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## ISSUE BRIEF:

# ADVANCED INDUSTRIES ACCELERATOR GRANT PROGRAM

BY TIM CASTANO

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In 2015, the Brookings Institution's Metropolitan Policy Program introduced the category of advanced industries, sectors anchored by R&D (research and development) and STEM (science, technology, engineering and math) activity that generate high-wage, high-growth, sustainable and inclusive employment. New Jersey's current advanced-industries profile features certain assets – a sophisticated workforce, an enviable location, engaged higher-education institutions – along with a number of weaknesses, particularly ongoing contraction across related fields.<sup>1</sup> Accepting the benefits of investment in R&D, New Jersey could invigorate its advanced industries by replicating an initiative underway in another state: Colorado's Advanced Industries Grant Accelerator Program, which backs locally incepted innovations in

the pre-investment stage, shepherding technologies and services from the research phase through development to commercialization.

### Key Points

- Advanced industries – sectors anchored by R&D (research and development) and STEM (science, technology, engineering and math) activity – produce high-wage, high-growth, sustainable, inclusive employment and strengthen the foundation of the economy.
- While New Jersey possesses a number of assets with respect to advanced industries, the state has witnessed declines in critical areas and has not kept pace with important national trends.
- Colorado's Advanced Industries Accelerator Grant Program aims to nurture ideas birthed in state research institutions, guiding concepts to commercialization.

The Metropolitan Policy Program defines advanced industries as those areas that spend at least \$450 per worker per year on R&D and employ at least 20 percent of their workforce in STEM-intensive occupations. Fifty advanced industries fall within one of three categories: manufacturing; energy; and services. Individuals employed in these enterprises have seen wage growth at five-times the rate of those in other occupations, while also having received markedly higher average salaries at each level of education. Moreover, 50 percent of the jobs within advanced industries call for less than a bachelor's degree, indicating the advantages can extend to almost every participant in the economy.<sup>2</sup> As the Metropolitan Policy Program notes of advanced industries, "Their dynamism is going to be a central component of any future revitalized U.S. economy. As such, these industries encompass the country's best shot at supporting innovative, inclusive, and sustainable growth."<sup>3</sup>

Advanced industries in New Jersey directly employ 326,130 fulltime workers and indirectly sustain an additional 260,900 jobs. On a regional basis, advanced industries contribute \$72.4 billion of output, accounting for 14 percent of all output. In the state, associated employment pays an average salary of \$105,130, as compared to average pay of \$58,750 for all industries.<sup>4</sup> Even with these encouraging figures, New Jersey has witnessed the deterioration of advanced industries and has not kept pace with important national trends.

The state has experienced an erosion of advanced industries since 1980, when it boasted 16 sectors with employment greater than 1.5-times the national average. As of 2013, New Jersey only houses four recognized advanced industries: basic chemical manufacturing; pharmaceutical and medicine manufacturing; R&D development services; and medical and diagnostic laboratories.<sup>5</sup>

In recent years, New Jersey has lagged behind the nation in terms of employment creation and overall output. Advanced-industry jobs in the state have grown only by 0.2 percent from 2010-2013, as measured against 2.7-percent growth nationwide. New Jersey's advanced-industry output reached 0.5 percent from 2010-2013, below the 3.8 percent enjoyed throughout the country.<sup>6</sup>

As the decline of New Jersey's advanced industries traces not to one ailment, resuscitation will require more than a single prescription. Policies promoting apprenticeship and STEM education, for example, could serve to enhance the state's human capital, an essential element in a knowledge- and skills-based economy. An investment by the state in R&D, especially in promising concepts that have yet to attract the full attention of private markets, presents a strategy supported by history and evidence. Ben Bernanke notes the government has performed well in funding technological innovation, while also outlining the case for intervention: "The primary economic rationale for a government role in R&D is that, without such intervention, the private market would not adequately supply certain types of research."<sup>7</sup> Additionally, the societal gains and spillover effects further strengthen the argument in favor of R&D engagement by the state.<sup>8</sup> Within this context, Colorado's Advanced Industries Accelerator Grant Program offers a model for New Jersey to explore.

With the state's core businesses, particularly aerospace, facing challenges related to depleted expertise, increased competition and decreased investment, Colorado designed the Advanced Industries Accelerator Act, which passed the General Assembly in 2013. The program – governed by clearly articulated goals and metrics – aims to nurture ideas birthed in state research institutions, guiding concepts to commercialization. The state has designated seven advanced industries: aerospace; advanced manufacturing; bioscience; electronics; energy; infrastructure engineering; and technology and information.

With an annual budget approaching \$15 million, Colorado's Advanced Industries Accelerator Grant Program consists of the following components: (a) Proof-of-Concept Grants, which support pre-commercial research and commercialization preparation, with each award potentially totaling up to \$150,000, with matching funds of three-to-one; (b) Early-Stage Capital and Retention Grants, which support Colorado-headquartered startups with less than \$10 million in revenue and less than \$20 million from investors by providing awards up to \$250,000, with matching funds of one-to-two; (c) Infrastructure Funding Grants, which support the development of business infrastructure for collaborative, cross-industry projects, with awards between \$50,000 and \$500,000; and (d) Export-Promotion Grants, which provide stipends to businesses new to exporting or expanding into new export markets, with each award potentially totaling up to \$15,000, with matching funds of one-to-one.

The inherent long-term horizon of R&D gestation likely places beyond quantification the ultimate outcomes of the Advanced Industries Accelerator Grant Program, as three years would not allow for sufficient maturation. Even so, in terms of interest and execution, the undertaking has proved successful, as the state has administered \$35 million grants to 227 organizations since introduction.<sup>9</sup> Examples of awards include \$150,000 to the University of Colorado for flexible thermal ground planes for smartphones and tablets, as well as \$22,500 to the Colorado School of Mines for virus-mimicking polymer molecular brushes as antimicrobial agents.<sup>10</sup>

While Colorado might have yet to realize the true impact of the Advanced Industries Accelerator Grant Program, the policy does speak to the state's commitment to entrepreneurship and technology expansion, which has registered positively in certain assessments. The *2014 Kauffman Index: Startup Activity* ranks Colorado fourth in the nation in terms of startup growth, while New Jersey comes in at 36<sup>th</sup>.<sup>11</sup> In addition, the Milken Institute's *2014 State Tech and Science Index* also ranks Colorado fourth nationally, with New Jersey placing 16<sup>th</sup>.<sup>12</sup> If nothing else, Colorado would appear to have fostered a culture in which advanced industries can thrive.

If New Jersey duplicated the Colorado Advanced Industries Accelerator Grant Program, the move would resemble a return to an earlier practice rather than the breaking of new ground. The Edison Innovation R&D Fund, previously managed by the New Jersey Commission on Science and Technology, awarded grants between \$100,000 and \$500,000 to state-based technology companies for proof-of-concept and

development efforts, so as to assist in delivering products to the commercial market and to harness the associated returns, such as job creation. The state no longer operates the Edison Innovation R&D Fund; however, in light of Colorado's progress, New Jersey could consider implementing a similarly structured instrument. An investment of around \$15 million each year could unlock further the potential of the state's STEM and R&D community, a consequential step toward prioritizing and maximizing New Jersey's advanced industries.

### Notes

<sup>1</sup> Metropolitan Policy Program, "New Jersey's Advanced Industries: What, Where, Why" (Washington, DC: Brookings Institution, 2015).

<sup>2</sup> Mark Muro, Jonathan Rothwell, Scott Andes, Kenan Fikri and Siddharth Kulkarni, "America's Advanced Industries: What They Are & Why They Matter" (Washington, DC: Brookings Institution, 2015).

<sup>3</sup> Ibid., 3.

<sup>4</sup> Metropolitan Policy Program.

<sup>5</sup> Ibid.

<sup>6</sup> Ibid.

<sup>7</sup> Ben S. Bernanke, "Promoting Research and Development: The Government's Role," *Issues in Science and Technology* 27 (4): 37-41.

<sup>8</sup> Steven J. Markovich, "Promoting Innovation Through R&D," Council on Foreign Relations, November 5, 2012; Bernanke.

<sup>9</sup> Alicia Wallace, "Colorado Advanced Industries grant program goes on rural road tour," *The Denver Post*, April 22, 2016.

<sup>10</sup> Colorado Office of Economic Development and International Trade, "Advanced Industries Accelerator Program Awards Almost \$2 Million to Colorado Organizations," Press release, March 12, 2014, available at <http://www.advancecolorado.com/news-events/news/advanced-industries-accelerator-program-awards-almost-2-million-colorado>.

<sup>11</sup> Arnobio Morelix, Robert F. Fairlie, Joshua Russell and E.J. Reedy, *2015 Kauffman Index: Startup Activity* (Kansas City, MO: Ewing Marion Kauffman Foundation, 2015).

<sup>12</sup> Kevin Klowden, Kristen Keough and Jason Barrett, *2014 State Tech and Science Index: Enduring Lessons for the Intangible Economy* (Santa Monica, CA: Milken Institute, 2014).