

2022-2023

Next Generation Manufacturing Canada

# CORPORATE PLAN

# Manufacturing. Revolutionized.

Next Generation Manufacturing Canada leads Canada's Advanced Manufacturing Supercluster.

NGen is dedicated to building world-leading advanced manufacturing capabilities in Canada, for the benefit of Canadians.

We aim to strengthen the Canadian economy and create high value jobs for Canadians while contributing solutions that address some of the world's most pressing challenges in areas like health care, energy and resource management, and environmental sustainability.

NGen works to achieve these objectives by leveraging the research, technology and industrial strengths of Canada's advanced manufacturing ecosystem.

We create new opportunities by supporting, connecting, and strengthening collaboration among manufacturers, engineering and technology companies, service providers, academia, researchers, innovation centres, business networks, funding agencies and investors, and our high-quality workforce, to enhance the competitiveness and growth potential of Canada's advanced manufacturing sector.

Catch up with what's happening in Canada's Advanced Manufacturing Supercluster at [www.ngen.ca](http://www.ngen.ca).

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# Summary: Corporate Plan 2022-2023

NGen has three priority objectives for 2022-2023:

1. Facilitate the successful completion and commercialization of its projects and conclude program funding under its existing Supercluster Contribution Agreement.
2. Obtain additional funding to continue to invest in world-leading advanced manufacturing projects, support ecosystem development initiatives, and sustain NGen's operating budget.
3. Continue to support ecosystem development initiatives that promote Canada's advanced manufacturing capabilities, build connections and collaboration, attract more young people into advanced manufacturing, develop a more highly skilled, equitable, diverse, and inclusive advanced manufacturing workshop, and help manufacturers manage business and technology transformation.

## Program Completion

For the 2022-2023 Financial Year, NGen is planning to make:

- \$105.0 million in actual disbursements enabling the completion of approved and contracted projects. These investments are expected to leverage an additional \$251.7 million in funding from industry and other sources.
- \$1.05 million in direct investments from its operational budget in support of Ecosystem Development Initiatives.

## New Funding

Based on indications of industry interest from our project pipelines, NGen has identified \$650 million in potential industry match for a new round of Supercluster funding, if the ISI program were to be recapitalized, that would extend over the next five years. NGen would invest additional Supercluster funding in four program streams aligned to the federal government's innovation priorities and opportunities identified by NGen members:

1. Zero-Emission Vehicles
2. Net Zero-Emission Manufacturing Processes and Facilities
3. Circular Manufacturing of Materials
4. Accelerated Scale-Up and Adoption of Transformative Manufacturing Technologies.

NGen will also pursue other funding opportunities, including from the federal Pan-Canadian AI Strategy (PCAIS) program to support a new AI commercialization in manufacturing initiative (AI4M).

## Ecosystem Development Initiatives

NGen will continue to build support for its Ecosystem Development Initiatives, placing special emphasis on attracting youth and under-represented groups into advanced manufacturing careers and providing training and resources to help companies improve the management of advanced manufacturing processes and implement net-zero emission facilities.

Over the coming year, NGen plans to:

- Launch another phase of its Careers of the Future campaign with increased financial support from industry sponsors.
- Promote the enrolment of more students across Canada on the VRTA platform and encourage its adoption by BIPOC learners and schools in remote communities.
- Support the expansion of MFI's Indigenous manufacturing entrepreneurship and financial literacy courses to at least 50 schools across Canada.
- Facilitate support and strengthen collaboration across the advanced manufacturing clusters that NGen has funded, with a particular focus on helping grow membership and services provided by the ten start-up clusters that have been created, including the Saskatchewan Indigenous Manufacturing Cluster.
- Develop and commercialize our Transformation Leadership Program with the goal of building a stream of business services revenue to finance future operating expenses for program delivery.
- Raise industry contributions for carrying out the program agendas developed by our Technology Advisory Groups and add additional Groups, particularly in the fields of cybersecurity and advanced materials.
- Provide IP advisory support and develop IP Commercialization Strategies for all our project partners. Our goal is to provide licensable access to more than 100 IP assets on NGen's IP Registry by the end of March 2023.
- Build our network of engaged members to 5,000 across Canada in order to identify a broader range of advanced manufacturing capabilities and facilitate more industry connections and partnerships. We will put special emphasis of engaging researchers, technology providers, and manufacturers around the activities of our Technology Advisory Groups, including partners that we intend to engage in our AI4M program.
- Continue to provide strategic insights to our members and the ecosystem at large through webinars and conference participation.
- Increase our engagement activities and the participation of our members and ecosystem partners in international events and networking opportunities, including participation in the World Manufacturing Forum, World Economic Forum's Global Network of Advanced Manufacturing Hubs, and Hanover Messe.
- Support our ecosystem partners in attracting multinational investments and product mandates to Canada.

# NGen's Five-Year Supercluster Strategy

## Mission

NGen builds world-leading advanced manufacturing capabilities in Canada, for the benefit of Canadians.

## Strategic Objectives

NGen's strategic objectives are aligned with those of Canada's Innovation Supercluster initiative. We aim to leverage Canada's research, technology and industrial strengths, workforce skills, and supporting innovation infrastructure to accelerate industry investment in innovation and the development, scale-up, and productive deployment of advanced technologies in Canadian manufacturing and their commercialization in global markets. Specifically, NGen's operating objectives are to:

- Provide strategic leadership for Canada's advanced manufacturing sector.
- Connect, engage, and strengthen collaboration across Canada's advanced manufacturing ecosystem and internationally.
- Strengthen the competitiveness and growth potential of Canada's advanced manufacturing sector, boosting GDP by more than \$13.5 billion by 2030.
- Create more than 13,500 well-paying full-time advanced manufacturing jobs by 2030.
- Scale and support the growth of SME technology companies and manufacturers.
- Enhance ecosystem support for advanced manufacturing in Canada.
- Support the development of a highly skilled and more equitable, diverse, and inclusive advanced manufacturing workforce.
- Strengthen the innovation and business transformation management capabilities of SMEs.

- Contribute solutions that address some of the world's most pressing challenges in areas like health care, energy and environmental sustainability, and food security.

NGen works to achieve these objectives by:

- Promoting Canada's advanced manufacturing capabilities across the country and internationally.
- Making connections, facilitating innovation partnerships, and improving access to ecosystem resources, including facilities that enable technology scale-up and adoption.
- Funding and supporting the commercialization of collaborative, industry-led projects that have the potential to transform advanced manufacturing in Canada and make significant contributions to GDP, job creation, and the well-being of Canadians.
- Developing and attracting a highly skilled, diverse, and inclusive advanced manufacturing workforce in Canada, with a special emphasis on attracting youth and under-represented groups into advanced manufacturing careers.
- Providing training and resources to help companies improve the management of advanced manufacturing processes and implement net-zero emission facilities.

## Program Funding Streams

NGen supports five program funding streams from the Government's Supercluster contribution:

1. High Potential Technology Development projects that develop and scale new manufacturing processes with the potential to give Canadian manufacturers a significant competitive advantage in world markets.

2. Ground-Breaking Technology Diffusion and Process Transformation projects that involve the adoption of advanced technologies to transform existing manufacturing processes in critical sectors of Canadian manufacturing.
3. Industry-led Ecosystem Development projects that enhance education and training, research and testbed infrastructure, and scale-up supports for Canada's advanced manufacturing ecosystem, and particularly for SMEs.
4. SME Capacity Building projects that support smaller-scale pilots, technology and commercialization feasibility studies, and cluster-building activities.
5. Strategic Ecosystem Development Initiatives that address critical gaps in Canada's advanced manufacturing ecosystem and are funded directly from NGen's own operating budget.

All NGen initiatives undertaken within these program streams are designed to be:

- Transformative – building world-leading advanced manufacturing capabilities in Canada and/or strategic capabilities that enhance the competitiveness of Canada's advanced manufacturing ecosystem.
- Applied – developing advanced manufacturing solutions with significant commercial potential.
- Collaborative – enabling capabilities that no individual company or organization can achieve on its own.
- Enduring – contributing know-how and resources that strengthen Canada's advanced manufacturing ecosystem.

### Powering the Ecosystem

All NGen initiatives, including the industry-led projects in which it co-invests, are intended to contribute to and strengthen Canada's advanced manufacturing ecosystem.

NGen has a unique role to play in this regard by

focusing the attention of ecosystem partners on advanced manufacturing, identifying and supporting industry-led innovation priorities, and building connections and collaboration across an extensive network of manufacturers, technology companies, academic and research institutions, innovation networks, other support organizations, and individual experts that are all part of NGen's membership.

Canada is the home of many technology leaders in advanced manufacturing, world-renown research in the field, and manufacturing companies already active in global supply chains and export markets. But, many of the country's advanced manufacturing assets and capabilities are not widely known. Linkages between researchers and technology companies on one hand and manufacturers on the other, are underdeveloped. Our objective is to build Canada's advanced manufacturing supercluster by expanding and engaging NGen's membership and by networking, supporting, and developing collaborative innovation and commercialization opportunities for members across the ecosystem.

An ecosystem approach is vital to solve the technical and manufacturing problems facing Canadian industry and tackling many of the bigger economic, social, and environmental challenges confronting Canadians, now and in the future. Advanced manufacturing is powering many of the solutions that we need. But it takes an ecosystem to achieve success, and to ensure that the opportunities and value of innovation are captured in Canada.

Collaboration is at the heart of NGen's strategy. World-leading capabilities in advanced manufacturing cannot be built one company or one organization at a time. The pace of technological change, business disruption, and emerging market opportunities is simply too fast for any one entity to take all the risks or command all the resources needed to succeed on its own.

Unique manufacturing solutions depend on integrating knowledge, tools, and capabilities employing a variety of advanced digital, materials, and pro-

duction technologies and techniques. Deployment, scale-up, and commercialization of those solutions depend on maximizing the potential of shared intellectual property and rely on supporting innovation, business services, public sector, and investment infrastructures for their success. Business knowledge and best practices shared across organizations, sectors, and regions are instrumental in enhancing the leadership and management capabilities required to develop and execute new business strategies effectively. Everyone in Canada's advanced manufacturing ecosystem has a stake in developing and gaining access to a highly qualified workforce.

Supercluster funding provides an important incentive for building collaboration and for strengthening Canada's advanced manufacturing ecosystem. All NGen technology-related projects must demonstrate that they will make a significant contribution in the form of intellectual property, education and workforce development opportunities, business knowledge, and/or tools and testbeds that can be shared with other members of the supercluster. NGen also co-invests in industry-led projects that aim to enhance ecosystem capacity, providing direct support for the development of local innovation clusters as well as funding for feasibility and pilot projects to help SMEs demonstrate, test, and scale up innovative manufacturing solutions.

NGen is uniquely positioned to work on behalf of its members by building collaborative approaches to programming, funding, and policy making that supersede organizational and jurisdictional boundaries. To that end, NGen also invests in strategic initiatives that address critical gaps in Canada's advanced manufacturing ecosystem which it funds from its own operating budget. In 2019-2020, NGen conducted a series of consultations with its Board as well with other industry and ecosystem leaders across the country to identify critical gaps and opportunities for strengthening support systems for Canada's advanced manufacturing sector.

Priorities are summarized in NGen's Ecosystem Consensus Report published in May 2020. The report in-

dicates that over 95% of members expect NGen to promote Canada's advanced manufacturing capabilities across the country and around the world. A majority of members also expect NGen to inform public- and private-sector innovation policies about the capabilities, opportunities, and constraints affecting the growth potential of the sector. Other priorities for NGen initiatives include:

- Identification of innovation partnership and business opportunities within Canada and internationally.
- Curated access to thought leadership on advanced manufacturing trends and best management practices around the world.
- Initiatives that address current and future skills shortages in advanced manufacturing, including the attraction of more young people into advanced manufacturing careers.
- Initiatives that enhance diversity and inclusion in Canada's advanced manufacturing workforce.
- Programs that enhance advanced manufacturing leadership and management capabilities.
- Cluster development in new fields of advanced manufacturing like advanced materials, digital twinning and simulation, biomanufacturing and medical technologies, cybersecurity, quantum computing, and artificial intelligence.
- The development of online platforms for diagnostics, training, partnering, IP commercialization, and data sharing.
- Facilitated access to public- and private-sector funding and procurement.

These priorities inform the direct investments that NGen is making in ecosystem development through its project funding as well as its own Ecosystem Development Initiatives.



# Operationalizing our Objectives in 2021-2022

NGen set three priority objectives in its Corporate Plan for 2021-2022:

1. Raise additional funding from public sector agencies and private sector investors in order to sustain NGen's ability to support world-leading, industry-led advanced manufacturing projects and ecosystem development initiatives.
2. Focus greater attention on ecosystem development.
3. Monitor and facilitate the successful completion and commercialization of NGen funded projects.

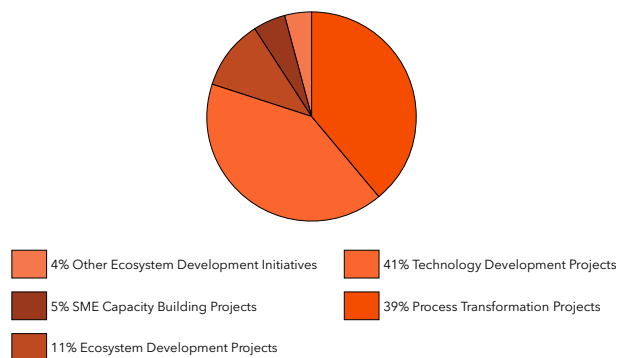
These priorities are reflected in the initiatives that NGen has undertaken for the year. Over the nine months ending December 2021, NGen:

- Raised \$20 million in additional Supercluster funding which we targeted to supporting collaborative initiatives promising the greatest commercial benefit in our existing project pipeline as well as to projects that will enhance advanced manufacturing capabilities across Canada's Electric Vehicle value chain.
- Approved \$16.8 million in additional funding for Ecosystem Development Projects and \$10.2 million for SME Capacity Building Projects. NGen also invested \$4.4 million from its operating budget in Strategic Ecosystem Development Initiatives.
- Saw through the closure of 30 projects (another nine projects have been completed but have yet to be officially closed out). Our closed projects accounted for \$45.8 million in NGen investment. To date, they have delivered \$1.85 billion in new sales and IP licensing revenues and have directly generated 1,030 full-time jobs.

## Program Funding Streams

As of the end of December 2021 NGen had committed \$224.7 million in Supercluster funding to support its five program streams. This represents 99% of its \$226.5 million budget for program funding. NGen's project funding budget is now fully committed. We expect to invest an additional \$1.161 million in other strategic ecosystem development initiatives by March 2022, leaving \$1.047 million to invest during the 2022/23 financial year. Expected funding allocations by project stream up to the end of March 2022 are summarized below. With most of NGen funding directed to projects, the same allocation also applies for the end of March 2023.

**Allocations to NGen Supercluster Funding Streams  
FY 2022 & 2023**



## Projects

In its 2021-2022 Corporate Plan, NGen set the following targets for project funding to be achieved by March 31st, 2022, the end of its financial year:

- Fully allocate NGen's funding budget for technology and ecosystem development projects.
- Approve \$5 million in funding for SME capacity building projects.
- Conclude contracting with projects accounting for at least \$200 million in NGen funding.

- Invest \$82.7 million to offset eligible project costs, bringing NGen's actual cumulative project investment to \$165.3 million.
- Raise at least \$25 million in additional funding for world-leading advanced manufacturing projects.

NGen also secured \$20 million in additional Supercluster funding on top of the \$229.8 million it originally received in the first phase of the Supercluster program. The additional funds have been allocated to support the strongest projects remaining in NGen's project pipeline in 2021 as well as a new challenge aimed at supporting the development of advanced manufacturing processes to build and enhance Canada's Electric Vehicle value chain.

By the end of December 2021, NGen had fully committed its entire project budget. We have approved NGen funding amounting to \$234.1 million in 167 projects valued in total at \$604.9 million. This currently represents an over-commitment of \$16.0 million which we are confident will be covered as a result of future underspending by projects partners and opportunities to obtain additional funding from other sources. NGen has also fully committed its funding budget for SME Capacity Building Projects, having

approved \$10.2 million in 66 feasibility studies, pilots, and cluster building projects between April and December 2021.

At year-end 2021, NGen had 111 projects under contract representing \$181.8 million in approved NGen funding and \$476.3 million in total project investments. We are well on the way to meeting our contracting target by the end of March 2022.

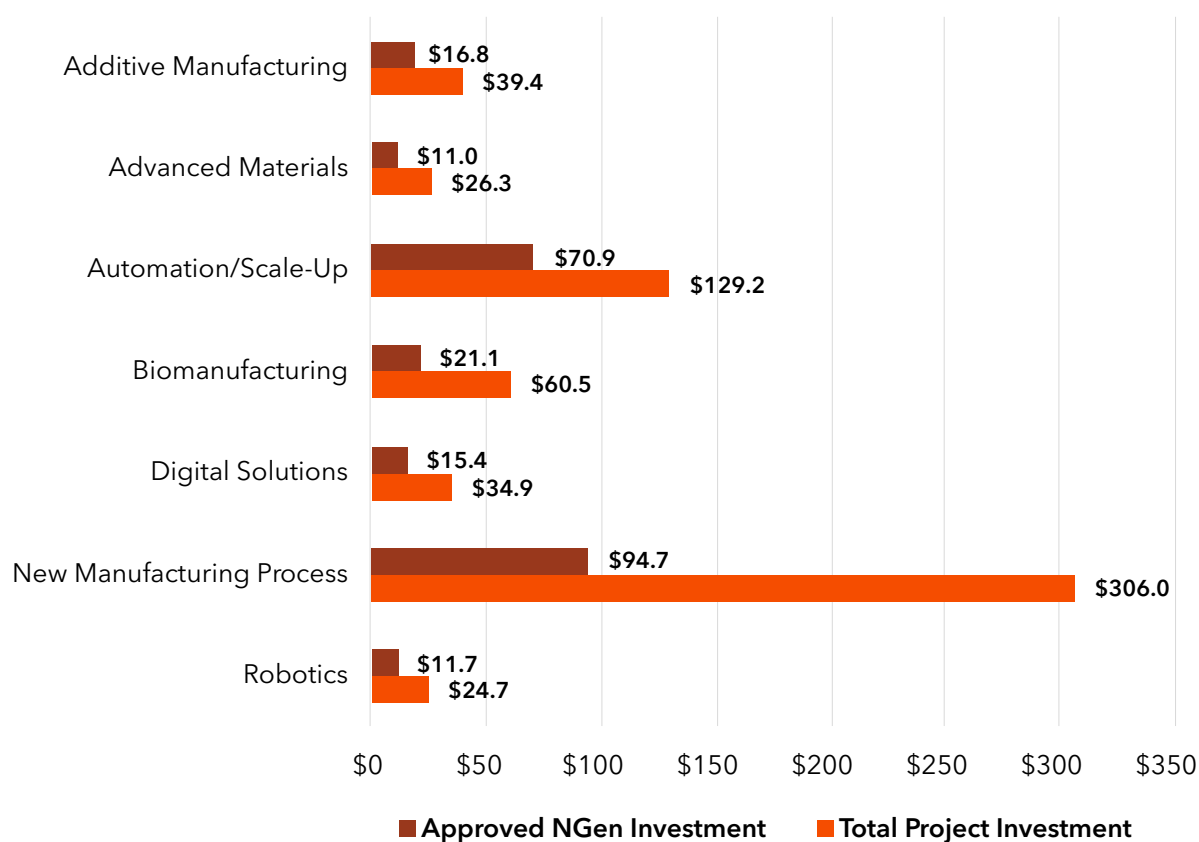
Actual project spending has, however, fallen short of expectations. Financial pressures, market uncertainties, closures, and staff shortages resulting from COVID-19 and supply chain disruptions have delayed many projects. NGen has taken steps to mitigate financial risks for project partners by providing funding advances. Nevertheless, NGen investment (the funding actually flowing to projects to offset eligible costs) amounted to \$34.1 million for the first nine months of the year up to the end of December and is now forecast at \$56.8 million for the end of the financial year in March 2022. That will bring NGen's total actual project investment up to \$113.1 million (about \$50 million short of target) with \$105.0 million left to disburse in 2022-2023.

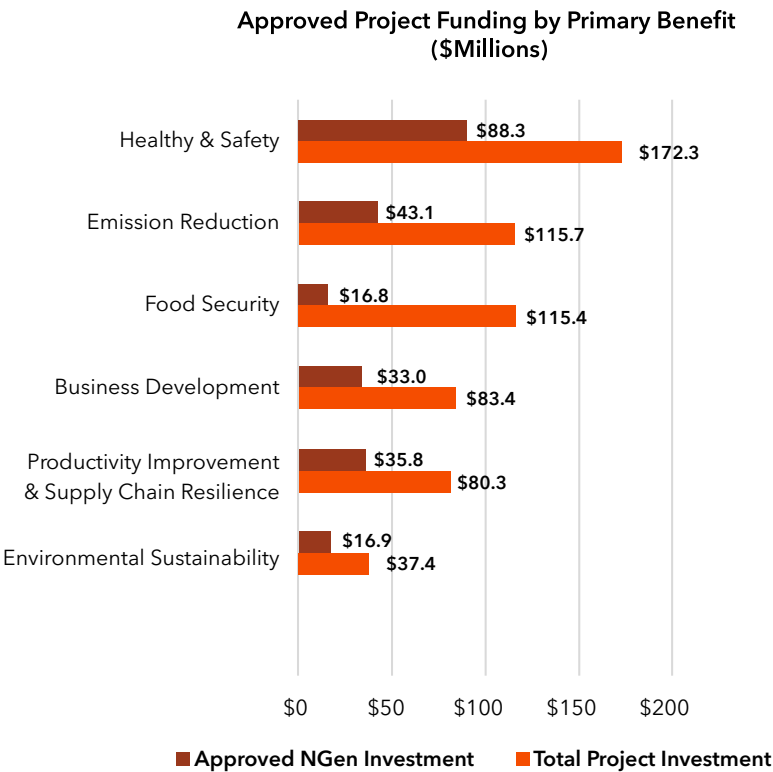
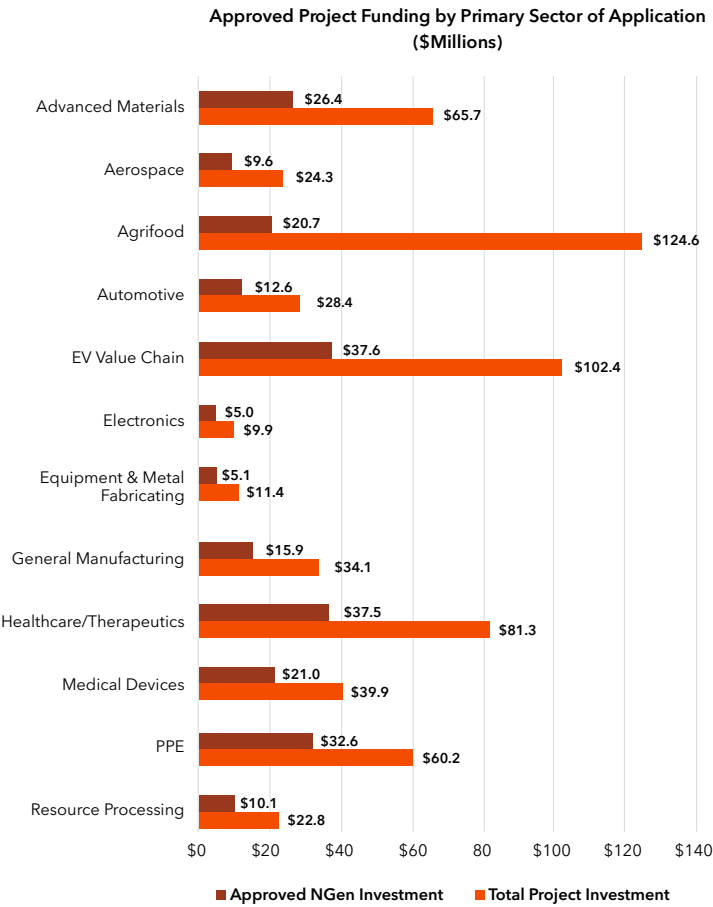
NGen's portfolio of approved projects is summarized below.

By Type of Project	# of Projects	Total # Project Partners	# of Industry Partners	# SME Partners	# Research Partners	NGen Investment	Total Project Investment	Investment Leverage Ratio
COVID-19 Rapid Response Challenge	16	31	23	22	8	\$38.9M	\$50.7M	1.30
Disinfecting Robot Challenge	5	7	7	7	0	\$4.6M	\$9.2M	2.02
Made Smarter Challenge	12	41	34	33	7	\$27.3M	\$60.7M	2.22
EV Challenge	14	48	32	26	16	\$30.8M	\$71.8M	2.33
Open Call Projects	40	204	118	94	87	\$119.9M	\$382.6M	3.19
Capacity Building of which:	79	247	158	146	89	\$12.6M	\$29.8M	2.36
- Feasibility Studies	19	59	43	36	16	\$1.7M	\$4.3M	2.49
- Pilot Projects	44	150	97	94	53	\$9.7M	\$22.6M	2.32
- Cluster Building	16	38	18	16	20	\$1.1M	\$2.9M	2.51
<b>Total Projects</b>	<b>167</b>	<b>579</b>	<b>372</b>	<b>328</b>	<b>207</b>	<b>\$234.1M</b>	<b>\$604.9M</b>	<b>2.58</b>

By Project Status	# Projects	Total # Project Partners	# Industry Partners	# SME Partners	# Research Partners	NGen Investment	Total Project Investment	Investment Leverage Ratio
Completed/ Closed	39	96	74	70	22	\$55.7 M	\$89.7 M	1.61
Contracted/ Underway	72	302	177	153	125	\$126.0 M	\$386.6 M	3.07
Approved/Not yet Contracted	56	181	121	105	60	\$52.4 M	\$128.6 M	2.46
<b>Total Projects</b>	<b>167</b>	<b>579</b>	<b>372</b>	<b>328</b>	<b>207</b>	<b>\$234.1 M</b>	<b>\$604.9 M</b>	<b>2.58</b>

### Approved Project Funding by Type of Solution (\$Millions)





By year-end 2021, NGen's project portfolio consisted of 167 projects involving 579 partners. Among those project teams, there were 372 industry and 207 research partners. Just over 88% of industry partners were SMEs. The strategic role that NGen plays in knitting together Canada's advanced manufacturing ecosystem by connecting and supporting collaboration among researchers, technology companies, and manufacturers across the country is evident in the geographic distribution of project partners.

Project partners are involved in every province across Canada. While 62% are based in Ontario, 12% are located in Quebec, 8% in British Columbia, 16% in the prairie provinces, and 7% in Atlantic Canada. NGen projects also bring partners together across provinces – 55 projects (one-third of the total) involve interprovin-

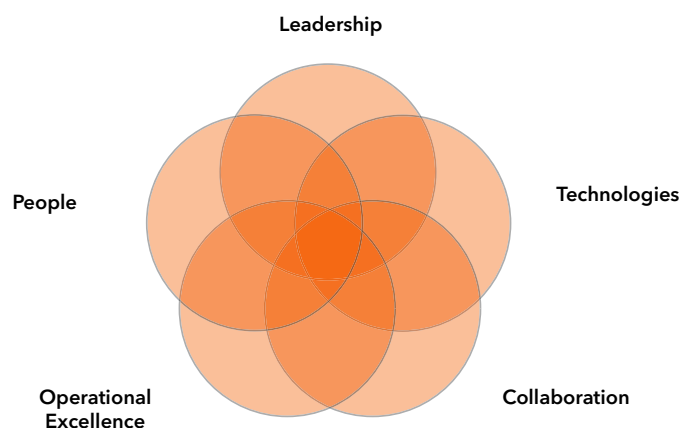
cial collaboration. Four projects involve international research partners.

### Ecosystem Development Initiatives

NGen's Ecosystem Development Initiatives are aligned to supporting transformation across Canada's advanced manufacturing ecosystem. They are activities that NGen funds directly from its operating budget that aim to provide leadership and strategic direction for Canada's advanced manufacturing sector, support existing programs that enhance ecosystem capabilities, connect and encourage collaboration among ecosystem members, and address priority issues identified in NGen's Ecosystem Consensus report where NGen can play a value-adding role by filling in some of the gaps in ecosystem support.

### NGen Project Partners





## Leadership

The objectives behind NGen's Leadership initiatives are to inform NGen members and the public about strategic trends and opportunities reshaping Canada's advanced manufacturing sector, promote Canada's advanced manufacturing capabilities to Canadians as well as on the world stage, and provide expert advice to business as well as policy leaders about advanced manufacturing.

Leadership initiatives include:

- Analysis and reports on strategic industry trends and opportunities.
- What's Next Workshops on current and upcoming industry issues.
- Participation in innovation and industry speaking engagements and events.
- Providing advice on advanced manufacturing to public and private sector organizations.
- Media outreach to the general public.

In its 2021-2022 Corporate Plan, NGen undertook to commission and publish a series of reports on strategic trends and industry opportunities in advanced manufacturing. During the year, NGen partnered with 13 organizations and published ten reports providing in-depth analysis and insights on:

- Canada's advanced manufacturing skills gap

(prepared by EMC, the Excellence in Manufacturing Consortium).

- The standards, certification, and testing infrastructure for PPE products critical in the fight against COVID-19 (in partnership with CSA and NRC-IRAP).
- PPE supply chain constraints and opportunities for improvement (in partnership with the University of Windsor and the Canadian Association of PPE Manufacturers).
- Autonomous Material Discovery and Development (prepared by UBC's School of Engineering).
- How NGen might positively address the problem of single-use plastics (in partnership with Ivey Business School).
- The Circular Food Economy (prepared by the Guelph-Wellington Our Food Future initiative).
- Canadian Automotive Supplier Capability and Electric Vehicle Value Chain Analysis (in partnership with Porsche Consulting, the Automotive Parts Manufacturers Association, and the Trillium Network for Advanced Manufacturing).
- The effectiveness of Ontario's Advanced Manufacturing Consortium model in meeting the needs of industry (prepared by the McMaster Manufacturing Research Institute).
- The state of advanced manufacturing in Newfoundland and Labrador (prepared by Canadian Manufacturers & Exporters Newfoundland & Labrador Division).
- The competitiveness of Canada's manufacturing supply chains (an inhouse NGen report).

NGen also partnered with the Innovation Economy Council in its research and analysis of opportunities for accelerating the commercialization of Canadian cleantech and IP commercialization strategies.

While these reports cover the issues identified in our 2021-2022 Corporate Plan, some have yet to be pu-

blished and NGen's development of a more comprehensive online thought-leadership resource is still a work in progress.

What's Next workshops are opportunities to disseminate strategic insights and engage members in discussions about important trends affecting the industry. NGen undertook to organize at least six online workshops in 2021-2022, including a national summit on supply chain resiliency. The summit took place in June 2021. NGen also organized eight additional webinars on supply chain resiliency, the economic outlook for manufacturers, circular manufacturing, and trends in cybersecurity and machine learning. The summit and webinars attracted around 920 participants with 59,127 subsequent web views. They enjoyed a quality rating of 8.4 out of 10. Two more webinars are planned for the first quarter of 2022, including one on smart factories and another on electric vehicle value chain opportunities for Canada.

NGen also committed to ramping up its efforts in getting the word about advanced manufacturing in Canada to the public as well as to industry groups in Canada and internationally. In 2021, NGen participated in 279 industry- and academic-hosted events, including 17 international speaking engagements. During the year NGen also generated over 115 offline media impressions, 54 million social media impressions, and over 1.5 million engaged website visits.

## Connections and Collaboration

Building connections and strengthening collaboration across Canada's advanced manufacturing ecosystem is at the heart of NGen's strategy to build world leading industry capabilities in Canada.

NGen's initiatives to strengthen ecosystem connectivity and collaboration within Canada include:

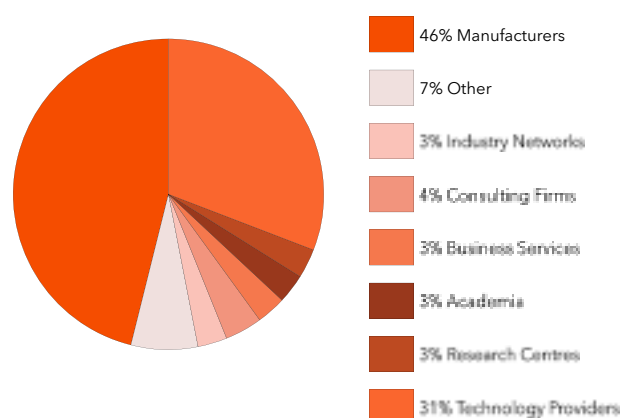
- Membership development enabling the identification and matching of member capabilities.
- Advanced manufacturing Cluster Building Projects and support for cross-cluster collaboration.

- Collaboration workshops and events, as well as facilitating one-on-one connections for NGen members.
- Partnerships with other innovation funding organizations.

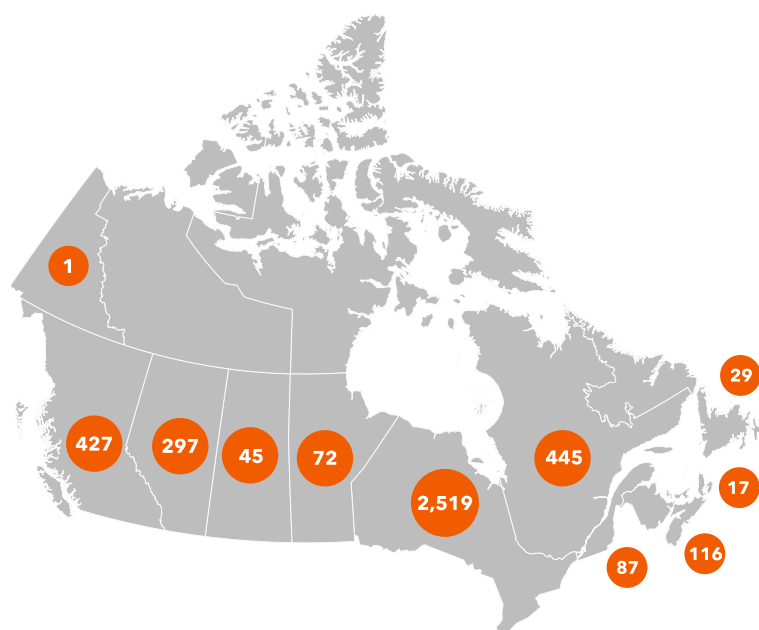
NGen builds its network – and connects the ecosystem – by expanding its membership of manufacturers, technology providers, academic and research centres, innovation and industry clusters, supporting services, public sector agencies, and individual researchers and industry experts. NGen members do not pay a fee to belong to the network, but they are screened and expected to describe their capabilities and how they contribute to advanced manufacturing. That information is then made available for all NGen members, allowing them to identify and connect with potential innovation partners as well as providing NGen with a rich database that we use to map out the ecosystem, promote capabilities, and help facilitate collaborative partnerships and new business opportunities.

In its 2021-2022 Corporate Plan, NGen set a target of reaching 4,000 members by the end of March 2022. The purpose was not only to grow our network but to increase opportunities for engagement in ecosystem initiatives in addition to possible project participation. By December 2021, NGen's membership network had grown to 4,517 members, including 2,750 organizations and 1,346 individual researchers, industry, and technology experts.

**Members by Type of Organization**



## NGen Membership Across Canada



NGen members are located in every province across Canada, as well as in the Yukon. There are also 462 international members. While Ontario accounts for a majority (62%) of NGen's Canadian membership, other regions are also well represented - 11% of members are located in Quebec, 11% in BC, 10% in the prairie provinces, and 6% in Atlantic Canada.

NGen members include industry and business networks as well as organizations that lead advanced manufacturing clusters across the country. NGen Capacity Building Projects provide funding support for industry-led initiatives to set up or enhance digital services for advanced manufacturing clusters. In our Corporate Plan for 2021-2022 we aimed to increase the amount of NGen and industry investment in cluster-building projects to at least \$2 million and to develop connections and collaborative relationships among advanced manufacturing clusters across Canada. From April to December last year, NGen approved support for 15 advanced manufacturing clusters, bringing the total to 17 clusters in our project portfolio. Ten are start-up clusters established as a result of NGen support. Total NGen and industry investment in all clusters now totals \$2.9 million.

NGen's cluster ecosystem brings together more

than 1,750 companies and research organizations from across Canada with an industry footprint that addresses a market in excess of \$50 billion. In addition to funding, NGen plays an active role in providing advice and other support services for cluster management and service delivery, as well as in facilitating collaboration among clusters. All clusters and cluster members have access to NGen services and workshops and our database of member capabilities. They serve as important channels for NGen communication and engagement with the ecosystem beyond NGen membership. They all work to support their own advanced manufacturing networks.

The advanced manufacturing clusters funded by NGen include:

- Saskatchewan Indigenous Manufacturers Network - Forming Canada's first Indigenous Manufacturers Cluster to develop training opportunities for Indigenous youth, share best practices in manufacturing management and technology adoption, and generate new business opportunities for Indigenous manufacturers.
- Ontario Aerospace Council - Created a B2B



aerospace matchmaking platform to grow competitiveness, opportunities & revenues.

- Canadian Association of Mold Makers (CAMM) (pan Canada) - Providing a virtual platform for industry stakeholders to deliver collaborative solutions critical for the continued success of Canadian mold makers. Working with Photonics cluster to manufacture smart products.
- CAPPEM Canadian Association of PPE Manufacturers (pan Canada) - Established a collaborative network of PPE manufacturers to expedite standards certification, enhance the resilience to Canada's PPE supply chain, and commercialize made-in-Canada PPE.
- Reseau Trans AL (QC) - Piloting a competitive edge program that combines photonics, machinery and big data to educate over 250 metal machine shops on the efficiencies that data can deliver.
- Canada Makes (pan Canada) - Leading additive experts from industry and academia are collaborating with manufacturers to solve complex machining challenges in a more competitive way and establish a Canadian brand for additive manufacturing technologies.
- Canadian Manufacturers & Exporters, Newfoundland & Labrador - Establishing a special interest group of manufacturers across NL to better understand the benefits, best practices and efficiencies of Industry 4.0 solutions and help grow business opportunities in an underserved region of Canada.
- Destination AI (pan Canada) - Technology experts are working with manufacturers to commercialize AI in manufacturing applications and accelerate the adoption of those solutions by manufacturers across Canada.
- Saskatchewan Industrial Mining Suppliers Association (SIMSA) - Virtual trade mission to South America generated \$20B in new business opportunities. SIMSA's membership has grown by 23% due to the delivery of digital services enabled by NGen. SIMSA's Carbon Calculator tool is now available to all NGen members. SIMSA and NGen are also partnering to support a Canada-wide Indigenous Manufacturers' Network.
- Wood Manufacturing Cluster of Ontario - NGen has supported the development of a virtual platform to deliver agile workshops, best practices, collaboration and procurement events.
- The Verschuren Centre (Nova Scotia, pan Canada)-NGen has supported the development of innovative bio-ingredient circular economies, bringing SME clean technologies together with manufacturers to replace petrochemical ingredients with bio-ingredients.
- Materials Atlantic (Nova Scotia, pan Canada) - NGen has enabled Materials Atlantic to bring technology expertise in advanced, nano, energetic and battery materials to collaborate with manufacturing. The Verschuren Centre and Materials Atlantic are working together to deliver cross-pollination value.
- Photons Canada (QC, pan Canada) - Photonics and optic technology companies collaborating with manufacturers to deliver new production efficiencies.
- Alberta Manufacturers & Exporters Enhancement Cluster - Bringing together SMEs from across Alberta to connect and collaborate in developing pivot programs and supporting workforce development.
- MARIOS Materials & Reliability in Oil Sands (Alberta, pan Canada) - Helping SME manufacturers with an oil and gas focus broaden their customer base and increase revenues by de-risking Industry 4.0 solutions for greater efficiencies.
- NanoMedicines (Ontario, pan Canada) - Supporting the creation of Canada's first nano-medicines group to advance medical

device, vaccine, diagnostics, and new medical innovations manufacturing. Working with CMC Microelectronics

- Canadian Advanced Air Mobility Consortium (pan Canada) – Starting up new manufacturing capabilities through collaboration between established aerospace and automotive organizations and companies.

NGen works to build connections and collaboration among its members and identify potential partners for innovation projects through a series of collaboration workshops and events, as well as one-on-one interactions with members. We hosted 12 online workshops from April to November 2021 involving over 500 members focusing on partnership opportunities for Capacity Building Projects and our EV Value Chain challenge.

NGen set a target of brokering at least 100 industry partnerships during its 2021-2022 financial year. By the end of December 2021, NGen had brokered 165 additional industry partnerships in projects, including 141 partnerships with SMEs, and recorded an additional 121 partnerships among researchers, technology providers, and manufacturers, in addition to connections made among partners in funded projects.

Collaboration with other funding agencies is also an important way for NGen to leverage financial and program support for advanced manufacturing projects and other ecosystem initiatives. Over the past year, NGen has worked jointly with federal and provincial departments including Innovation Science and Economic Development Canada, Natural Resources Canada, Global Affairs Canada, Agriculture and Agri-Food Canada, Health Canada, Environment and Climate Change Canada, Employment and Social Development Canada, BC's Ministry of Jobs, Economic Recovery and Innovation, the Ministry of Economic Development, Job Creation, and Trade as well as the Ministry of Education in Ontario. We have worked as well with a number of other public sector funding and innovation-support agencies like the National

Research Council, NRC-IRAP, BDC, EDC, the National Science and Engineering Research Council, the Federal Development Agency for Southern Ontario, Prairies Economic Development Canada, the Atlantic Canada Opportunities Agency, Investissement Québec, and Innovate Alberta. We have also established funding agreements with the Digital Supercluster, Protein Industries Canada, Scale-AI, and Canada's Oceans Supercluster, Sustainable Technologies Development Canada, MITACS, Vineland Research Centre, the Trillium Network for Advanced Manufacturing, and the Canadian Food Innovators Network. (NGen played an advisory role in the establishment of CFIN and continues to work with the Network in promoting its funding programs and sharing opportunities for project funding.)

### **International Strategy**

International engagement is a key aspect of NGen's efforts to promote Canada's advanced manufacturing capabilities to the world, find opportunities to build collaborative innovation partnerships in multinational supply chains, attract advanced manufacturing talent and investment to Canada, and develop international commercialization opportunities for NGen members and project partners.

NGen's strategy for international engagement prioritizes promotion, partnerships, investment and other commercial opportunities with those countries, international companies, and innovation programs that are leaders in advanced manufacturing. Country/regional targets include the European Union (particularly Germany, Italy, France, Belgium, and the Netherlands), the United Kingdom, Japan, South Korea, and the United States. Corporate targets include international technology providers, manufacturing companies, and investment firms that have indicated a potential interest in locating or investing in Canada to gain access to the country's advanced manufacturing ecosystem or high-quality talent pool. International partners include advanced manufacturing clusters, export and economic development agencies, and

advanced manufacturing innovation centres, as well as the Eureka! program managed in Canada by NRC-IRAP. NGen is also an active participant in key events related to advanced manufacturing like the World Manufacturing Forum, Hannover Fair, and other international trade shows showcasing advanced manufacturing technologies. NGen works in conjunction with Canadian partners, including Global Affairs, Export Development Canada, NRC-IRAP, Invest in Canada, as well as federal and regional economic development agencies in pursuit of its international strategy objectives.

In its 2021-2022 Corporate Plan, NGen undertook to increase its international engagement and collaboration efforts, placing particular emphasis on the strategic business opportunities that its members have identified – medtech and bio-manufacturing, cleantech and clean energy, aerospace, autonomous vehicles, machine learning and robotics. Over the past year, NGen has taken an active international role, in spite of the cancellation of in-person international events due to COVID-19. Key international engagements in 2021 included:

- Participation in the World Manufacturing Foundation's Scientific Advisory Council, input into WMF reports, and speaking opportunities at the World Manufacturing Forum;
- Leading Canadian participation in 2021's online version of the Hanover Messe, the world's leading advanced manufacturing trade fair. NGen organized a conference program involving Canadian Minister Champagne, Ontario Minister Fedeli, and Quebec Minister Fitzgibbon and featuring four Ontario and Quebec leaders in electric vehicle technology. NGen also organized livestream presentations and networking opportunities for seven Canadian AI, additive manufacturing, and robotics companies during the week-long virtual event resulting in 1,116 qualified business leads from around the world during the event and 43 connections afterwards.
- Presentations to international audiences,

including policy makers and companies involved in the European Union's Horizon program (the event which highlighted Canadian AI and robotics capabilities was organized by NGen in partnership with Science Business and Canada's Mission to the EU), the Canada-EU Workshop on Opportunities in Cleantech (a panel with Canada's Minister of Environment and Climate Change), the Canada-Italy symposium on the hydrogen economy, the Toronto International Investment Forum, Japan Investment Forum, NRCan's symposia on critical minerals and the EV value chain, the Canada-UK Dialogue on Aerospace, Canada-Sweden forum on cybersecurity, as well as online conferences with the US-based Association for Manufacturing Excellence, Korea Technology and Information Promotion Agency, Confederation of Indian Industry, and Asia Business Leaders Advisory Council.

NGen has gained international recognition over the past year as a result of our initiatives. One of our projects, led by the Aspire Food Group which is developing a fully automated facility for processing high quality protein powders, was named by UNESCO as one of the top 10 AI solutions in the world in delivering on the United Nations Sustainable Development Goals. NGen was highlighted by the OECD as a leading example of an innovative cluster initiative. We have also been invited by the World Economic Forum to join its Global Network of Advanced Manufacturing Hubs which showcases and connects leading examples of cluster development in the sector.

## People - Workforce Development

World leading advanced manufacturing capabilities are not built on technology alone. They depend on the development and productive deployment of a highly skilled workforce. NGen is working to build Canada's advanced manufacturing workforce capabilities by attracting more young people into the sector, preparing them with the skills they will need for a successful career in advanced manufacturing,

helping current workers upskill their technology and digital competencies, assisting more female and BI-POC workers to find jobs in advanced manufacturing, and encouraging best Equity, Diversity, and Inclusion (EDI) practices in workforce recruitment and human resource management.

NGen's workforce development initiatives include:

- Our Careers of the Future Campaign, a multimedia campaign and educational website ([www.careersofthefuture.ca](http://www.careersofthefuture.ca)) aimed at attracting more young people, and particularly females and BI-POC students, into careers in advanced manufacturing.
- Student outreach initiatives and connections to work integrated learning opportunities among NGen members.
- An Indigenous Entrepreneurship program to educate Indigenous youth and prepare them with the skills required in advanced manufacturing.
- Support for the Virtual Robotics Training Academy (VRTA), an online platform for students and employees to learn coding and practice with robotics and computer network simulations.
- AMPUP - NGen's open source upskilling program which offers manufacturers easier and lower cost access to modular education and training programs relevant to advanced manufacturing provided that are provided by colleges, universities, and private sector training providers across Canada.
- Development of advanced manufacturing micro-credentials in partnership with colleges and universities across Canada.

In its 2021-2022 Corporate Plan, NGen undertook to launch its Careers of the Future multimedia campaign and educational website. We aimed to realize at least 50,000 engaged visits to the website and set a target of 50% for female engagement. The campaign began in May 2021. By December it had

resulted in more than 357 million offline and social media impressions and 286,916 engaged site visits, 49% of them by females. According to our surveys of students and parents across the country at the beginning of the campaign and again in the autumn of 2021, Careers of the Future has made 144,000 students more aware of advanced manufacturing and helped 1.5 million more young Canadians see themselves potentially in an advanced manufacturing career in the future. The campaign also allowed NGen to award 10 students across Canada a \$10,000 bursary based on winning essays explaining the importance of advanced manufacturing and why they would like to work in the sector.

The Careers of the Future campaign also allowed NGen to engage with more student groups across the country and encourage NGen members to increase work integrated learning opportunities for students. Over the past year, we have participated in 27 online interviews with youth groups including Youth Culture, the Interview Dudes, First Robotics Canada's Youth Council, and Brilliant Labs in Atlantic Canada, leading to virtual appearances in 254 schools across the country and an online audience of more than 50,000 students. Working with MIT-ACS and CEWIL partners, NGen also facilitated more than 3,000 work integrated learning placements for students in its projects as well as among its members across the country.

NGen undertook to launch its Indigenous Entrepreneurship Education Program in 2021. The program aims to inspire First Nations, Inuit, and Métis youth to consider careers in manufacturing, prepare them with the knowledge and skills needed to pursue entrepreneurship and jobs in manufacturing, and provide educational resources for teachers, including connections with local manufacturers. NGen has partnered with the Martin Family Initiative to incorporate manufacturing and financial literacy into its curricula for primary, secondary, and adult Indigenous education. By year-end 2021, pilots were underway at two First Nations elementary schools - Clearwater River Dene in northern Saskatchewan and Morley Community School in Alberta. The pi-

lots involve 215 grade 6 to 8 students and 12 staff members.

Our Corporate Plan for 2021-2022 stated that NGen would support the development of an online robotics simulation platform that will allow students and other users to design, build, program, and test drive robots in a virtual environment and encourage its adoption by school boards across Canada. Over the past year, NGen has worked with Inspire-Tech Canada and Cisco to develop VRTA-Online, a cloud-based learning platform that provides students and employees easy low-cost access to industry-relevant STEM-based simulation programs. The platform currently includes coding courses (Python, Java, R) along with four robotics and eight Cisco network simulator packages. NGen supported a Virtual Robotics bootcamp in the summer of 2021. By the end of December, 2,900 learners from 14 Ontario school boards had been enrolled in VRTA.

NGen also undertook to expand the curriculum, the number of education and training partners, and the number of trainees in its AMPUP program and set a target to support at least 400 trainees through the program by the end of March 2022. Between April and December 2021, NGen added six new education and training partners and increased industry enrolment in AMPUP by 216 trainees. By the end of 2021, 371 trainees from 70 companies across Canada had participated in NGen supported training through AMPUP. Just over 40% of the training involved interprovincial connections facilitated by NGen. Over \$700,000 of training value had been delivered through discounts negotiated between NGen and 23 AMPUP training providers including business schools, schools of engineering, industry associations, and private training organizations.

NGen's AMPUP program was the catalyst for the development of three new micro-credentials in Data Analytics (at Conestoga College) and 3D Visualization and Data Systems and Visualization for Manufacturing at Mohawk College in 2021. It also helped NGen establish connections and new advanced manufacturing micro-credentialing opportunities with

14 university business schools across the country.

In its Corporate Plan for 2021-2022, NGen committed to expanding its workforce equity, diversity, and inclusion initiatives to engage more members in the 50/30 Challenge, identify best diversity and inclusion practices, and connect members to programs across the country that are working to increase the participation of women and BIPOC communities in manufacturing. Accordingly, NGen has continued to promote the 50/30 challenge to its members. We have partnered with Ryerson University's Diversity Institute and the Centre for Global Inclusion to identify global diversity and inclusion benchmarks and best EDI practices in industry and share them with our members. In addition to NGen's support for Indigenous education and the priority we have placed on diversity and inclusion in our Careers of the Future campaign and VRTA initiative, we have also facilitated industry connections with and contributions to organizations promoting diversity and inclusion in Canada's advanced manufacturing workforce. Over the past year, NGen has actively promoted and provided in-kind organizational support to Engineers Canada for its Women in Engineering campaign, CME's Women in Manufacturing campaign, Women in AI, the See it Be it STEM it program, and Black North.

### **Technology Adoption and Scale-Up**

The profitable adoption, deployment, and scale-up of technologies in manufacturing depends on strong business leadership and the effective and efficient management of innovation in pursuit of well-defined productivity improvement and business growth objectives. NGen works to enhance the capacity of companies, and especially SMEs, to manage technology transformation through its Transformation Leadership and Factory Forward programs as well as through support for its Advanced Technology Advisory Groups.

NGen's Transformation Leadership Program (TLP) has been developed in partnership with Dr. Dan Shunk, professor emeritus in Process Engineering at Arizona State University and an international expert

in process excellence and manufacturing change management. TLP is designed to guide manufacturing leadership teams through the steps required for successful digital transformation, providing them with insights and tools that will enable them to gather the information they need to make good business improvement decisions. TLP aims to reduce the risks and costs of making poor decisions about technology adoption and deployment, strengthen competitiveness by improving organizational and supply chain alignment, and enhance collaboration by sharing experiences and best practices about advanced manufacturing management.

NGen undertook to launch TLP online in its Corporate Plan for 2021-2022 and to increase enrolment in the program. Online development of TLP modules is underway. Nevertheless, 85 manufacturing leaders have completed the TLP program to date. Training cohorts have included MHI and its suppliers as well as a consortium of SMEs in British Columbia supported by the BC government.

Factory Forward is a joint venture between NGen and RBC to produce a series of videos showcasing leading advanced manufacturing companies in Canada and best practices in innovation management, together with podcasts on related management and skills development issues. NGen undertook to launch Factory Forward in 2021. By the end of the year two videos had been produced along with a series of podcasts. They are now available on NGen's website, social media, and our Careers of the Future media channels.

As part of its effort to educate manufacturers about how best to deploy advanced technologies and to strengthen connections and collaboration between researchers and technology providers on one hand and Canadian manufacturers on the other, NGen established four Technology Advisory Groups in 2021 focusing on Artificial Intelligence and Machine Learning, Additive Manufacturing, Robotics and Automation, and Digital Twins. The Advisory Groups bring together more than 200 technology leaders from across Canada to work collaboratively in disseminating knowledge and technical know-

how to manufacturers with the aim of accelerating the adoption of advanced technologies and promoting their productive deployment more widely in the sector. Members also work together to identify strategic opportunities for promoting and developing a competitive Canadian advantage for their technology sectors.

NGen's Technology Advisory Groups have each undertaken industry surveys and have published four strategy white papers describing the current state of technology adoption within Canadian manufacturing and opportunities for the future. By the end of 2021 their collaborative efforts have resulted in the formation of two new cluster organizations - Canada Makes and Destination AI. Working with our Additive Manufacturing Group (Canada Makes), NGen has also secured \$350,000 in funding from NRC-IRAP to support the participation of 56 manufacturing companies in small pilot projects to demonstrate new additive technologies.

### **Operational Excellence**

In its Corporate Plan for 2021-2022, NGen undertook to provide its members with access to online tools to help them improve performance and grow their business. Three types of tools have been developed over the past year:

- NGen's online IP Registry containing 44 IP Rights arising from NGen-funded projects that are available for licensing. Five have been licensed to date.
- Strategic Assessment Tools (SATs) based on NGen's Transformation Leadership Program. The SATs are worksheets that provide guidance and assessment criteria for companies looking to improve their management of digital transformation.
- An Industry Carbon Calculator, developed and shared by SIMSA, which provides a methodology and allows companies to calculate their carbon footprint.

In line with its IP and Data Strategies, NGen also aimed to enhance operational excellence among its industry members by running a series of educational workshops and one-on-one consultations, as well as participating in industry conferences, on IP commercialization and cybersecurity. Over the past year:

- NGen's Vice President for Intellectual Property conducted 41 meetings with individual companies to help them develop their IP strategies.
- NGen organized five virtual IP workshops for members with over 632 participants.
- NGen's VP for Intellectual Property also participated in three industry panels involving an additional 497 attendees and led a class at the University of Toronto Law School on IP commercialization in advanced manufacturing.
- NGen's VP for Cybersecurity participated in six industry conferences on cybersecurity in manufacturing.

# Program Support for Ecosystem Development

NGen will have contributed a total of \$168.6 million to advanced manufacturing ecosystem development activities by the end of March 2022, either in the form of direct investments approved for strategic Ecosystem Development Initiatives or from approved funding for ecosystem supports in NGen projects.

All NGen industry-led projects are expected to make a contribution to Canada's advanced manufacturing ecosystem beyond the benefits accruing to participating project partners themselves. Based on approved project plans, approximately 13% of investments in NGen's technology-related and capacity building projects – \$66.8 million in total – will be allocated to activities that contribute to ecosystem development by the end of March 2022. These contributions include developing education and

training programs for students and workers, engaging colleges, universities, and other research centres in project activities, enabling access for smaller companies to technology testing and scale-up facilities, and sharing best practices and industry knowledge. They do not take into account the future benefits that can be expected by sharing IP generated as a result of the projects.

Another \$91.1 million will be contributed through investments that leverage NGen funding for Ecosystem Development Projects. Cluster Building Projects will account for another \$2.9 million in ecosystem support. NGen's direct investments in Strategic Ecosystems Development Initiatives (excluding payroll and administrative costs) will contribute an additional \$7.8 million by the end of March 2022.

Support for Ecosystem Development	Total Investment
Technology and Capacity Building Projects (Estimate)	\$66.8 million
Ecosystem Development Projects	\$91.1 million
Cluster Building	\$2.9 million
Strategic Ecosystem Initiatives	\$7.8 million
<b>Total Allocated to March 31, 2022</b>	<b>\$168.6 million</b>



# Equity, Diversity, & Inclusion Strategy

NGen was an original signatory to the Government of Canada's 50/30 Challenge in November 2020. The organization takes seriously the need and the benefits that will arise from building organizations that are reflective of the diversity of Canadian society and provide equitable career opportunities for employees irrespective of race, gender, physical capability, or sexual orientation.

In line with its 50/30 commitment, NGen will maintain gender parity on its Board of Directors and aims to increase the representation of female and BIPOC employees on its senior management team. Our 16 Board members currently include nine female directors, including our Chair, and seven male directors. Two of the six members of NGen's Senior Leadership Team are women. Among NGen's staff of 42 full- and part-time employees, 22 are women and 11 are people of colour. NGen's 50/30 commitment will inform future career development opportunities and succession planning within the organization.

NGen also takes active steps to enhance equity, diversity, and inclusion within its internal operations as well as in program activities supporting ecosystem development. To that end, NGen has undertaken a review of its operations to identify and rectify cases of unconscious bias in its communications, program development and delivery, and human resource and internal management practices and procedures. NGen's work with Diversity Institute and Centre for Global Inclusion has allowed it to identify best equity, diversity, and inclusion practices for industry that are being applied internally in our own EDI policy and procedures and that we are also communicating to NGen members.

The engagement of women, BIPOC, and LGBTQ+ students and employees is one of the assessment criteria for evaluating NGen funded projects. NGen has also placed a priority on EDI in its Ecosystem

Development Initiatives. We work to ensure that the messaging, role models, and mentors involved in our Careers of the Future campaign reflect the diversity of Canada's student population. We are placing a priority on Indigenous entrepreneurship, education, and cluster building. And, we lend support and engage actively with other organizations that aim to enhance education, career opportunities, and working conditions for female, BIPOC, LGBTQ+, and handicapped students and employees in advanced manufacturing.

# IP Strategy

NGen's Intellectual Property Strategy is critical to achieving our objectives in maximizing the commercial potential and economic impacts of NGen-funded projects, enhancing the IP management capacity of SMEs, and creating new business opportunities for NGen members.

NGen has established clear, transparent, and predictable IP ownership policies and licensing structures with respect both to the Background IP that project partners bring to their collaborative activities as well as to the Foreground IP arising from Supercluster-funded projects, including procedures for NGen members to request and negotiate licenses to use Foreground IP in future commercial applications.

Foreground IP is shared among participating members of project consortia according to the terms of project collaboration agreements developed in consultation with NGen's IP Manager. Wherever feasible, and as determined by IP owners, IP arising from projects is shared with other NGen members. Balancing this availability is a mechanism that enables companies to recoup their investment through licensing/sharing agreements.

An IP strategy is expected for all industry partners participating in NGen-funded projects. It is an important criterion in evaluating and selecting projects for NGen investment. It is also a prerequisite for Collaboration Agreements among project partners that must be concluded before Master Project Agreements are signed off and funding ultimately approved by NGen. Each Collaboration Agreement includes:

- Assurance of adherence to commitments set out in NGen's IP Strategy;
- A right for each participant in a project to access on fair, reasonable, and non-discriminatory terms and subject to relevant competitive issues all Foreground IP arising from the project, at

least for research and development purposes; and,

- A commitment from each project participant to enter negotiations regarding access to Foreground IP arising from the project with other NGen members subject to any limitations placed on such access.

NGen provides direct advisory support to assist project applicants develop their IP strategies during the project application process as well as during the course of project implementation. By the end of December 2021, NGen had provided IP guidance for 253 project proposals. It had also delivered ten webinars on IP management involving the participation of more than 1,285 NGen members. With respect to IP strategy outcomes, NGen had recorded:

- 111 IP strategies developed for NGen-funded projects.
- 532 instances of Background IP contributed to projects.
- 395 instances where Background IP was shared with project partners.
- 557 instances of Foreground IP expected to be created by projects.
- 200 IP rights created.
- 44 IP profiles in its IP Registry available for sharing or licensing with other NGen members.
- 5 post-project licenses granted to date.

# Data Strategy

NGen's data strategy outlines how it will acquire, store, govern, manage, use, and share data to accomplish its mission, achieve its strategic objectives, create value for its clients, carry out its operations, and ensure its long-term business success.

NGen's data strategy is based on leveraging data as a strategic asset – focusing on business results, using data as a competitive advantage for NGen and its members, and supporting NGen's strategic objectives. NGen has implemented robust operational, governance, and compliance processes to ensure data integrity, privacy, and security.

NGen's Vice President of Data, Technology, and Cybersecurity is responsible for developing, implementing, and overseeing the policies and procedures related to the governance and management of data contained in and transferred into, out of, and between Third Party platforms and NGen's corporate services IT stack.

In 2021-2022, NGen undertook important initiatives in the implementation of its data strategy. Analyses of advanced manufacturing capabilities and priorities were published based on data provided by NGen members. NGen upgraded its online collaboration platform that helps members identify prospective partners for innovation projects. It also expanded content in its online IP Registry and increased the information and tools housed on NGen's website.

With respect to NGen's internal management systems, all project application processes and NGen programs were administered online. All project information related to application status, assessments, financial data, as well as project monitoring and outcomes was consolidated into a single platform enabling real-time performance reporting.

NGen also focused on hardening cybersecurity protection for the data it manages. It undertook a

third-party audit of its cybersecurity systems in early 2021. Cybersecurity awareness training is provided to NGen staff on a bi-weekly basis. NGen also ran five virtual workshops for NGen members and other industry participants on cybersecurity. NGen is a member of Canada's Cybersecurity Advisory Council (CSAC) and the Cybersecurity Working Group of the Canadian Centre for Cybersecurity (CCCS). It is a participant in the Government of Canada's Data Trust Project.

NGen continues to enhance the security of its data systems on a regular basis. We are expanding our online services platform, including upgrades to the NGen and Careers of the Future website, enhancements to our virtual education and training programs, developing more innovation partnership and IP sharing opportunities on our collaboration platform, and providing our SME members access to online digital tools that will enable them to improve business performance. NGen also leverages the data it collects from members and website traffic to assess the impacts of its projects and Ecosystem Development Initiatives, increase funding opportunities for its members, and generate additional revenue to sustain the organization beyond the March 2023 conclusion of its current Supercluster Contribution Agreement with ISED.

# Performance Monitoring

NGen monitors the effectiveness and efficiency of its internal operating processes as well as the progress of its projects and programs in order to ensure that risks are mitigated, operating processes are improved, and that projects meet the goals they set as part of their project application, remain compliant with funding rules, and deliver value for the funds committed to their execution.

NGen's project monitoring process aims to help projects achieve the best results possible while ensuring adherence to program deliverables. NGen monitors the progress of projects in its project portfolio on a quarterly basis. Monitoring consists of meetings between project partners and NGen project staff to review key metrics such as the project's progress and performance, risk management, financial management and forecasting; facilitate the project team's IP, exploitation, and commercialization strategy; and report on project outcomes. Upon the completion of every project, a final report is issued describing outcomes and detailing results. Under the terms of NGen's Master Project Agreement, funding recipients are expected to report on the impacts of their projects over a five-year period following the completion of their project.

Project performance and that of NGen as a whole is regularly monitored and evaluated according to the strategic outcomes defined by NGen's Five-Year Supercluster Strategy and those of the Innovation Supercluster Initiative as a whole. We track performance on a number of targets and metrics related to:

- Ecosystem Benefits related to Workforce Development and Business Transformation Management.
  - Workforce Equity, Diversity, and Inclusion
  - Environmental Benefits.
  - Health and Safety and other Social Benefits.
- 
- Leadership.
  - Member and Ecosystem Engagement.
  - Commercialization.
  - Job Growth.
  - Scaling SMEs.

# Progress – Outcomes to Date

Outcomes & Objectives	NGen Initiatives	Performance Metrics – Results By Dec. 2021
Leadership – Promote and raise awareness about Canada’s advanced manufacturing capabilities and trends transforming the industry.		
	Strategic analysis of key industry trends	12 reports on strategic opportunities prepared in collaboration with 13 ecosystem partners.
	What’s Next webinars	1,588 participants in 16 webinars focusing on strategic trends in advanced manufacturing with 59,127 subsequent online views. Webinar quality rating = 8.4/10.
	Public speaking engagements	Speaking engagements in 613 events in Canada and internationally.
	Expert advice on industry conditions and trends	Participation in 25 Boards and Advisory Groups related to advanced manufacturing.
	Public outreach	197 million offline media impressions, 48 million social media impressions, 2 million engaged website visits.
Engagement – Grow and engage NGen’s membership network and facilitate connections and collaboration across Canada’s advanced manufacturing sector and internationally.		
	Expand membership and support network growth across Canada	4,517 members contributing to advanced manufacturing in Canada. Support for 17 advanced manufacturing clusters across Canada. 10 advanced manufacturing cluster start-ups.
	Increase participation in NGen funded projects	579 partners in 167 projects. 372 industry partners. 207 academic and research partners. 38% of project partners from outside Ontario. 1 in 3 projects involves interprovincial collaboration. 4 international research partners.
	Foster new innovation partnerships	4 partnerships created on average per project. 89% of project partners expect to sustain their partnerships. 350 innovation partnerships facilitated in addition to project teams.
	Broker new business opportunities	40,000+ automated matches for quality verified made-in-Canada PPE. 29 funding partners.
	Increase international engagement and recognition	28 international partnership engagements. 34 international conferences, including World Manufacturing and World Economic Forums. Three Canadian delegations to Hannover Fair. Project named by UNESCO as one of Top Ten AI applications in the world in support of the UN’s Sustainable Development Goals.
Commercialization – Add at least \$13.5 billion in GDP to the Canadian economy by 2030 by increasing industry investment and revenue opportunities from the IP, new products and services, and improved processes created by NGen funded projects.		
	Increase investment in innovation	\$370.8 million in incremental innovation investments forecast from approved projects. \$1.58 in incremental investment forecast for every dollar invested by NGen.

Outcomes & Objectives	NGen Initiatives	Performance Metrics - Results By Dec. 2021
	Increase investment in innovation	\$97.5 million in incremental investments realized to date. \$89.3 million in incremental industry investments realized to date. 49% of project partners expect to receive follow-on investments. \$62 million in follow-on investments after project completion.
	Increase industry revenue generated from sales and IP licenses	\$1.85 billion in additional revenue. 40.8X more revenue generated than invested in closed projects. Approximately 6X federal tax revenue generated per dollar of NGen investment.
	Promote IP creation and commercialization	111 IP strategies developed for NGen-funded projects. 532 instances of Background IP contributed to projects. 395 instances where Background IP was shared with project partners. 557 instances of Foreground IP expected to be created by projects. 200 IP rights created. 44 IP profiles in its IP Registry available for sharing or licensing with other NGen members 5 post-project licenses granted to date. Over \$625 million in IP license fees realized.
	Develop new products, services, and processes	350 new manufacturing processes. 319 new products and services.
	Improve manufacturing productivity and supply chain resilience in Canada	\$35.8 million for NGen investments in 47 projects that will enhance the productivity and supply chain resilience of Canadian manufacturers. 68% of project partners expect to see an improvement in overall operating efficiency. 78% of project partners expect to see improvements in supply chain integration.
Employment Benefits - Create at least 13,500 new full-time well-paying jobs by 2030.		
	Create new jobs directly as a result of NGen funded projects	1,030 full time jobs created directly as a result of completed projects. 35,799 new jobs expected to be created by 2030.
	Provide more work integrated learning opportunities for students	203 students engaged with industry partners in NGen projects. 3,000+ work integrated learning placements with NGen members.
Scaling SMEs - Provide SMEs opportunities to grow their business that they would not otherwise be able to achieve on their own.		
	Increase SME participation in NGen-funded projects	328 SME project partners (88% of all industry partners).
	Provide SMEs with scale-up opportunities through feasibility and pilot projects	130 SMEs involved in collaborative pilot projects and feasibility studies. 76% of project partners expect scale-up potential to increase. \$350,000 for 56 SMEs to pilot additive demonstration applications.
	Create new companies to commercialize IP arising from NGen projects	15 new companies created.
	Connect SMEs with global supply chain opportunities	55 SMEs partnering with multinational companies. 64% of project partners expect to access new global markets because of their projects.

Outcomes & Objectives	NGen Initiatives	Performance Metrics – Results By Dec. 2021
Ecosystem Benefits – Strengthen the development of Canada’s advanced manufacturing workforce and enhance the transformation management capabilities of SMEs.		
	Attract and prepare more young people for future careers in advanced manufacturing	286,916 students, parents, and educators accessing information about advanced manufacturing from <a href="http://www.CareersoftheFuture.ca">www.CareersoftheFuture.ca</a> . 1.5 more students see themselves in advanced manufacturing careers thanks to our Careers of the Future campaign. Virtual presentations in 254 schools across Canada. 2,900 students enrolled in online coding courses and virtual robotics simulations.
	Provide upskilling opportunities to enhance the capabilities of Canada’s advanced manufacturing workforce	89% of project partners will upskill their workforce because of their project. \$700,000+ in training value delivered by 23 education and training partners to 371 employees from 70 companies. 3 new micro-credentials in advanced manufacturing for students and adult learners.
	Raise awareness about best practices involved in technology adoption and scale-up	125 technology leaders working together in 4 Technology Advisory Groups to educate manufacturers to increase the adoption of Additive Manufacturing, AI/Machine Learning, Robotics and Automation, and Digital Twin technologies in manufacturing. 8 webinars focusing on specific technology adoption issues with 732 participants. 1,782 participants in NGen IP workshops and conferences.
	Improve the capacity of manufacturers to manage technology and business transformation.	81 manufacturing executives graduated from NGen’s Technology Leadership Program. (Quality rating 9.2/10)
EDI Benefits – Create better employment opportunities for female, BIPOC, LGBTQ+, and handicapped workers in advanced manufacturing.		
	Promote industry engagement in Canada’s 50/30 Challenge and the adoption of EDI best practices across advanced manufacturing	82 of the the original signatories to 50/30 Challenge are NGen members. Quarterly updates and outreach to members about the 50/30 Challenge. 81% of project partners will increase investments in training for employees from under-represented groups because of their project.
	Enhance innovation and business opportunities for Indigenous manufacturers	Supported the formation Canada’s first Indigenous Manufacturing Cluster.
	Support technical skills development, manufacturing entrepreneurship and financial literacy education for Indigenous youth	215 Indigenous students and 12 staff members piloting new manufacturing entrepreneurship and financial literacy courses. Program established to train Indigenous youth in digital design technologies.
	Provide easy low-cost access to online coding and simulation courses for youth in remote communities	Over 900 students enrolled in VRTA from northern Ontario school boards.

Outcomes & Objectives	NGen Initiatives	Performance Metrics - Results By Dec. 2021
	Support ecosystem initiatives that educate, mentor, and increase employment opportunities for female, BIPOC, LGBTQ+, and handicapped individuals and help them focus on advanced manufacturing	In-kind support for Women in Engineering, Women in Manufacturing, Women in AI, See It Be It STEM It, Black North initiatives.
Environmental Benefits - Facilitate the transition to a net zero economy through significant reductions in industrial waste and GHG emissions, improvements in environmental management practices, and the development of globally competitive capabilities for manufacturing more eco-friendly products.		
	Reduce industrial waste and GHG emissions and improve environmental management practices	79% of NGen projects deliver environmental benefits. \$59.9 million for NGen investments in projects intended to reduce GHG emissions and enhance environmental sustainability, leveraging total project investments of \$151.3 million. 25 projects whose primary goal is to reduce GHG emissions.
	Facilitate the transition to a net zero economy and circular manufacturing	\$37.6 million for NGen investments in 23 projects to build a globally competitive EV value chain in Canada, leveraging total project investments of \$102.4 million. 12 projects whose primary goal is to develop new bio-friendly manufacturing processes, including the circular manufacturing.
Health and Safety and other Social Benefits - Save lives and protect Canadians.		
	Develop new medical devices and therapeutics to improve health care for Canadians	\$58.4 billion for NGen investments in medical device and health care projects with total project investment of \$121.2 million. 20 new devices, test kits, and therapeutic products to fight COVID-19, including 2 vaccines. 13 new manufacturing processes for medical devices. 14 new manufacturing processes for health care products and therapeutics.
	Increase the supply of Canadian-made PPE and improve PPE manufacturing processes	\$32.6 billion for NGen investments in PPE manufacturing projects with total project investment of \$60.2 million. 19 new PPE products to protect Canadians from COVID-19. 17 new processes for PPE manufacturing.
	Enhance food security	\$16.8 million for NGen investments in projects that will enhance food security, leveraging total project investment of \$115.4 million.



# Corporate Plan for 2022-2023

NGen has three priority objectives for 2022-2023:

1. Facilitate the successful completion and commercialization of its projects and conclude program funding under its existing Supercluster Contribution Agreement.
2. Obtain additional funding to continue to invest in world-leading advanced manufacturing projects, support ecosystem development initiatives, and sustain NGen's operating budget.
3. Continue to support ecosystem development initiatives that promote Canada's advanced manufacturing capabilities, build connections and collaboration, attract more young people into advanced manufacturing, develop a more highly skilled, equitable, diverse, and inclusive advanced manufacturing workshop, and help manufacturers manage business and technology transformation.

## 1. Program Completion

NGen will use Supercluster funding from its current Contribution Agreement to reimburse eligible project expenses and offset the costs of Ecosystem Development Initiatives incurred up to the end of March 2023.

For the 2022-2023 Financial Year, NGen is planning to make:

- \$105.0 million in actual disbursements enabling the completion of approved and contracted projects. These investments are expected to leverage an additional \$251.7 million in funding from industry and other sources.
- \$1.05 million in direct investments from its operational budget in support of Ecosystem Development Initiatives.

Timelines for project completion depend on the type of project and deadlines for delivery built into the Master Project Agreements undertaken between NGen and project partners.

Timelines for Project Completion				
Type of Project	2020/1	2021/2	2022/3	Total Project Investment
COVID-19 Rapid Response				\$50.7 million
Disinfecting Robot Challenge				\$9.2 million
Made Smarter Challenge				\$60.7 million
EV Challenge				\$71.8 million
Advanced Manufacturing Open Call				\$382.6 million
SME Capacity-Building				\$29.8 million

Throughout the year ahead, NGen will continue to work with project partners to monitor and expedite the successful completion of projects and to provide ongoing assistance where needed in the form of IP strategy support, further connections with potential partners and additional sources of investment, and facilitation of new business opportunities to enhance the commercialization of project outcomes.

At the end of FY2022-2023, NGen will leave a \$2.5 million contingency for cash reserves funded from its industry contributions to cover operating expenses that will be used after March 2023 to meet the final obligations of closing off our current Supercluster Contribution Agreement if the ISI program is not recapitalized.

## 2. New Funding

Based on indications of industry interest from our project pipelines, NGen has identified \$650 million in potential industry match for a new round of Supercluster funding, if the ISI program were to be recapitalized, that would extend over the next five years.

NGen would invest additional Supercluster funding in four program streams aligned to the federal government's innovation priorities and opportunities identified by NGen members:

1. Zero-Emission Vehicles
2. Net Zero-Emission Manufacturing Processes and Facilities
3. Circular Manufacturing of Materials
4. Accelerated Scale-Up and Adoption of Transformative Manufacturing Technologies.

Each program stream would involve investments in industry-led collaborative projects as well as in partnering, education, facilitated services, and workforce development initiatives to strengthen ecosystem supports.

### Zero Emission Vehicles

NGen launched a zero-emission vehicle challenge

in the summer of 2021 to identify industry-led, collaborative projects that will build world-leading manufacturing capabilities across battery and fuel cell electric vehicle value chains – from mineral processing, materials development, and battery production to parts and assembly. Within three months, interested industry partners filed 35 applications for funding. Total industry investment committed to these projects amounted to just over \$180 million. The total request for NGen investment was \$90 million.

These amounts represent a significant underestimate of the amounts that industry will be willing to invest and potential funding requests for NGen. Companies had a very short period of time to develop their innovation projects, find industry and academic partners, and develop robust project plans eligible for NGen funding. NGen also placed limits on the types of projects that it would consider. Funding was capped at \$4 million per project and all projects must be complete by the end of March 2023. With more advance knowledge, more time to plan and identify project partners, and opportunities to use NGen funding to incent higher levels of industry investment in larger projects, commitments and funding requests would be much higher.

### Net Zero Emission Processes and Facilities

Approximately 10% of all project investments approved by NGen (approximately \$20 million) and total industry commitments (\$55 million) during the first phase of Supercluster funding were targeted to developing and applying solutions to reduce GHG emissions from production processes and facilities. These were projects arising from NGen's open call for project proposals. Opportunities arising from a specific call for project applications aiming at achieving net-zero processes and facilities would be much greater, particularly as it would coincide with heightened expectations from both customers and governments to reduce emission footprints.

NGen can support the transition to net-zero manufacturing by providing resources, training, and

connections to facilitate business planning and investments, particularly on the part of SMEs. The cost of process and facility transformation is likely to be much larger than what can be funded directly by NGen. But, NGen can play a strategic role in developing, scaling-up, and proving out collaborative technology solutions that integrate capabilities from across Canada. By supporting later-stage scale-up and application, NGen can work in partnership with earlier stage technology funding agencies like NRC, IRAP, and SDTC as well as with later-stage funding programs like those of SIF, BDC, and regional development agencies that provide investment support for actual implementation in manufacturing facilities.

### **Circular Manufacturing of Materials**

Approximately \$43 million of NGen funding and total commitments of \$118 million from our first phase of Supercluster funding were committed to projects and other ecosystem initiatives aimed at manufacturing processes enabling the re-use or replacement of plastics or other carbon-intensive materials. Industry demand for similar types of project funding is increasing in response to regulations that will phase out single-use plastics or encourage improved methods of carbon capture in materials and materials processing.

NGen has identified more than \$150 million in matchable industry funding requests for projects involving the development and adoption of new processes for manufacturing alternatives to single-use plastics. This amount does not take into consideration applications for projects involving bio-fibres, carbon-fibres, other carbon-infused materials, or the recycling of industrial waste products into new materials and feedstocks, that we have seen in project proposals that were part of our original tranche of funding requests and which we are confident would increase as a result of a targeted circular manufacturing challenge.

### **Scale-Up and Adoption of Transformative Manufacturing Technologies**

NGen's Net-Zero Emission Vehicle Challenge exhausted the funds that NGen has available from its first tranche of Supercluster funding plus the post 2021 budget top-up. Excluding applications for this challenge, there were still 169 projects with 135 currently identified industry partners in our advanced manufacturing project pipeline, with a total funding request of \$443.2 million and total estimated project investments of \$462.8 million. A majority of these projects involve the development and scale-up of unique advanced manufacturing processes or the adoption of advanced manufacturing technologies to enable the scale-up of medical device production, bio-manufacturing, and robotics and automation systems or AI solutions to transform manufacturing processes.

### **Pan-Canadian AI Strategy Manufacturing Commercialization Program (AI4M)**

In addition to Supercluster recapitalization, NGen intends to apply for new funding from the federal government's Pan-Canadian AI Strategy (PCAIS) Commercialization Program which could provide \$25 million to \$50 million in additional funding support over a period of five years for projects aiming to expand and accelerate the successful adoption of Artificial Intelligence and Machine Learning solutions in manufacturing.

In line with our overall goal of building world-leading advanced manufacturing capabilities in Canada, NGen's PCAIS initiative (AI4M) would aim to:

- Expand and accelerate the adoption of Artificial Intelligence and Machine Learning (AI/ML) solutions by Canadian manufacturers;
- Help applied research centres and technology companies scale their capabilities by facilitating the application and commercialization of their AI solutions for manufacturing in Canada and around the world; and,

- Develop a top-tier AI talent pool specializing in advanced manufacturing applications.

AI4M would provide support for the commercialization of manufacturing-related AI solutions identified by NGen's AI/ML Technology Advisory Group as strategic opportunities to build technological and manufacturing leadership in Canada, including:

1. Rapid Prototyping and Testing of materials, products, and processes, including applications in Form and Function Engineering where AI enables design and engineering based on the analysis of what alternative solutions could look like. These applications would build on Canada's expertise in Canada enabling the rapid design, characterization, and testing of materials, motors and powertrains for electric vehicles, medical devices, and genomic applications in biomanufacturing.
2. Systems Optimization, including applications for predictive maintenance and asset optimization, energy efficiency and carbon reduction, demand planning, materials and inventory management, supply chain resilience, and circular manufacturing.
3. Autonomous vehicles and robotics.
4. The development of new AI-enabled digital manufacturing services.

Funding under the program would made be available on a matching basis for collaborative, industry-led initiatives that:

- Promote and raise awareness about Canadian research and technology capabilities in AI for manufacturing as well as potential opportunities identified by manufacturers for AI research, technology development, and employment opportunities in the sector;
- Support the development of a highly qualified and diverse talent pool with expertise in ma-

nufacturing-related AI, including support for secondary, college, and Indigenous AI-related education programs as well as groups like Women in AI that are committed to attracting and supporting the inclusion of employees from under-represented groups;

- Raise awareness among manufacturers about potential benefits, use cases, and best practices for adopting AI solutions and help companies understand how to develop data strategies that will enable them to deploy AI applications effectively;
- Offer companies access to and use of rapid design, engineering, prototyping, and testing platforms that have been developed by Canadian research centres and technology companies; and,
- Develop, pilot, demonstrate, and prove out AI solutions offered by Canadian technology providers in actual manufacturing operations, including support for developing talent pools in manufacturing companies capable of managing data for successful AI deployment.

NGen will also look for opportunities to partner with Scale-AI in jointly supporting projects that involve the adoption and commercialization and supply chain and logistics applications.

### Other Project Funding Opportunities

NGen will continue to pursue other opportunities to obtain funding for advanced manufacturing projects and sustaining our business beyond March 2023 in the event that the Supercluster program is not recapitalized before that time.

NGen is well equipped to pursue two types of funding opportunities:

1. Programs where NGen itself obtains funding to support projects and receives a proportion of that funding for related operating expenses, which can be complemented by management

fees charged to funding recipients (our current funding model).

2. Programs that fund projects directly. Here NGen can play a facilitation role in project development and raise revenue to offset its operating expenses from management fees charged to project partners without having to administer actual funding or project approvals and monitoring itself. This is the model employed by clusters in the Eureka! program.

NGen's network of members, established systems for efficient and responsible administration of projects and project financing, and our strong pipeline of project opportunities are advantages for NGen in pursuing opportunities to assist federal and provincial governments in spending funds already allocated in program budgets.

### 3. Ecosystem Development Initiatives

NGen will continue to build support for its Ecosystem Development Initiatives, placing special emphasis on attracting youth and under-represented groups into advanced manufacturing careers and providing training and resources to help companies improve the management of advanced manufacturing processes and implement net-zero emission facilities.

Over the coming year, NGen plans to:

- Launch another phase of its Careers of the Future campaign with increased financial support from industry sponsors. The next stage of the campaign will engage younger students in grades 6 to 8, update the Careers of the Future website with new video content in addition to more educational materials for students and educators, and organize another contest for students providing bursaries for those with the best projects tied to themes in advanced manufacturing. NGen plans to invest \$600,000 in the next phase of the campaign in 2022-2023 and is aiming to attract additional sponsorships from industry of at least \$2 million.
- Promote the enrolment of more students across Canada on the VRTA platform and especially its adoption by BIPOC learners and schools in remote communities.
- Support the expansion of MFI's Indigenous manufacturing entrepreneurship and financial literacy courses to at least 50 schools across Canada.
- Facilitate support and strengthen collaboration across the advanced manufacturing clusters that NGen has funded, with a particular focus on helping grow membership and services provided by the ten start-up clusters that have been created, including the Saskatchewan Indigenous Manufacturing Cluster.
- Develop and commercialize our Transformation Leadership Program with the goal of building a stream of business services revenue to finance future operating expenses for program delivery.
- Raise industry contributions for carrying out the program agendas developed by our Technology Advisory Groups and add additional Groups, particularly in the fields of cybersecurity and advanced materials.
- Provide IP advisory support and develop IP Commercialization Strategies for all of our project partners. Our goal is to provide licensable access to more than 100 IP assets on NGen's IP Registry by the end of March 2023.
- Build our network of engaged members to 5,000 across Canada in order to identify a broader range of advanced manufacturing capabilities and facilitate more industry connections and partnerships. We will put special emphasis of engaging researchers, technology providers, and manufacturers around the activities of our Technology Advisory Groups, including partners that we intend to engage in our AI4M program.
- Continue to provide strategic insights to our

Estimated Operating Expenses (Millions of Dollars)							
	Full Year 2021/2	1Q 2022/3	2Q 2022/2	3Q 2022/3	4Q 2022/3	Full Year 2022/3	Total to March 2023
Total Operating Expenses	\$14.8	\$2.7	\$2.7	\$2.6	\$2.7	\$10.7	\$40.7
Of which: ISI Contribution	\$6.5	\$1.6	\$1.6	\$1.5	\$1.6	\$6.3	\$31.7

members and the ecosystem at large through webinars and conference participation.

- Increase our engagement activities and the participation of our members and ecosystem partners in international events and networking opportunities, including participation in the World Manufacturing Forum, World Economic Forum's Global Network of Advanced Manufacturing Hubs, and Hanover Messe.
- Support our ecosystem partners in attracting multinational investments and product mandates to Canada.

### Operating Expenses

NGen's operating expenses support general administration costs as well as direct investments in NGen's Ecosystem Development Initiatives. Total cash requirements to support operating expenses for 2022-2023 are budgeted at \$10.7 million, of which \$6.3 million will be funded by the ISI contribution.

## Risk Management

Current and potential organizational and operational risks are identified and reviewed quarterly by NGen's senior management team and Board of Directors. Mitigating actions are undertaken by management to reduce or eliminate risks, and their implementation is likewise reported to and monitored by the Board.

The risks facing NGen over the year ahead and mitiga-

ting actions we are taking relate to:

- Closures, staff shortages, and supply chain challenges that are delaying project progress and spending. NGen is providing cash advances to project teams in order to encourage progress. We are monitoring project performance and cash requirements on a regular basis.
- Project underspending which might leave some NGen funding unspent at the end of March 2023. NGen is currently budgeting an overcommitment of 3.5% of its total project funding budget. We will increase our rate of contribution to projects if excess funds become available over the course of the year.
- Uncertainty about future Supercluster funding and the recapitalization of the ISI initiative which may dilute our momentum in funding advanced manufacturing innovation initiatives and weaken the organization. NGen and other Superclusters are working with ISED to present the strongest case possible for Supercluster recapitalization in the 2022 federal budget. We are also pursuing other opportunities for funding as outlined above.
- Cybersecurity threats to NGen and project partners. NGen has undertaken a cybersecurity audit and is continually upgrading cybersecurity protections and staff training. We are leading cybersecurity workshops for members and partnering with other organizations to provide education and tools that will help our members assess and address cybersecurity threats.

# Financial Management

NGen will ensure that by the end of March 2023 industry matching funds contributed to supporting project activity will at least equal the Supercluster funds invested in its project portfolio (excluding projects related to COVID-19 where the 50:50 matching ratio has been waived). NGen will also ensure that at least 25% of operating expenses are offset by contributions from industry or other sources apart from Supercluster funding. (This requirement was also waived for NGen's 2021 financial year.) Industry contributions for operating expenses come from administration fees charged to the partners participating in projects approved for NGen funding, as well as from sponsorships, in-kind contributions, and other user fees related to NGen activities and services. To date, industry contributions in projects well exceed the amount of NGen investment.

**Anticipated Revenue from other Sources**

	In \$000s
Industry Contributions towards Eligible Project Costs	226,833
Project Management/Administration Fees	—
Conferences and Sponsorship	25
Membership and Registration Fees	25
Other Government Contributions	24,900
Interest Income	100
Sponsorship	—
Other: In-Kind Contributions towards OPEX	<u>150</u>
<b>Total</b>	<b><u>252,033</u></b>

**Industry Matching Funds**

	In \$000s
Industry Contributions towards Eligible Project Costs	226,833
Project Management/Administration Fees	—
Membership and Registration Fees	—
Other Amounts and Fees	<u>300</u>
<b>Total</b>	<b><u>227,133</u></b>

There are no amounts owing to the Crown pursuant to legislation, NGen's Supercluster Contribution Agreement, or any other agreement.



## Planned Statement of Operations for year ending March 31, 2023

UNAUDITED

### WITH INDUSTRY CONTRIBUTIONS

in \$ 000's	Latest Forecast 2022	Plan 2023	5 YEAR Plan 2023
<b>REVENUES</b>			
Federal Contributions			
OPEX	12,304	5,819	31,732
Projects & Programs	56,771	106,164	218,033
In-Kind Contributions	300	100	641
Industry Project & Other Contributions	91,316	226,833	349,832
Other Government Contributions	6,500	24,900	33,480
	167,191	363,816	633,718
Administration Fees	5,400	0	10,644
Sponsorships, Fees & Other Income	150	700	766
<b>TOTAL REVENUES</b>	<b>172,741</b>	<b>364,016</b>	<b>645,128</b>
<b>EXPENSES</b>			
Project Expenditures	53,829	97,448	206,032
Program Expenditures	2,942	7,516	12,000
Industry project & other expenditures	91,316	226,833	349,832
Other Government Contributions	6,500	24,900	33,480
	154,586	356,696	601,344
Salaries & Benefits	5,359	5,810	19,216
Advanced manufacturing ecosystem initiatives	5,561	1,047	8,848
Outsourced Services	1,969	1,774	6,333
Administration & Governance	756	908	3,216
Communications & Events	187	135	834
Amortization of Capital Assets	1,000	1,000	2,264
	14,833	10,674	40,711
<b>TOTAL EXPENSES</b>	<b>169,419</b>	<b>367,371</b>	<b>642,055</b>
<b>EXCESS / (SHORTFALL) OF REVENUE OVER EXPENSES</b>	<b>3,322</b>	<b>(3,355)</b>	<b>3,072</b>
<b>NET ASSETS (DEFICIENCY) - Beginning</b>	<b>3,106</b>	<b>6,427</b>	<b>(1,025)</b>
<b>NET ASSETS (DEFICIENCY) - Ending</b>	<b>6,427</b>	<b>3,072</b>	<b>2,047</b>

