emerge as major clean energy hotspots



Across major clean energy sectors, New York has the most activity in energy efficiency (EE), solar, and energy storage

Sector Category	Count*	Percent of Total
Energy Efficiency and Advanced Buildings	236	40%
Energy Storage	143	24%
Solar	124	21%
Transportation	118	20%
Bioenergy	69	12%
Wind	63	11%
Smart Grid	62	10%
Hydropower	12	2%

There are strong linkages showing that organizations involved in more than one sector are mostly likely to have overlaps between energy efficiency and solar (11% of organizations) and energy storage and solar (10% of organizations)

*Organizations may be classified into more than one sector based, so percentages indicate a sector's percent of the total 591 organizations in the inventory. 825 product sector categories were recorded from 591 organizations.



Energy Efficiency (EE) Sector Analysis

- The inventory did a deeper dive into the EE sector. Key findings include:
 - Predominance of lighting products, particularly solid state lighting, within the sector
 - Lighting represents 43% of the sector, while solid state lighting represents 82% of lighting
 - Geographic clusters for each of the three segment types within the sector
 - Building automation clusters in NYC, Rochester, Buffalo, and Syracuse
 - Lighting shows larger and more prominent cluster activity in Central New York, the Capital Region, and the Mid-Hudson than the building automation
 - HVAC and Refrigeration shows strong clustering in Buffalo, Albany, and New York City
 - Government, academic, and non-profit organizations exclusively provide R&D and testing services to this sector
 - For-profit organizations are active across the value chain, especially in end product manufacturing and final assembly, and also in R&D and component manufacturing

Energy Storage Sector Analysis

- Key findings from the Energy Storage sector analysis include:
 - Energy storage organizations are more engaged upstream on the value chain and smaller in size than other sectors
 - There are a number of geographic clusters within the sector:
 - Software application development and design & prototyping is primarily located in the Capital Region, NYC, and Long Island. Advanced materials entities are also located in these locations, as well as having a strong presence in Rochester
 - Electrical assembly is primarily located in the Capital Region, NYC and Long Island
 - Chemical & material processing is predominantly located in Rochester and NYC
 - Clusters often form around academic institutions or other areas where there is R&D expertise

Cross Sector Linkages

34% of the organizations in the inventory are active in more than one clean energy sector

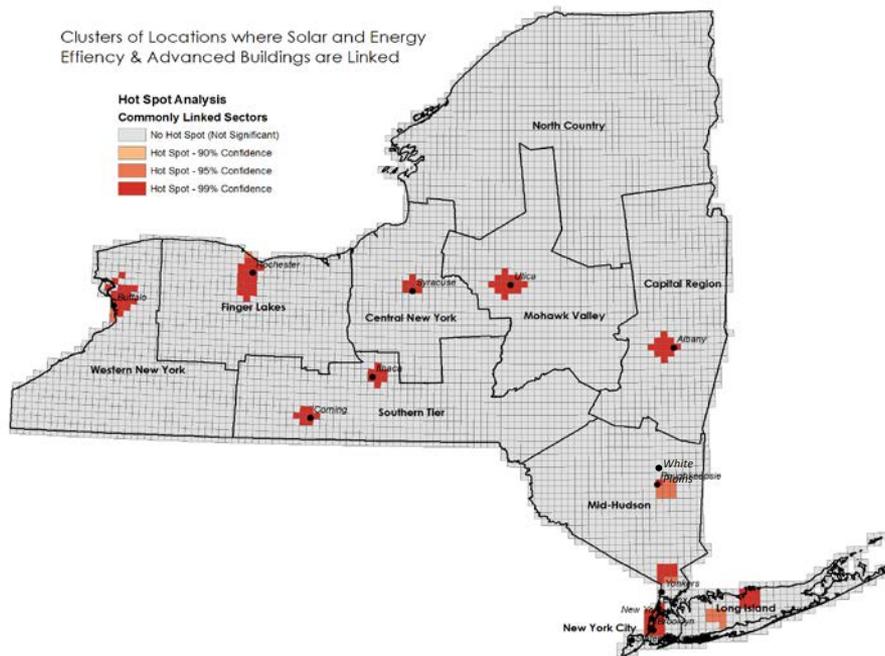
- » Of those organizations, researchers analyzed the most commonly overlapping sectors, and looked deeper into those components of the economy. The most commonly overlapping sectors are:
 - › **Energy efficiency and advanced buildings and solar** (67 organizations)
 - › **Solar and storage** (62 organizations)

Sector	Energy Efficiency and Advanced Buildings	Energy Storage	Transportation	Solar	Bio-energy	Smart Grid	Wind	Hydro-power
Total Organizations by Sector	236	143	118	124	69	62	63	12
Energy Efficiency and Advanced Buildings								
Energy Storage	44							
Transportation	35	41						
Solar	67	62	32					
Bioenergy	28	29	19	25				
Smart Grid	34	33	25	36	19			
Wind	28	36	28	42	21	26		
Hydropower	15	13	13	15	12	12	11	

*Total product entries were considered rather than total organizations. Organizations may have more than one product entry.
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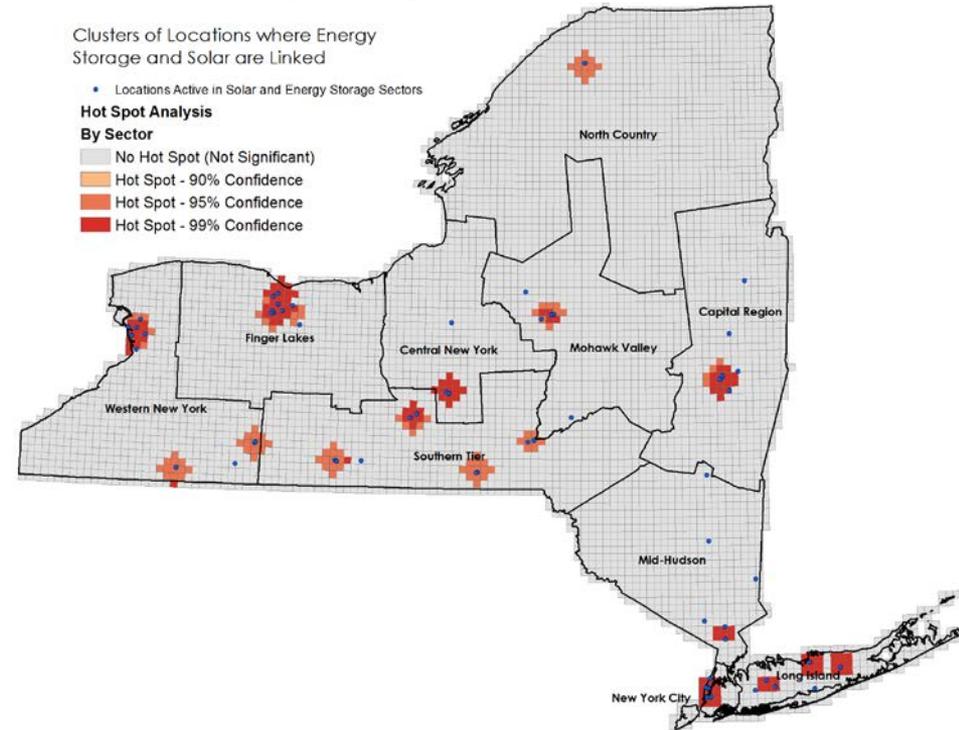
Hot spot analysis of the energy efficiency and solar sectors reveals many small statistically significant urban clusters

- » Some smaller urban areas – including Corning, Poughkeepsie, and White Plains – show statistically significant cross-sector activity between EE and solar
- » Activity also clusters in Buffalo, Rochester, Syracuse, Utica, Ithaca, Albany and NYC/Long Island



Hot spot analysis of organization in both solar and energy storage reveals many small statistically significant urban clusters

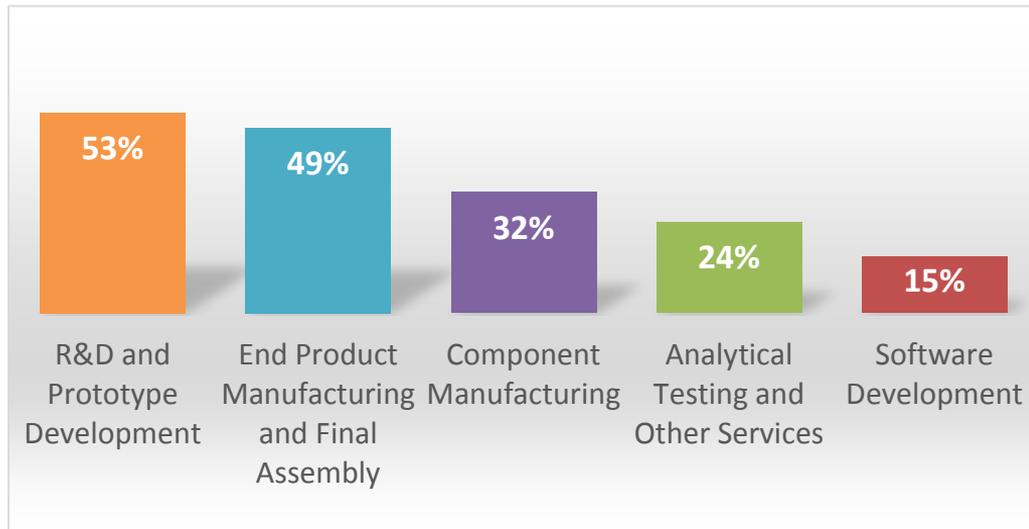
- Rochester hosts the largest cluster, followed by Buffalo and Albany
- One smaller hot spot appears in the North Country REDC area, which is where Clarkson University is located



Value Chain Analysis

Organizations were tracked by their position in the value chain, with R&D and prototype development and component manufacturing as the most common activities

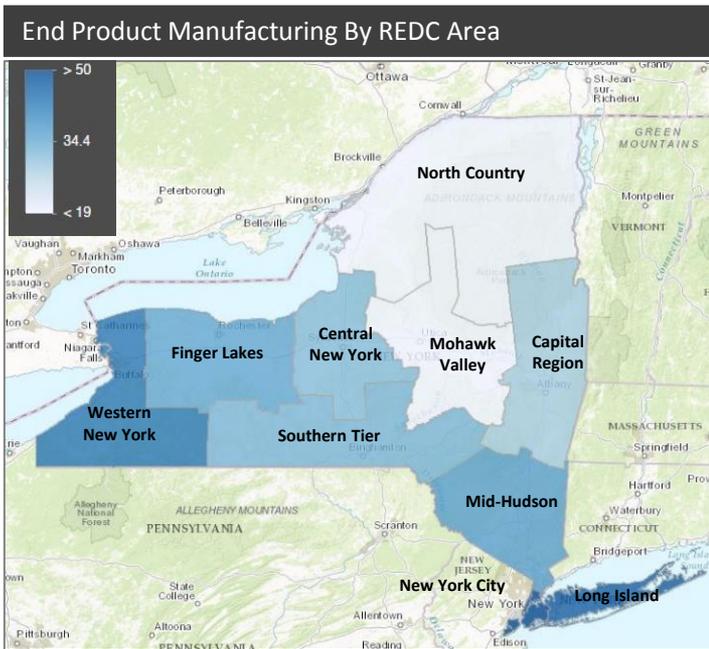
Value Chain Category	Count	Percent of Total
R&D and Prototype Development	316	53%
End Product Manufacturing and Final Assembly	288	49%
Component Manufacturing	191	32%
Analytical Testing and Other Services	139	24%
Software Development	88	15%



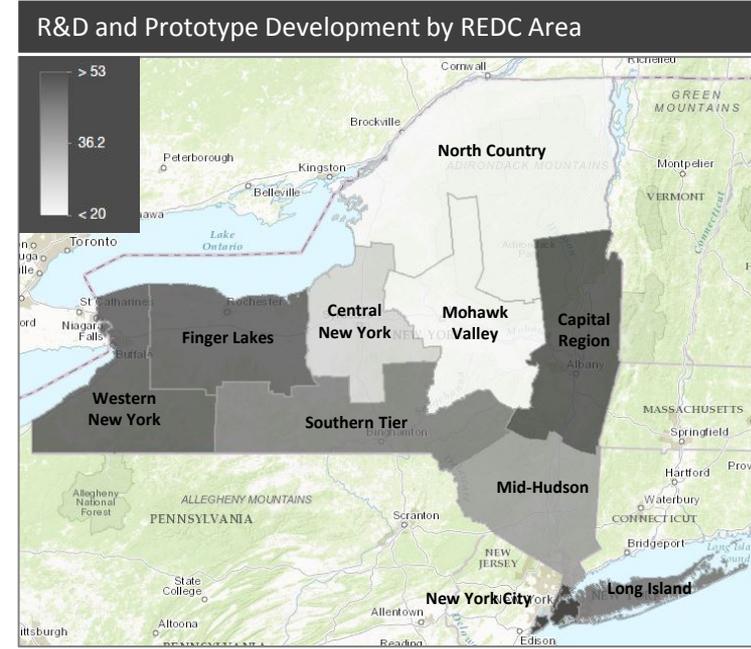
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*Organizations may have more than position on the value chain.

Comparing the distribution of value chain links shows different REDC areas of activity for end product manufacturing and R&D and prototype development



- » NYC, Long Island, and Western New York have the highest concentration of end product manufacturing



- » The Capital Region, NYC, Finger Lakes, and Western New York are strong R&D centers

Value chain positions most likely to overlap include end product manufacturing, R&D, and component manufacturing

- » Chart shows where companies are active in two positions on the value chain
 - › R&D and prototype development and end product manufacturing and final assembly are the most commonly overlapping value chain positions for an organization
 - › Component manufacturing is also more likely to be linked with both R&D and end product manufacturing than other value chain positions
- » Overall, 50% of the organizations in the database are active in more than one position on the value chain. Notably, 50% of organizations are active in only one position.

Value Chain	End Product Manufacturing and Final Assembly	R&D and Prototype Development	Component Manufacturing	Analytical Testing and Other Services	Software Development
End Product Manufacturing and Final Assembly					
R&D and Prototype Development	132				
Component Manufacturing	113	104			
Analytical Testing and Other Services	37	59	49		
Software Development	43	34	20		
				N=591	7

*Total value chain positions were considered rather than total organizations. Organizations may have more than position on the value chain.

Service Provider Analysis

Supply side service providers account for roughly 24% of the organization entries in the database

- **These organizations were classified by the types of services they provide. They include:**
 - Incubators
 - Proof-of-concept-centers (POCCs)
 - Contract manufacturers
 - Test facilities
 - Engineering consultants
- **144 unique organizations are classified as supply side service providers**
 - **Engineering consultants and contract manufacturers are the most common**, with 41% and 38% (respectively) of service providers showing activity in these areas
 - POCCs are the least common, with just 10% activity

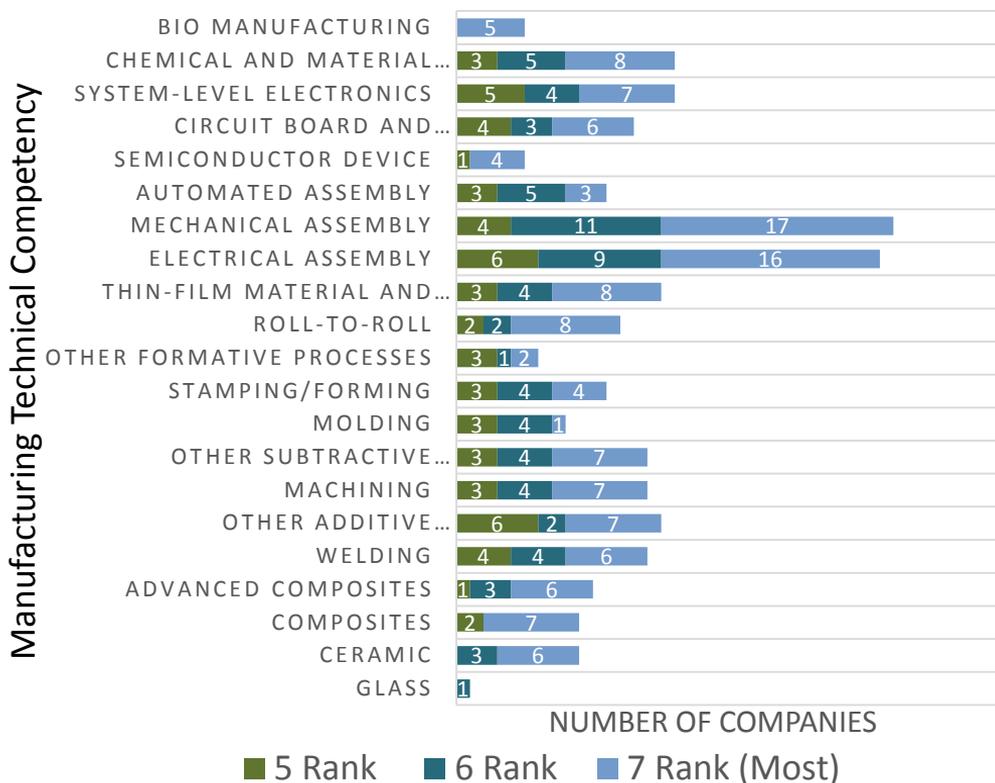
Service Provider Types	Count	Percent
Incubators	28	19%
Proof of Concept Centers (POCCs)	14	10%
Contract Manufacturers	55	38%
Test Facilities	28	19%
Engineering Consultants	59	41%

*Organizations may offer more than one service

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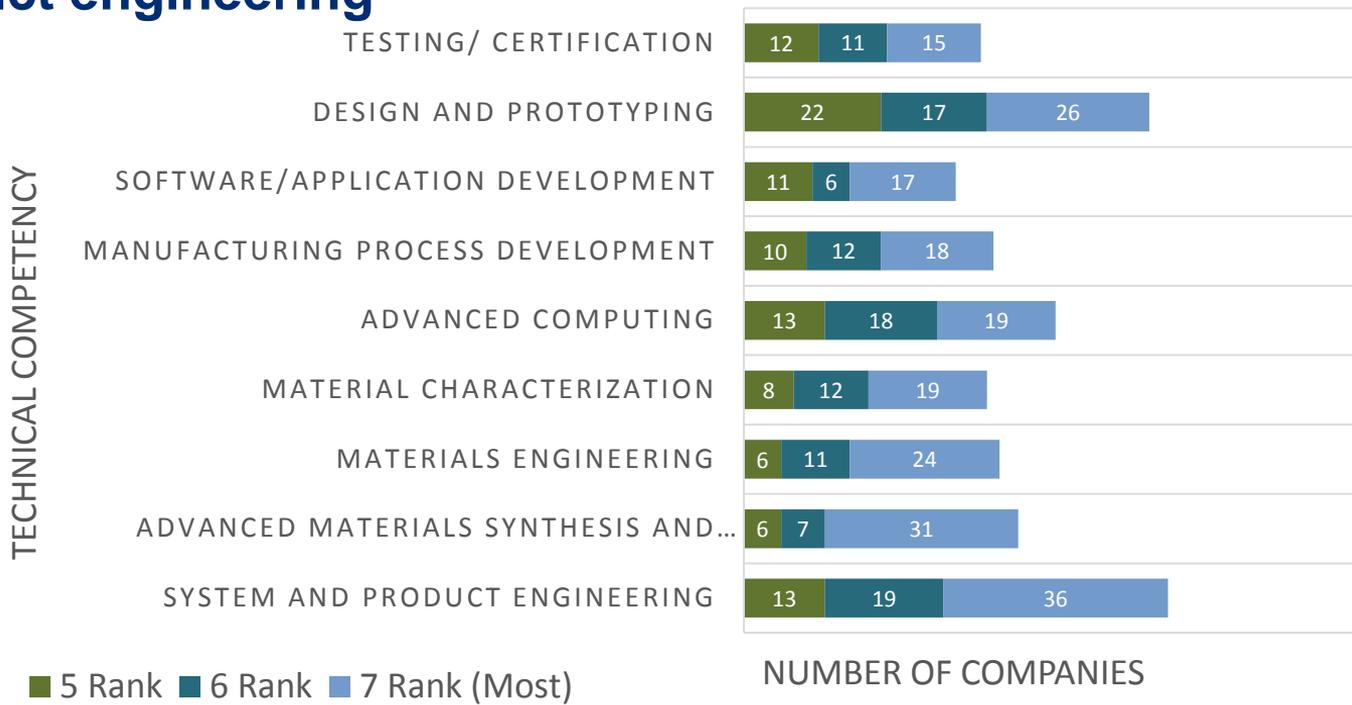
Technical Competencies

With stakeholder input, the study identified the most important technical competencies within manufacturing and R&D



- The study created a **taxonomy for understanding R&D and manufacturing technical competencies** in clean energy.
- 137 organizations in the database responded to a survey which asked for a self-ranking of technical competencies on a scale of 1 to 7.
- New York has clear **strengths in mechanical assembly and electrical assembly** technical competencies.

R&D, testing, and software services technical competency strengths include design and prototyping, advanced materials, and system and product engineering



THANK YOU!



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