VIRGINIA ISRAEL ADVISORY BOARD

COMMONWEALTH OF VIRGINIA
OFFICE OF THE GENERAL ASSEMBLY

MEMORANDUM

TO: His Excellency Governor Ralph Northam
The Honorable Eileen Filler-Corn - Speaker of the House
The Honorable Mamie E Locke - Chairman Joint Rules Committee

FROM: Mel Chaskin – Chairman, Virginia Israel Advisory Board

DATE: December 11, 2020

RE: FY 2020 Annual Review of the Virginia Israel Advisory Board

CC: Distribution List (Attached)

The first VIAB Economic Impact Study done on Oran Safety Glass (OSG) by Old Dominion University, Dragas Center for Economic Analysis and Policy was released showing that the 10 year economic impact of OSG on the Commonwealth of Virginia (2000-2019) was a $400 million dollar contribution to the Virginia economy. This was 2000 times VIAB's 2019 budget and 100 times VIAB's budget since inception and will continue as an on-going economic impact for the foreseeable future.

Mel Chaskin
Chairman, Virginia Israel Advisory Board

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VIRGINIA ISRAEL
ADVISORY BOARD

COMMONWEALTH OF VIRGINIA
OFFICE OF THE GENERAL ASSEMBLY

Virginia Israel Advisory Board

Annual Report
FY 2020

December 1ST 2020

Mel Chaskin – Chairman

Chuck Lessin – Vice Chairman

Dov Hoch – Executive Director

December 2020

Executive Director's Message

The most telling indicator of the Virginia Israel Advisory Board's success in fulfilling our economic development mission and achievement of the Commonwealth's public policy goals over the past year was Governor Northam and Secretary of Commerce Brian Ball's comments during a meeting with Energix in Israel (November 2019). The Governor thanked the Chairman of Energix for investing $130m in solar energy farms throughout Virginia. This fulfilled a core component in attaining the Commonwealth's renewable energy targets.

ENERGIX GROUP
CREATING YOUR GREEN ENERGY

During my two years as Executive Director, a single company (Energix) invested $130m and had a $33m economic impact on the Commonwealth - which is 150 times our annual budget.

Non-Financial Measurements: Throughout the annual report there are citations of fruitful Commonwealth-wide collaboration with a multitude of public and private concerns. For me, these are clear non-financial measurements that vindicate broad acknowledgment from scores of economic institutions of our value and as a tiny organization helps us to significantly leverage our resources for greater impact.

Post Corona Approach: We've positioned the Virginia Israel Advisory Board to overcome the constraint of not meeting in person by enhancing our online partnership platform which allows Virginia and Israeli companies to present their offerings, partnership interests and interact to advance business.

My thanks to the Board of Directors of the VIAB, particularly the leadership of Chairman Mel Chaskin and Vice Chairman Chuck Lessin who tirelessly volunteered countess hours throughout the year. In the coming year, we hope to remain an economic engine contributing to the Commonwealth of Virginia's economy.

Dov Hoch
Executive Director
Virginia Israel Advisory Board

Chairman's Message

FY 20 was a challenging year due to COVID -19, but we were still able to accomplish many positive activities.

Some highlights are Governor Northam's economic trip to Israel. This being the first trip outside of Europe, indicating the importance of Israel in the economic development strategy of the Commonwealth.

The Israel Ministry of Defense delegation came to Virginia. We established an on-going defense and maritime program which leverages the strong synergies between Israel and Virginia in these segments.

The first VIAB Economic Impact Study done on Oran Safety Glass (OSG) by Old Dominion University, Dragas Center for Economic Analysis and Policy was released showing that the 10 year economic impact of OSG on the Commonwealth of Virginia (2000-2019) was a $400 million contribution to the Virginia economy. This was 2000 times VIAB's 2019 budget and 100 times VIAB's budget since inception and will continue as an on-going economic impact for the foreseeable future.

I am very grateful to our Executive Director, Dov Hoch, in accomplishing these and other economic advantages for Virginia during this challenging period.

I would like to thank our Board members who provided a balanced presence throughout the Commonwealth and have contributed their time, contacts, and resources to advancing our mission.

Mel Chaskin
Chairman
Virginia Israel Advisory Board

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Governor Ralph Northam Visited Israel With the Virginia Israel Advisory Board

The three days in Israel involved business and government meetings throughout the country and an evening event attended by 200 people. The Governor flew directly to Israel on the recently launched direct United flight from Dulles to Tel Aviv.

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Governor Northam with the Virginia Israel Advisory Board Executive Director Dov Hoch

The Governor's third trip abroad and first outside Europe was to Israel - indicating the importance of Israel in the Commonwealth's Economic Development Strategy.

Governor Northam Met With Israeli Companies Who, In The Past Year Alone, Invested $500 Million In Virginia

Energix, a renewable energy company traded on the Tel Aviv Stock Exchange, that invested $130m in the past two years building solar energy farms throughout the Commonwealth. Energix also built its U.S. headquarters in Arlington and hired 33 people. The company's long-term commitment to Virginia includes ownership and management of solar farms in Virginia for decades.

Elbit Systems, multi-billion dollar defense contractor Elbit Systems Ltd. (NASDAQ: ESLT) (TASE: ESLT), recently acquired Roanoke-based Harris Night Vision for $350m.

Israel Aerospace Industries Ltd. (IAI), who expanded its North American headquarters in Virginia and moved to new offices in Herndon. "I am grateful for the opportunity to meet with IAI officials in Tel Aviv to discuss ways we can strengthen economic ties between Virginia and Israel." said Governor Northam in this press release.

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Israeli Ministry of Defense Delegation Developed Partnerships with Commonwealth of Virginia Companies

Governor Ralph Northam met the delegation of 16 Israeli companies in his office after having met with the Israeli Ministry of Defense in Tel Aviv in November.

At the invitation of Governor Northam, the Israeli Ministry of Defense brought a delegation of 16 companies to Virginia. The delegation, including the three largest Israeli defense contractors, sought to source goods and services in Virginia and develop R&D, manufacturing and sales partnerships. They conducted 200 B2B & B2G meetings throughout the Commonwealth which have already begun to birth new business in Virginia.

The four-day-event (Feb. 3-6) in six cities involved meetings with **Governor Ralph Northam**, Secretary of Commerce and Trade **Brian Ball**; Secretary of Public Safety and Homeland Security **Brian Moran**; the Mayor of Virginia Beach, **Mr. Bobby Dyer**; Mayor of Norfolk, **Kenny Alexander** and Mayor of Hampton, **Donnie Tuck**, as well as, ten county & city EDAs.

This year, Israeli defense companies have significantly expanded and invested throughout Virginia including Elbit Systems $350m acquisition of a Roanoke company and Israel Aerospace Industry (IAI) moved its North America HQ to Herndon, which Governor Northam announced when he visited IAI in Israel in November.

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Economic Impact Analyses of the Virginia Israel Advisory Board – Israeli Company Case Studies

The Dragas Center for Economic Analysis and Policy in the Strome College of Business at Old Dominion University conducted case studies on the economic contribution of individual Israeli companies to the economy of Virginia.

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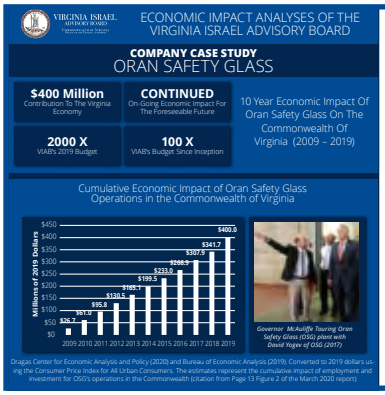
Energix Renewable Energy

$130m investment over the last two years rendered economic impact of $33 million.

Economic impact = 150 times Virginia Israel Advisory Board's annual budget.

VIEW ENERGIX CASE STUDY



Oran Safety Glass

$400m economic impact over a decade.

Economic impact = 2000 times Virginia Israel Advisory Board's annual budget.

VIEW ORAN CASE STUDY

Thomas Jefferson "Commerce With All Nations" Award

We inaugurated a certificate of appreciation to recognize people and organizations who partner with the Virginia Israel Advisory Board in an on-going manner. The award is ceremonially cited as: Thomas Jefferson's "Commence with all Nations". This year's recipients indicate the range of Commonwealth-wide institutions the Virginia Israel Advisory Board collaborates with and vindicates the value these concerns place on our undertakings.

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Post Coronavirus Partnership Building Platform

Acknowledging the prolonged period during which travel and face-to-face meetings will be limited, the Virginia Israel Advisory Board (VIAB) enhanced our online partnerships platform. The platform pairs Virginia and Israel companies allowing them to present their offerings and indicate their partnership interests. The platform is secure and only companies who enter their information and are vetted can access it.

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The Virginia Manufacturers Association (VMA) signed an MOU with the Manufacturers Association of Israel and works with the Virginia Israel Advisory Board to find Virginia partners and suppliers (exporters) for Israeli companies.

Promoting Virginia in Israel - Virginia Israel Advisory Board Segment Focus

The Virginia Israel Advisory Board focuses our activities on industries that have strong synergies between Israel and Virginia (e.g. defense and maritime) and on those that will render the greatest economic impact (e.g. manufacturing and tech).

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University of Virginia Students are Consulting Israeli Companies

Forty UVA students are participating in the Tamid Group Program and performing research for Israeli companies.

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Governor Ralph Northam Visited Israel With The Virginia Israel Advisory Board

The three days in Israel involved business and government meetings throughout the country and an evening event attended by 200 people. The Governor flew directly to Israel on the recently launched direct United flight from Dulles to Tel Aviv.

Governor Northam, Secretary of Commerce and Trade Brian Ball (right) and Virginia Israel Advisory Board Vice Chairman Chuck Lessin (left) at a meeting with Energix in Tel Aviv (November, 2019).

Governor Ralph Northam met with leading Israeli companies who in the past year alone invested $500m in Virginia (i.e. more than 2000 times the Virginia Israel Advisory Board's budget in the corresponding period). A sample of the companies the Governor met with are:

Elbit Systems, multi-billion dollar defense contractor Elbit Systems Ltd. (NASDAQ: ESLT) (TASE: ESLT), recently acquired Roanoke-based Harris Night Vision for $350m.

Israel Aerospace Industries Ltd. (IAI), who expanded its North American headquarters in Virginia and moved to new offices in Herndon. "I am grateful for the opportunity to meet with IAI officials in Tel Aviv to discuss ways we can strengthen economic ties between Virginia and Israel." said Governor Northam in this press release.

Strauss Group, who owns Sabra Dipping (Hummus) in Colonial Heights through a joint venture with PepsiCo. invested $170m in Virginia over the past decade.

Governor Northam's delegation to Israel included his senior economic team: Secretary of Commerce and Trade **Brian Ball**, Secretary of Agriculture and Forestry **Betina Ring**, Virginia Tourism Corporation President and CEO **Rita McClenny**, Senior Virginia Economic Development Partnership staff, Virginia Israel Advisory Board Vice Chairman **Chuck Lessin** and Executive Director **Dov Hoch**.

The Virginia Israel Advisory Board planned the Governor's trip with the Virginia Economic Development Partnership over the course of several months.

Israeli Ministry Of Defense Delegation Developed Partnerships With Virginia Companies

At the invitation of Governor Northam, the Israeli Ministry of Defense brought a delegation of 16 companies to Virginia. The delegation, including the three largest Israeli defense contractors, sought to source goods and services in Virginia and develop R&D manufacturing and sales partnerships. They conducted 200 B2B & B2G meetings throughout the Commonwealth which have already begun to birth new business in Virginia.

The four-day-event (Feb. 3-6) in six cities involved meetings with **Governor Ralph Northam**, Secretary of Commerce and Trade **Brian Ball**; Secretary of Public Safety and Homeland Security **Brian Moran**; the Mayor of Virginia Beach, **Mr. Bobby Dyer**; Mayor of Norfolk, **Kenny Alexander** and Mayor of Hampton, **Donnie Tuck**, as well as, ten county & city EDAs.

This year, Israeli defense companies have significantly expanded and invested throughout Virginia including Elbit Systems $350m acquisition of a Roanoke company and Israel Aerospace Industry (IAI) moved its North America HQ to Herndon, which Governor Northam announced when he visited IAI in Israel in November.

The range and number of participating organizations in the four-day event is a clear testimony to Virginia Israel Advisory Board's acknowledged value to economic development organizations throughout the Commonwealth. Participating Virginia organizations included:

Commonwealth Center of Innovation for Autonomous Systems (ODU and VTech)

Virginia Economic Development Partnership

Fairfax County Office of Emergency Management

Fairfax County Economic Development Authority

Hampton Roads Economic Development Alliance

Greater Williamsburg Partnership

Virginia Tourism Corporation

The City of Norfolk

The City of Virginia Beach

Israeli Ministry of Defense Delegation Developed Partnerships with Virginia Companies (Highlights)

Governor Ralph Northam met the delegation of 16 Israeli companies in his office after having met with the Israeli Ministry of Defense in Tel Aviv in November 2019.

Eliad Peretz NASA (right), Megan Mahle - Department of Homeland Security (2nd from Right), Deborah Lee James – Former Secretary of the Airforce (3rd from Right), Virginia Israel Advisory Board Executive Director Dov Hoch (Left).

Panel on the Defense Industry trends includes Duane Baker Lockheed Martin (right), James (Gib) Goodwin III RADM U.S. Navy (ret.), Lt Gen. Ted Bowlds U.S. Airforce (ret.) (Left), Asher Kotz Fairfax County (Moderator).

Norfolk Mayor Kenny Alexander addressed the delegation in his city, as did Virginia Beach Mayor Bobby Dyer.

Former CIA Director James Woolsey (right) holding a drone designed by Israeli company Colugo, who are considering building their U. S. operations in Virginia, Maj. Gen. Patrick Burden - Army Futures Command (Left), and Virginia Israel Advisory Board Executive Director Dov Hoch (Center).

Economic Impact Analyses of the Virginia Israel Advisory Board

Israeli Company Case Studies

The Dragas Center for Economic Analysis and Policy in the Strome College of Business at Old Dominion University conducted case studies on the economic contribution of individual Israeli companies to Virginia.

Professor Robert McNab, the Director of the Dragas Center for Economic Analysis and Policy and Professor of Economics in the Department of Economics in the Strome College of Business at Old Dominion University, conducted the research. Professor McNab is a member of the Joint Advisory Board of Economists of the Commonwealth of Virginia (appointed by Governor Northam) and a member of the Survey of Professional Forecasters of the Federal Reserve Bank of Philadelphia.

ENERGIXGROUP
CREATING YOUR GREEN ENERGY

Energix Renewable Energy

$130m investment produced a $33m economic impact in the Commonweatlh (i.e. increase in GDP) in the last two years which is 150 times the Virginia Israel Advisory Board's budget.

Governor Northam lauded Energix's CEO and Chairman of the parent company, while meeting with him in Israel, as being aligned with the Commonwealth's strategy of migrating to renewable energy sources.

OSG
VISION THROUGH GLASS

Oran Safety Glass

$400m economic impact over the past 10 years which is 2000 times Virginia Israel Advisory Board's annual budget.

Oran Safety Glass's contribution to the GDP of the Commonwealth is on-going. They employ 160 workers in Emporia.

Thomas Jefferson's "Commence with all Nations" Award

We inaugurated a certificate of appreciation to recognize people and organizations who partner with the Virginia Israel Advisory Board in an on-going manner. The award ceremonially cites Thomas Jefferson's: "Commence with all Nations".

This year's recipients include a broad range of Commonwealth-wide institutions the Virginia Israel Advisory Board collaborates with. It vindicates the value these concerns place on our undertakings and our activities' alignment to the public policy goals.

2020 Recipients of the VIAB - Thomas Jefferson's "Commence with all Nations" Award

Brett Vassey
Virginia Manufacturers Association

Bill Donohue
President, Executive Director of GENEDGE

Patrick O Gottschalk
Former Secretary of Commerce and Trade
Williams Mullen Law Firm

Tom Scott
Virginia Economic Development Partnership VEDP

Rita McClenny
President & CEO
Virginia Tourism Corporation

Amy Jordan
Hampton Roads
Economic Development Alliance

Asher Kotz
Fairfax County
EDA

Post-Coronavirus Partnership Building Platform

Acknowledging the prolonged period during which travel and face-to-face meetings will be limited, the Virginia Israel Advisory Board (VIAB) enhanced our online partnerships platform. The platform allows Virginia and Israel companies to present their offerings and indicate their partnership interests. The platform is secure and only companies who enter their information and are vetted can access it.

Partnerships can include out-sourced manufacturing, supply chain, and HR management that accelerates an Israeli company's presence and entrance in Virginia while lowering the risk. Virginia companies benefit from expanding work-force, investment, and access to Israeli innovation to gain a competitive advantage.

Shraga Brosh (left) and Brett Vassey (right) heads of respective Israel and Virginia Manufactures Associations signed an MOU that promotes partnering.

The Virginia Manufacturers Association (VMA) signed an MOU with the Manufacturers Association of Israel and works with the Virginia Israel Advisory Board to find Virginia partners and suppliers (exporters) for Israeli companies.

Promoting Virginia in Israel - Virginia Israel Advisory Board Segment Focus

The Virginia Israel Advisory Board focuses our activities on industries that have strong synergies between Israel and Virginia (e.g. defense and maritime) and on those that will render the greatest economic impact (e.g. manufacturing and tech).

The business development model for building Israeli companies' operations in Virginia is a many-2-many approach which enables leading business institutions to facilitate interactions between multiple companies.

This model succeeded to fund and develop Israeli companies in the Virginia Bio+Tech Park in Richmond including Israeli company Cupron who over the past 10 years licensed technology to EOS Surfaces of Norfolk, Virginia and work with Sentara on Medical Textiles.

Virginia companies are using a variety of models to access Israeli innovation:

- Mars INC. works with an Israeli VC to source food tech ventures
- Altria sourced their first vaping technology in Israel
- Carilion Health - partners with the leading Israeli hospital system

Next year we are focusing on bringing:

- Maritime related companies to the Hampton Roads with theDock Maritime Accelerator whom Governor Northam met with in Israel
- Electricity and grid related innovations with The Israeli Electric Company's business accelerator

The Virginia Israel Advisory Board Exhibited at the Israel USA Business Summit in Tel Aviv VIAB met with 30 Israeli companies at various stages of entering the U. S. market and choosing a location for building their operations. The annual Israel USA Business Summit (this year Feb. 2020) is the anchor Israeli event for states seeking to attract direct foreign investment from Israeli companies.

Virginia can access Israeli innovation through our Open Innovation Program

Virginia Israel Advisory Board booth at the Israel USA Business Summit in Tel Aviv (Feb. 2020) In promoting Virginia to Israeli companies Our marketing message is: Enter and grow in the U.S. Market through Virginia.

Ian Steff Assistant Secretary of Commerce for Global Markets & Director General of the U.S. & Foreign Commercial Service, U.S. Department of Commerce with Dov Hoch Virginia Israel Advisory Board Executive Director at the USA Israel Business Summit (Tel Aviv Feb. 2020).

University of Virginia Students are Consulting Israeli Companies

Forty UVA students are participating in the Tamid Group Program and performing research for Israeli companies. Executive Director Dov Hoch met with students at the Darden School of Business on the UVA Campus in February and is working with Tamid to launch consulting chapters at other Virginia universities. Student consultants also participate in summer internships in Israel with the most exciting and innovative companies. (e.g. WAZE, WhatsApp).

THE ECONOMIC IMPACT OF ENERGIX'S INVESTMENT IN SOLAR ENERGY FACILITIES IN THE COMMONWEALTH OF VIRGINIA

March 2020

Abstract

We estimate that Energix's planned investment of $130 million in Virginia by the end of the first quarter of 2020 will raise Virginia's real (inflation-adjusted) Gross Domestic Product by $33.2 million by the end of 2020. By 2025, we estimate that Energix's $130 million investment in 2019 and 2020 and the operations of its facilities in the Commonwealth will increase real GDP in Virginia by $48.7 million and create 30 new permanent jobs. Energix's planned management operations in Northern Virginia will create 57 permanent jobs and raise Virginia's real GDP by $5.5 million when hiring reaches planned levels.

Dragas Center for Economic Analysis and Policy

rmcnab@odu.edu

Executive Summary

Energix Renewable Energies Ltd. is one of Israel's largest renewable energy companies with an estimated market valuation of approximately $1.6 billion. Energix's renewable energy portfolio includes existing or planned facilities in Israel, Poland, and the United States. Through the end of 2018, Energix's solar energy portfolio included 139 Megawatts (MW) of photovoltaic facilities in commercial operation, approximately 150 MW of projects in the construction or pre-construction phase, and over 1,000 MW of projects in development. Energix Renewable Energies, through its Virginia based subsidiary, Energix US LLC, plans to invest $130 million in Virginia by the end of the first quarter of 2020. Energix is responsible for the design, development, approval, and construction of the partnership's solar energy production facilities throughout the Commonwealth. Unlike many other solar facility development firms proposing or constructing facilities in Virginia, Energix plans to operate and maintain the solar energy production facilities.

Energix's decision to locate and invest in Virginia was influenced by market and regulatory conditions in the Commonwealth, to include: an emerging market for solar power generation, a significant existing and growing demand for power from data centers, existing legislation supporting the construction and operation of solar power generation projects, and a deregulated market that increases the return on investment to solar power projects. Energix specifically credits the Virginia Israel Advisory Board (VIAB) for introducing the firm to Virginia, connecting Energix with senior leaders in the Commonwealth, brokering entries with private and public entities throughout Virginia, and assisting in the identification of potential projects. Energix noted that VIAB facilitated the partnership between Energix and its US partner, Caden Energy.

Energix's planned investment of $130 million in the design, development, and construction of solar power generating facilities is projected to be complete at the end of the first quarter of 2020. The pre-construction and construction phases of Energix's solar power facility projects will generate jobs in the construction sector in Virginia. As Energix plans to operate and maintain its facilities in the post-construction phase, it is expanding its existing management team in Northern Virginia and will add permanent jobs to operate and maintain the facilities once construction is complete. Energix's management positions are expected to pay more than $100,000 annually and it is reasonable to expect that its solar facility operators and maintainers will, on average, earn higher than average salaries. Energix is also seeking approval for additional projects that, in time, will add to its economic impact in the Commonwealth.

We estimate that Energix's planned investment of $130 million in Virginia by the end of the first quarter of 2020 will raise Virginia's real (inflation-adjusted) Gross Domestic Product by $33.2 million by the end of 2020. In addition, the investment phase of Energix's solar facilities will increase private nonfarm payrolls (jobs) in Virginia by 97 in 2019 and 219 in 2020, mainly due to an increase in construction employment. We estimate Energix's planned investment of $130 million in 2019 and 2020, and the operation of its' solar farm facilities in the Commonwealth through 2025 will increase real GDP in Virginia by a total of $48.7 million from 2019 to 2025 and create an average of 30 new permanent jobs. Energix's management operations in Northern Virginia will add an additional 57 permanent jobs and raise real GDP by an additional $5.5 million in 2025 alone. Additional investments by Energix in the Commonwealth would undoubtedly increase the estimated economic impact.

1. Introduction

Energix Renewable Energies Ltd. is one of Israel's largest renewable energy companies with an estimated market value of $1.6 billion.[1] Energix's renewable energy portfolio includes existing or planned facilities in Israel, Poland, and the United States. Through the end of 2018, Energix's solar energy portfolio included 139 Megawatts (MW) of photovoltaic facilities in commercial operation, approximately 150 MW of projects in the construction or pre-construction phase, and over 1,000 MW of projects in development.[2] Energix Renewable Energies, through its Virginia based subsidiary, Energix US LCC[3], plans to invest at least $130 million in Virginia by the first quarter of 2020.

In this research note, we estimate the total economic impact of Energix's planned investments in 2019 and 2020 in the Commonwealth of Virginia. The period of analysis of the economic impacts is from 2019 to 2025. As the projects are in the pre-construction or construction phase, the estimated total economic impact is a projection of the incremental increase in economic activity and employment in Virginia. Our intent is not only to approximate the increase in direct investment in the Commonwealth, but also estimate the secondary and tertiary impacts on output and employment. As we discuss in this note, a $1 increase in electric power generation output will, on average, increase gross economic output in Virginia by $1.37.[4]

[1] Market valuation is obtained from Yahoo Finance as of February 14, 2020.
[2] Energix Group (2019), Business Overview. Available at: http://www.energix-group.com/Business-Overview/.
[3] For simplicity, we refer to Energix Renewable Energies Ltd., Energix US LLC, Caden Energix, and the various Caden Energix LLCs formed for specific projects as Energix. Energix is the sole managing partner in Caden Energix and the project specific Caden Energix LLCs.
[4] We obtain the total economic impact multiplier for the solar electric power generation industry (NAICS 221114) from JOBSEQ. Economic output includes the value added of an industry to final output (Gross Domestic Product) and its output of intermediate inputs that are used in other industries in the production of final output. The total economic impact multiplier includes the direct, indirect, and induced multipliers.

The remainder of this note is structured as follows. In the second section, we briefly review the operations of Energix in Virginia. We then discuss the methodology and assumptions underlying the economic impact estimates in the third section. The fourth section presents the economic impact estimates. The last section concludes and offers suggestions regarding investments in renewable energies.

2. A Brief Background on Energix and Its Decision to Locate in Virginia

Energix entered the Virginia renewable energy market in late 2017 when it established a physical presence in Northern Virginia. The decision by Energix to expand its operations to the United States was driven by the increasing demand for renewable energies. The selection of Virginia was not only influenced by market conditions, but also a regulatory environment and proactive engagement by the Virginia Israel Advisory Board (VIAB).

As illustrated in Table 1, market conditions in the United States have shifted away from coal towards natural gas and renewables. In 2000, total solar (photovoltaic) energy production for electrical generation purposes was 493.4 Kilowatt Hours (KWh) or 0.01% of total net electrical production. By 2018, net electrical generation from solar rose to 66,603.7 KWh, an increase of 13,400%.[5] During this period, the use of coal in electricity production fell 41.7%, replaced, in part, by natural gas (144.2%), solar, and wind (4,815.8%).

To say that the growth in solar generating capacity exceeded expectations would be an understatement. In 2011, the U.S. Energy Information Administration (EIA) projected that national solar generating capacity would increase ten-fold by 2040.[6] The 2011 projection of solar

[5] United States Energy Information Agency, Monthly Energy Report, October 2019.
[6] United States Energy Information Agency, 2011 Energy Outlook.

generating capacity in 2035 was achieved in 2016 and the 2040 solar generating capacity projection was reached in 2017. From a business perspective, the impetus to invest in solar generating facilities is clear as the solar industry is rapidly expanding. Of note, the EIA's 2019 Annual Energy Outlook projects 43% of new net electrical generation capacity will come from solar power over the next three decades.[7]

Table 1

Selected Sources of Net Electricity Production in Millions of Kilowatt Hours (KWh)

United States, 2000 and 2018

	Coal	Natural Gas	Nuclear	Solar	Wind	Total Production (Million KWh)
2000	51.72%	15.81%	19.83%	0.01%	0.15%	3,802,105
2018	27.44%	35.14%	19.32%	1.59%	6.58%	4,177,810

Source: United States Energy Information Agency, Monthly Energy Report, October 2019.

Market conditions in Virginia are also favorable for Energix's investment in solar power generation facilities. While estimates vary, 30% to 40% of cloud service providers in the U.S. reside in Northern Virginia. Projections are that the number of these cloud service providers and the associated data centers will only increase in the coming future.[8] Increasing population growth and economic activity will also increase the demand for electricity in Virginia over time. In its 2018 annual report, Energix stated that it intends to expand its activities in the U.S., albeit at a

[7] United States Energy Information Agency, Annual Energy Outlook, 2019.

[8] While an oft-quoted statistic is that 70% of the world's internet traffic flows through Northern Virginia, this estimate is disputed (https://blog.telegeography.com/does-70-of-the-worlds-internet-traffic-flow-through-virginia). The percentage of cloud service providers can be more accurately estimated.

moderate pace due to overall market complexity and that the U.S. is a relatively new market for the company.[9] From a regulatory perspective, Energix credits existing legislation supporting the construction and operation of solar power generation projects, and a deregulated market that increases the return on investment to solar power projects. As the state government shifts its electricity demand towards renewable-based sources, the public demand signal for solar is likely to increase over time.

Finally, Energix specifically credits the VIAB for introducing the firm to Virginia, connecting Energix with senior leaders in the Commonwealth, and brokering entries with private and public entities throughout Virginia. VIAB worked with Energix to identify potential projects and locations in the Commonwealth. Energix noted that VIAB facilitated the partnership between Energix and its U.S. partner, Caden Energy.

3. Energix's Operations in the Commonwealth of Virginia

Energix is the sole managing partner in Caden Energix LLC, the partnership between Energix US LCC and Caden Energy. Energix is also the sole managing partner for the LLCs formed for each of the specific projects discussed in this section. Energix is responsible for the design, development, approval, and construction of the partnership's solar energy production facilities throughout the Commonwealth. Energix's proposed solar power projects will be distributed throughout the Commonwealth, including the counties of Appomattox, Campbell, Greenville, Henry, New Kent, Pittsylvania, Prince George, Rockingham, and the independent city of

[9] Energix Renewable Energies Ltd., "Periodic Report for 2018", http://www.energix-group.com/Financial-Reports.

Chesapeake. Unlike many other solar facility development firms proposing or constructing facilities in Virginia, Energix plans to operate and maintain the solar energy production facilities.

Energix expects to complete its planned investment of $130 million by the end of the first quarter of 2020 and is also in the process of receiving approvals for other solar farm development projects. Table 2 displays four Energix projects that are in the approval, pre-construction, or construction phases in Virginia. These projects provide a measure of the breadth of Energix's projects and how these projects are moving through the approval and construction process.

Table 2

Examples of Caden Energix Solar Energy Projects in Virginia

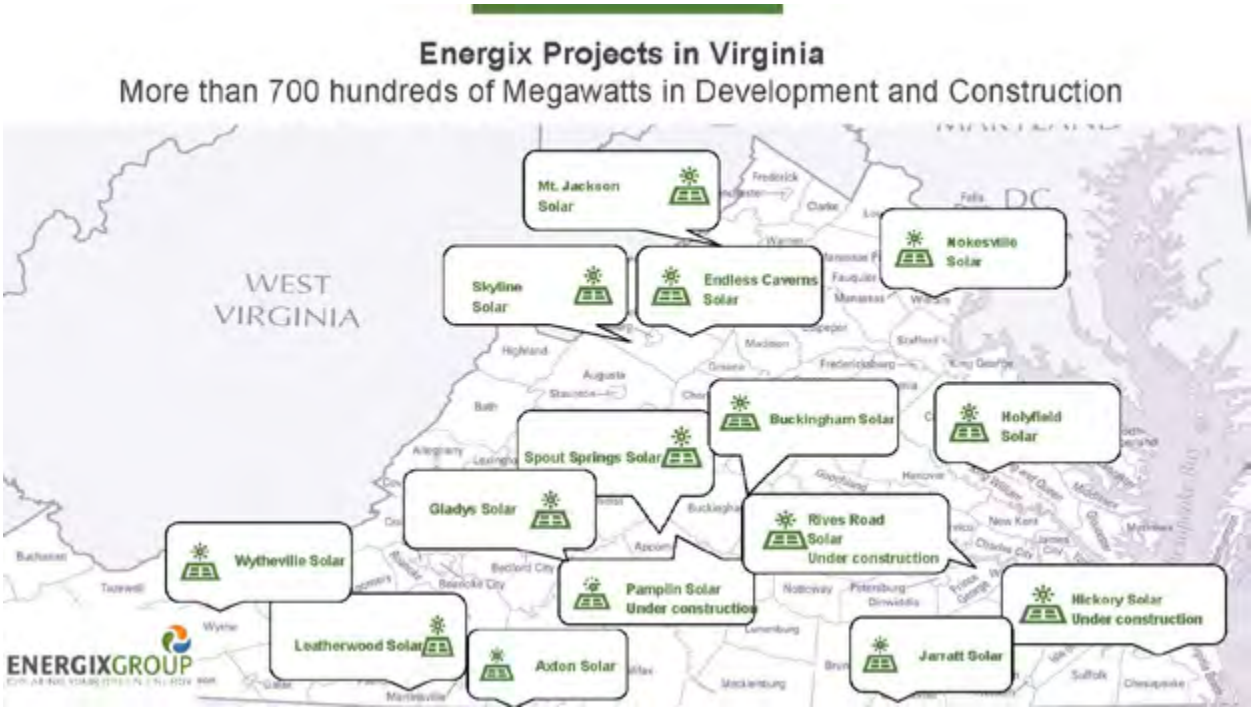
Location	Investment	Megawatts	Status
Appomattox[10]	$60 million	60 MW	Under Consideration
Chesapeake City[11],	$40 million	32 MW	Construction Underway
Campbell County[12]	$90 million	60 MW	Approved - County Supervisors
Pittsylvania County[13]	$60 million	66 MW	Approved - Planning Commission

Figure 1 illustrates the scope of Energix's planned investments in the Commonwealth. In total, Energix now plans to build over 700 hundred MW of solar generating facilities throughout the Commonwealth. It is reasonable to conclude that the estimates contained in this report likely underestimate the overall economic impact of Energix over the next five years. We recommend that as additional projects are approved and enter the construction phase that the estimates be updated to reflect this new information.

[10] County of Appomattox, Staff Report, Caden Energix Sprout Spring, February 2019,
[11] Sarah Honosky, "Campbell supervisors OK county's third solar farm project," Roanoke News Advance, November 7, 2019.
[12] Victoria Bourne, "Chesapeake narrowly approves $40 million plan for first solar farm," Virginian Pilot, February 14, 2018.
[13] Caleb Ayers, "Another solar farm project advances in Pittsylvania County", Danville Register & Bee, November 7, 2019.

Figure 1

Energix's Project Portfolio in the Commonwealth of Virginia as of February 2020



Source: Energix (2020).

Energix is also currently expanding its existing management team in Northern Virginia. Energix's new management positions are expected to pay more than $100,000 annually and five positions were advertised in the fall of 2019. As the solar power generation facilities are completed and enter operation, Energix will need to add permanent jobs to operate and maintain the facilities. While the Bureau of Labor Statistics does not specifically track wages in the solar energy industry, median average wages in the electrical power generation, transmission, and distribution industry group were above median average wages for Virginia in 2018.[14] The

[14] U.S. Bureau of Labor Statistics, Occupational Employment Statistics, 2019.

evidence suggests that Energix's investments will create an initial burst of construction jobs and then a sustained increase of skilled jobs that pay above the median wage in the Commonwealth.

Virginia's Renewable Energy Strategy

The global energy industry has undergone significant change in recent years. Economic policy and market forces have shifted the industry towards clean and renewable energy sources. Virginia has taken significant steps to prioritize the transition to clean energy and Energix plays a critical role in this transformation.

In 2018, Virginia lawmakers passed the Grid Transformation and Security Act. The bill called for the expansion of solar energy by allowing for the increased capacity of solar facilities from 50 MW to 5,000 MW. In September 2019, Governor Ralph Northam signed an executive order that set ambitious new goals for the state to reach 30% renewable energy by 2030 and 100% carbon-free electricity by 2050.[15] Northam has pushed these goals further, calling for 3,000 MW worth of solar and onshore wind generation by 2022.[16]

Energix's plan to build over 700 MW of solar generating facilities throughout the Commonwealth is integral to achieving the goals set forth by the governor. Energix's planned development of solar facilities in rural areas such as Pittsylvania county and Henry county will generate jobs and tax revenue in relatively more rural areas of the Commonwealth. Given the breadth of Energix's investments in the Commonwealth over the next five years, its impact on the Commonwealth's renewable energy strategy is likely to increase over time.

[15] Executive Order No. 43, Expanding Access to Clean Energy and Growing the Clean Energy Jobs of the Future, September 16, 2019.
[16] Mel Leonor, "Northam lays out renewable energy goals for Virginia, calls for carbon-free electricity by 2050", Richmond Times Dispatch, September 17, 2019.

A Short Primer on Economic Impact Analysis

To estimate the impact of Energix's investment in the construction, operation, and maintenance of solar power generation facilities in the Commonwealth of Virginia, we quantify the direct, indirect, and induced economic impacts. We focus our analysis on the impact on the construction sector, the impact on the solar power generation sector, and the impact of Energix's managerial staff.

To understand our approach, it is helpful to imagine a pebble dropped into a puddle of water to visualize how the economy reacts to a change in investment in a solar power generation facility. The impact represents the initial round of economic activity on output, earnings, and employment. The initial round of economic activity ripples through the rest of the economy like the waves moving through the puddle. These ripples represent the indirect and induced impacts that come about through the interconnectedness of the local economy. The indirect economic impact comes from economic activity by suppliers to Energix. The induced impact comes from industries directly and indirectly affected by Energix's investment in Virginia.

These spillovers can create a total economic impact that is larger than the direct impact. The notion of an economic multiplier summarizes the total economic impact of a change in economic activity. If a firm invests a $1,000,000 (direct impact) that generates $300,000 in indirect economic impacts and $200,000 in induced economic impacts, then the economic impact multiplier effect is ($1,000,000 + $300,000 + $200,000) / $1,000,000 = 1.5.

There are two important considerations when evaluating economic multipliers. First, the size of the multiplier inherently depends on how much of the economic activity continues to recycle within the region. If a firm obtains most of its materials from outside of the region (a

"leakage"), then the actual multiplier effect will necessarily be smaller. Second, the multiplier effect, where spending spills over to a variety of other sectors, is great when the direct impact is positive, however, it is equally painful when there is a reduction in direct economic activity. From an economic impact perspective, "new" money that is "injected" in a state has a greater economic impact than "old" money that is "redistributed" from existing spending in a state.

We present dynamic estimates of the estimated total economic impact of Energix's investment spending and projected spending in Virginia.[17] We use REMI PI+ software, developed by REMI, which is based on regionalized input-output tables and estimates of relationships between industries. The dynamic estimates of the estimated total economic impact apportion the investment spending and other expenditures over time. The estimated economic impacts depend on the flow of investment and other spending. The dynamic estimates also capture the "echo" of economic activities across time.

Estimated Economic Impacts of Energix

Estimated Economic Impact of Energix's Solar Investment and Operations

To estimate the total economic impact of Energix's investment in solar power facilities in 2019 and 2020 and its planned operation and maintenance of the facilities through 2025, we must first ascertain the flow of investment and operating and maintenance expenditures. Table 3 illustrates the flow of $130 million in investment spending into non-residential equipment in 2019 and 2020. We assume that the operating and maintenance expenditures are equivalent to

[17] Static estimates of the total economic impact are available upon request.

an increase in exogenous (outside the model) industrial production[18], starting in 2019 and continuing throughout the duration of the analysis.[19] We specifically limit our analysis to the $130 million of investment in 2019 and 2020. As Energix places more projects in the approval and construction pipeline, the estimated economic impact will invariably increase.

Table 3

Estimated Investment and Operating Expenditures

Energix Solar Farm Facilities in the Commonwealth of Virginia

Millions of Nominal Dollars

2019 – 2025

	2019	2020	2021	2022	2023	2024	2025
Investment Spending (In Millions)	$40	$90	$0	$0	$0	$0	$0
Operating Expenditures (In Millions)	$1.2	$4.0	$4.1	$4.2	$4.3	$4.4	$4.5

Source: Energix with assumptions made by the Dragas Center for Economic Analysis and Policy regarding the timing of investment spending and level of operating expenditures.

Real (inflation-adjusted) Gross Domestic Product (GDP) is a measure of the final value of the production of goods and services in an area during a given period. Figure 2 displays the incremental change in real GDP as a result of Energix's investment of $130 million in 2019 and 2020, and operation of solar farm facilities in 2019 through 2025. As one might expect, the estimated impact on real economic activity is highest in the years when Energix is constructing

[18] Exogenous industrial production is equivalent to the increase in output that is outside the model. In other words, the operating expenditures are an injection of new spending from outside of Virginia and thus are not created by spending within the model.

[19] A simplifying assumption is that operating expenditures are equal to three percent of investment spending. We inflate operating expenditures at two percent a year to capture the impact of inflation.

the solar farm facilities. The economic impact does not entirely go away, however, as Energix will continue to expend resources to operate and maintain these facilities. Figure 3 illustrates the cumulative economic impact, a running total of the annual incremental impacts, from 2019 to 2025. In total, we estimate that the cumulative economic impact will be an approximate $48.7 million increase in real GDP relative to the baseline forecast from 2019 to 2025.

Figure 4 displays the impact of the investment and continued operation of the facilities on private nonfarm employment (jobs). The construction of the solar farm facilities in 2019 and 2020 increases nonfarm employment, not only by construction jobs, but also through indirect and induced impacts on employment across the Virginian economy. These increases, however, dissipate with the end of the construction phase but are also not eliminated given the continued operation and maintenance of the facilities. In 2025, for example, we estimate that Virginia has approximately 30 new jobs above the baseline forecast due to the operation of the solar farm facilities and residual effects of the investment program.

Estimated Economic Impact of Energix's Northern Virginia Facility

Energix is currently hiring new management positions to join its two existing positions in its Northern Virginia facility. We estimate that hiring increases over time and reaches an average of 20 total personnel. We estimate that the total economic impact of Energix's personnel is an approximately $5.5 million annual increase in Virginia's real GDP. As these are relatively highly paid management personnel (on average), total employment increases by more than 50 jobs once the location is fully staffed. This illustrates the significant economic multiplier on employment in the utilities industry. On average, for every job that is added by Energix, another 1.6 jobs are created through the indirect and induced effects.

Conclusion

Based on information provided by Energix and under reasonable assumptions, we conservatively estimate that Energix's planned investment of $130 million in the Commonwealth of Virginia and its continued operation and maintenance of the solar energy facilities will increase real (inflation-adjusted) Gross Domestic Product in Virginia. While the impact varies year to year, the cumulative impact from 2019 to 2025 is almost $50 million. In addition, the construction phase of Energix's solar facilities will increase private nonfarm payrolls (jobs) in Virginia by 102 in 2019 and 239 in 2020. While a number of these jobs will dissipate after the construction phase of Energix's investment is complete, we estimate that Energix's continued operation and maintenance of the solar energy facilities will create, on average, 30 new permanent jobs in Virginia through 2025. Energix's management operations in Northern Virginia will, on average, also add an additional 57 permanent jobs and raise real GDP by $5.5 million.

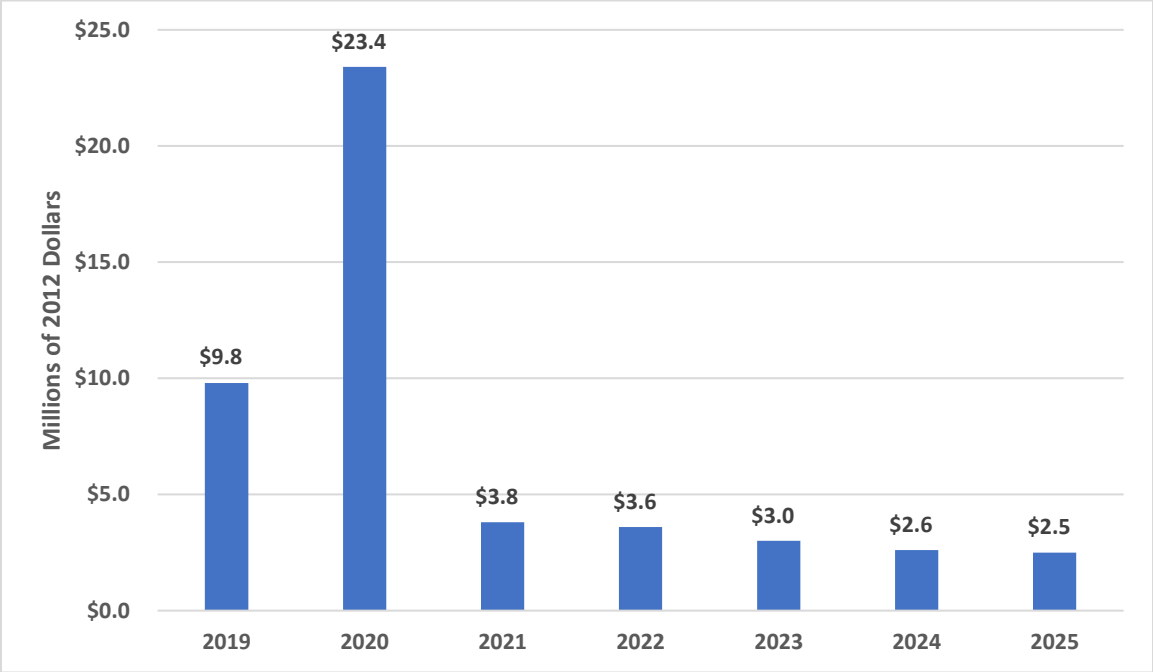
In aggregate, we estimate that Energix's investments and operations in Virginia will increase Virginia's real GDP by approximately $55 million relative to the baseline forecast from 2019 to 2025. While the most significant increases in jobs are associated with the investment and construction phase, over 80 new permanent jobs remain by 2025. The increases in real GDP and jobs provide a lower bound for Energix's contributions to economic activity in the Commonwealth. As Energix continues to invest in new facilities and expand its Northern Virginia operations, our estimates will increase.

Figure 2

Estimated Annual Economic Impact on Real Gross Domestic Product

Energix US, LLC Investment in the Commonwealth of Virginia

2019 - 2025



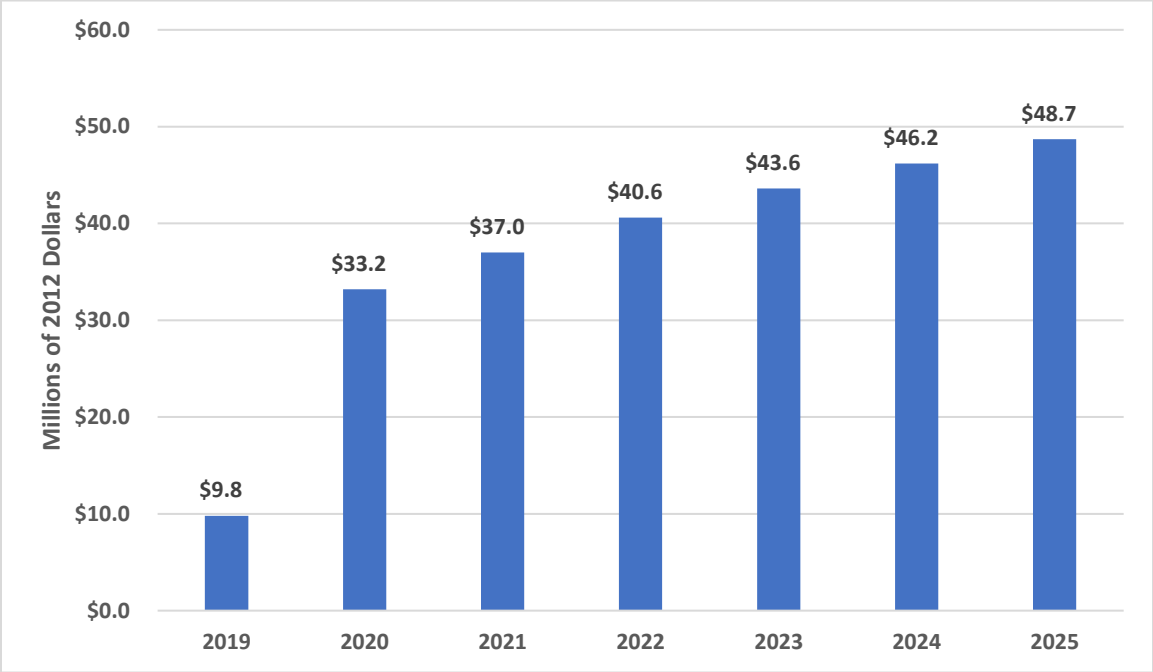
Source: Dragas Center for Economic Analysis and Policy, 2019. Estimated annual economic impact represents the incremental increase in real GDP each year as a result of Energix's planned $130 million investment and operation of their solar farm facilities.

Figure 3

Cumulative Economic Impact on Real Gross Domestic Product

Energix US, LLC Investment in the Commonwealth of Virginia

2019 - 2025



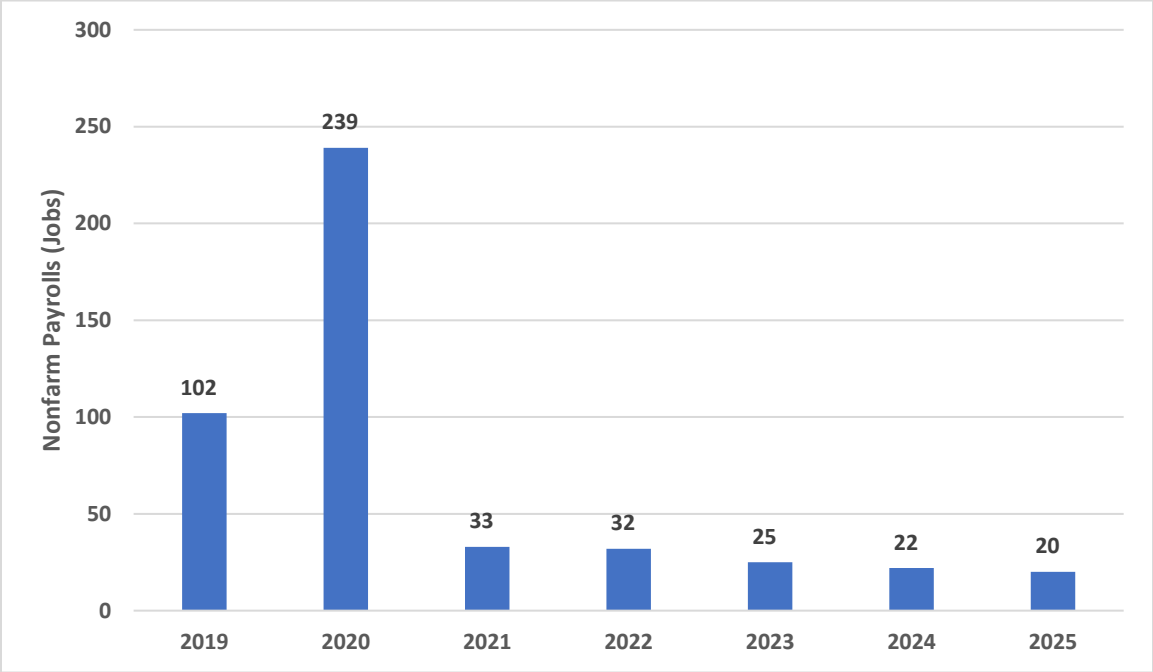
Source: Dragas Center for Economic Analysis and Policy, 2019. Cumulative economic impact represents the sum of the incremental increases in real GDP as a result of Energix's planned $130 million investment and operation of their solar farm facilities.

Figure 4

Estimated Annual Economic Impact on Private Nonfarm Payrolls (Jobs)

Energix US, LLC Investment in the Commonwealth of Virginia

2019 - 2025



Source: Dragas Center for Economic Analysis and Policy, 2019. Estimated annual economic impact represents the incremental increase jobs each year as a result of Energix's planned $130 million investment and operation of their solar farm facilities.

Table 4
Estimated Economic Impacts
Energix US, LLC Investment in the Commonwealth of Virginia
2019 - 2025

	2019	2020	2021	2022	2023	2024	2025
Total Employment (Jobs)	107	251	42	38	30	25	23
Private Non-Farm Employment (Jobs)	102	239	33	32	25	22	20
Residence Adjusted Employment	100	234	36	36	29	25	23
Population	30	94	78	70	62	55	50
Labor Force	25	74	55	47	39	33	29
Gross Domestic Product	$9.8	$23.4	$3.8	$3.6	$3.0	$2.6	$2.5
Output	$17.1	$41.0	$7.1	$6.7	$5.6	$5.1	$4.8
Value-Added	$9.8	$23.4	$3.8	$3.6	$3.0	$2.6	$2.5
Personal Income	$6.5	$16.3	$4.3	$4.1	$3.6	$3.2	$3.1
Disposable Personal Income	$5.5	$14.0	$3.8	$3.6	$3.1	$2.8	$2.7
Real Disposable Personal Income	$4.8	$11.1	$1.2	$2.4	$2.0	$1.8	$1.8
Investment Spending	$40 mil	$90 mil	$0	$0	$0	$0	$0
Operating Expenditures	$1.2 mil	$4.0 mil	$4.1 mil	$4.2 mil	$4.3 mil	$4.4 mil	$4.5 mil

Source: REMI (2019) and Dragas Center for Economic Analysis and Policy. Estimates for Gross Domestic Product, Output, Value Added, and Real Disposable Personal Income are in millions of 2012 dollars. Personal income and disposable personal income are in millions of nominal dollars. Investment spending is investment in nonresidential equipment. Operating expenditures are exogenous industrial production in the utilities industry.

Table 5
Estimated Economic Impacts
Energix US, LLC Employment in Northern Virginia
2019 - 2025

	2019	2020	2021	2022	2023	2024	2025
Total Employment (Jobs)	11	28	43	57	58	58	57
Private Non-Farm Employment (Jobs)	10	27	40	54	54	53	52
Residence Adjusted Employment	10	25	38	51	52	53	52
Population	3	10	20	31	40	46	52
Labor Force	3	9	16	24	30	33	36
Gross Domestic Product	$1.0	$2.5	$3.9	$5.3	$5.5	$5.5	$5.5
Output	$1.7	$4.4	$6.8	$9.3	$9.5	$9.5	$9.5
Value-Added	$1.0	$2.5	$3.9	$5.3	$5.5	$5.5	$5.5
Personal Income	$0.9	$2.3	$3.8	$5.4	$5.9	$6.3	$6.6
Disposable Personal Income	$0.7	$2.0	$3.3	$4.7	$5.1	$5.4	$5.7
Real Disposable Personal Income	$0.7	$1.7	$2.6	$3.5	$3.6	$3.8	$3.9
Energix Employment	4	10	15	20	20	20	20

Source: REMI (2019) and Dragas Center for Economic Analysis and Policy. Estimates for Gross Domestic Product, Output, Value Added, and Real Disposable Personal Income are in millions of 2012 dollars. Personal income and disposable personal income are in millions of nominal dollars. Energix's employment is assumed to be in the utilities industry.

THE ECONOMIC IMPACT OF ORAN SAFETY GLASS'S OPERATIONS AND INVESTMENTS IN THE COMMONWEALTH OF VIRGINIA

March 2020

Abstract

Oran Safety Glass (OSG) develops and produces safety glass at its Emporia, Virginia production facility. We conservatively assume that OSG sources its materials from other states and sells its products to the customers outside of Virginia. We estimate that the total economic impact of OSG's operations in the Commonwealth of Virginia are approximately $400.0 million in 2019 dollars from 2009 to 2019. We also find that OSG's overall impact on nonfarm employment in Virginia climbed from 107 jobs in 2009 to 239 jobs in 2019.

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Executive Summary

Oran Safety Glass (OSG) develops and supplies laminated glass solutions for the defense and security industries, the transportation industry, and a wide variety of special applications. The defense and security division of OSG specializes in glass solutions for a variety of defense, law enforcement, and security-oriented organizations. While OSG is headquartered in Israel where it operates glass production facilities, OSG also manages two glass production facilities in the United States, including one facility in Emporia, Virginia.

Safety glass is one of the products that is made with flat glass. In general, safety glass is composed of layers of glass held together with an interlayer. When the glass is broken, the interlayer keeps the layers of glass bonded and inhibits the shattering of the glass into larger pieces. Ballistic safety glass, for example, is designed to mitigate the impact of small caliber weapons and shrapnel. Much of OSG's work in the United States is focused on defense-oriented applications of its glass products.

OSG's production facility in Emporia currently employs about 130 employees with average sales of $30 to $50 million annually. OSG recently invested $2.5 million in its Emporia facility and plans to add additional equipment and machinery over the next two years. The projected investments will not only diversify OSG's production line but are also expected to increase overall production at the Emporia facility. As a result, OSG expects to create approximately 55 new jobs in the Commonwealth of Virginia by 2021.

We present static estimates of the estimated total economic impact of OSG's investment and employment in Virginia. We use JOBSEQ software, developed by Chmura Economics, which is based on regionalized input-output tables and estimates of relationships between industries. The static estimates provide annual measures of the incremental impact of OSG's operations on economic output in Virginia.

Economic output is a measure of the value of the production of goods and services in an area during a given period. We assume that OSG purchases inputs from other states and sells its products to clients in other states as we do not have specific information on OSG's operations. This approach also provides a more conservative estimate of the impact of OSG's operations on economic output in the Commonwealth.

We estimate the annual incremental change in real (inflation-adjusted) economic output in the Commonwealth from 2009 to 2019 in 2019 dollars. We estimate the incremental impact of Oran Safety Glass on the Virginia economy increases from approximately $21.9 million in 2009 to $58.4 million in 2019. We estimate the total economic impact of OSG's operations in the Commonwealth of Virginia from 2009 to 2019 to be approximately $400.0 million. We estimate that for every $1 of OSG sales, an additional $0.84 of economic activity is created in Virginia. Likewise, every job created by OSG in Virginia yields approximately 0.68 more jobs in the Commonwealth. We estimate that OSG's direct employment increased from 50 in 2009 to 130 in 2019, leading to an increase in overall employment in the Commonwealth from 107 in 2009 to 239 in 2019.

Introduction

Oran Safety Glass (OSG) develops and supplies laminated glass solutions for the defense and security industries, the transportation industry, and also a wide variety of special applications. The defense and security division of OSG specializes in glass solutions for a variety of defense, law enforcement, and security-oriented organizations. While OSG is headquartered in Israel where it operates two glass production facilities, OSG also manages two glass production facilities in the United States, including one facility in Emporia, Virginia. OSG's expansion into the U.S. market was, in part, driven by the rapid expansion in the demand for laminated glass. Current projections estimate that the value of the flat laminated glass market in the U.S. will exceed $40 billion by 2025.

OSG's production facility in Emporia, Virginia currently employs about 130 employees with average sales of $30 to $50 million over the past decade. OSG recently invested $2.5 million in its Emporia facility and plans to add additional equipment and machinery over the next two years. The projected investments will not only diversify OSG's production line but are also expected to increase overall production at the Emporia facility. As a result, OSG expects to create approximately 55 new jobs in the Commonwealth of Virginia by 2021.

In this report, we estimate the total economic impact of OSG's operations and investments in the Commonwealth of Virginia from 2009 to 2019. OSG's operations and investments ripple throughout the Virginia economy so that its overall economic impact is larger than its direct employment and investment. We estimate that for every $1 of OSG investment, an additional $0.84 of economic activity is created in Virginia. Likewise, every job created by OSG in Virginia yields an additional 0.68 jobs in the Commonwealth.

The remainder of this report is structured as follows: In the second section, we briefly review the operations of Oran Safety Glass in Virginia. We then discuss the methodology and the assumptions underlying the economic impact estimates in the third section. The fourth section presents the economic impact estimates. The last section concludes.

A Brief Background on Flat Glass

How glass is cast when it is in its molten state determines its final shape. When molten glass is dispersed over a plane, it makes a product called **flat glass** or plate glass. Flat glass can be rolled or made by broad sheet. Flat glass can also be bent after it is cast, a desirable property in the transportation industry. Layering multiple planes of flat glass can yield a final product that is relatively light yet surprisingly effective in protective capabilities.

While estimates about the size of the global flat glass market vary, there is broad consensus that the global market will grow rapidly over the coming decade. The construction industry is becoming increasingly reliant on flat glass for windows, railings, skylights, and other features. The solar energy industry uses flat glass in the production of solar panels and, given the significant rise in solar energy investments globally, flat glass demand is expected to rise accordingly. Laminated glass products which are used in the construction, transportation, and security industries (among others), also continue to increase in demand (IMARC Group, 2019; Market Reports World, 2019; Research and Markets Limited, 2019). Recent reports project that the overall size of the United States' flat glass market will grow at an annual rate of nearly ten percent through 2025 (IMARC Group, 2019).

Safety glass is one of the products that is made with flat glass. In general, safety glass is composed of layers of glass held together with an interlayer. When the glass is broken, the

interlayer keeps the layers of glass bonded and inhibits the shattering of the glass into larger pieces. Ballistic safety glass, for example, is designed to mitigate the impact of small caliber weapons and shrapnel.

Oran Safety Glass

OSG produces a range of products for a variety of industries. OSG provides commercial construction products such as heavy impact/protection glass, insulated and infrared radiation blocking glass, light-weight compositions, and special curves and blends of glass compositions. OSG also produces windshields and side windows for automobiles and high-speed locomotives, anti-vandalism glass, and recently introduced glass with embedded displays. Additionally, OSG provides safety glass products for defense and security applications, including ballistic protection (which covers bullets, blast, and fragment strikes) for a variety of land and marine platforms.

As demand of OSG products increased in the United States in the early 2000's, OSG decided to open a production facility in the southeastern United States. After scouting locations in North Carolina and Virginia, OSG selected Emporia, a city in Virginia, as the site for its new manufacturing facility. OSG invested approximately $4.2 million in the production facility to make ballistic glass for military vehicles. The Commonwealth provided financial incentives, including a $125,000 grant from the Governor's Opportunity Fund and $125,000 from the Virginia Tobacco Indemnification and Community Revitalization Commission (Glassonline, 2006). Approximately 50 employees worked at the facility after construction was complete.

In 2009, OSG invested an additional $2.2 million in the Emporia plant, increasing average employment to approximately 75 employees. In 2017, OSG and the Commonwealth of Virginia announced that OSG would again expand its Virginia facility. OSG would invest $4.45 million and

create an additional 55 manufacturing jobs. The Commonwealth provided financial incentives to aid OSG's investment and expansion of its existing workforce by 55 jobs. These incentives came in the form of the Commonwealth's Opportunity Fund ($150,000) and the Tobacco Region Opportunity Funds ($235,000) from the Virginia Tobacco Region Revitalization Commission (Area Development News Desk, 2017; Emporia News, 2017). The OSG glass plant produces all types of OSG products for sale throughout the United States.

At the end of 2019, the OSG facility in Virginia employed approximately 130 employees. Most of the employees were engaged in the manufacturing field, earned between $13 and $14 an hour, and worked 40 hours a week. The Bureau of Labor Statistics tracks average weekly wages of all employees in the manufacturing industry, as well as average weekly wages in total private nonfarm employment. Average weekly wages for the manufacturing sector in Emporia were higher than average weekly wages for total private nonfarm employment in Emporia, in part due to the presence of the OSG facility. The planned addition of new technology and machinery in OSG's Virginia location will not only add to OSG's production capacity, but also increase the number of manufacturing jobs in an economically distressed region.

OSG credits the involvement of the Virginia Israel Advisory Board (VIAB) with its initial decision to locate in the Commonwealth and noted publicly that VIAB was instrumental in working with the Governor's office and other entities in the Commonwealth government. When Governor Terry McAuliffe spoke about the most recent expansion in 2017, VIAB was present and a participant in the announcement. OSG viewed, and continues to view, their work with VIAB as a partnership as OSG was able to draw upon VIAB's expertise to ensure that its investments were handled with "utmost care."

The Importance of Manufacturing Jobs – OSG and Commonwealth Policy

Growing manufacturing employment in Virginia has and continues to be a foundation of economic policy. Manufacturing employment compensation is typically higher than average compensation for the private sector. Workers at all ages and levels of education are able to find employment within manufacturing. Leaders within the Commonwealth have recognized how crucial manufacturing is in the creation of jobs. As such, economic development efforts have focused on bringing companies to Virginia, especially if those companies locate in relatively more rural areas of the state.

The Commonwealth's Department of Planning and Budget spoke to the importance of the manufacturing industry in their most recent Fiscal Impact Statement. The statement discusses the 60 new projects within the manufacturing and supply chain sectors. These projects represent approximately 6 billion dollars in investment and over 8,000 jobs. Undoubtedly, manufacturing employment is crucial to economic development in the Commonwealth.

In many ways, the Commonwealth's strategy for growth within this sector is to focus on shipbuilding, mechanics and repairs, and transportation. Manufacturing of mechanical equipment, as well as parts for military equipment and passenger vehicles complements this growth strategy. Oran Safety Glass is one elements of Virginia's success story. Oran Safety glass is located in a more rural part of the Commonwealth and has created relatively well compensated manufacturing jobs. As Oran Safety Glass has expanded over the previous decade, it has increased employment and its corresponding economic impact. The importance of these expansions is highlighted by the fact that multiple governors have announced the location and expansion of OSG in the Commonwealth.

A Short Primer on Economic Impact Analysis

To estimate the impact of OSG's investment and production for its Emporia production plant, we quantify the direct, indirect, and induced economic impacts. We focus our analysis on the impact of OSG's investments in 2009 and 2018 and its average annual employment from 2009 to 2015. We conservatively use the lowest average levels of employment for our estimates to provide a lower-bound on the economic impact of OSG on the Virginia economy. We also explicitly assume that inputs are sourced from outside the Commonwealth and sales are made to customers outside Virginia, as we do not have data on input purchases and sales.

To understand our approach, it is helpful to imagine a pebble dropped into a puddle of water to visualize how the economy reacts to a change in investment in a glass production facility. The impact represents the initial round of economic activity on output, earnings, and employment. The initial round of economic activity ripples through the rest of the economy like the waves moving through the puddle. These ripples represent the indirect and induced impacts that come about through the interconnectedness of the local economy. The indirect economic impact comes from economic activity by suppliers to OSG. The induced impact comes from industries directly and indirectly affected by OSG's investments and operations in Virginia.

These spillovers can create a total economic impact that is larger than the direct impact. The notion of an economic multiplier summarizes the total economic impact of a change in economic activity. If a firm invests a $1,000,000 (direct impact) that generates $300,000 in indirect economic impacts and $200,000 in induced economic impacts, then the economic impact multiplier effect is ($1,000,000 + $300,000 + $200,000) / $1,000,000 = 1.5.

There are two important considerations when evaluating economic multipliers. First, the size of the multiplier inherently depends on how much of the economic activity continues to recycle within the region. If a firm obtains most of its materials from outside of the region (a "leakage"), then the actual multiplier effect will necessarily be smaller. Second, the multiplier effect, where spending spills over to a variety of other sectors, is great when the direct impact is positive; however, it is equally painful when there is a reduction in direct economic activity. From an economic impact perspective, "new" money that is "injected" in a state has a greater economic impact than "old" money that is "redistributed" from existing spending in a state.

We present static estimates of the estimated total economic impact of OSG's investment and employment in Virginia. We use JOBSEQ software, developed by Chmura Economics, which is based on regionalized input-output tables and estimates of relationships between industries. The static estimates of the estimated total economic impact "lump" the investment spending and employment into an annual period and there is no feedback mechanism. We also caution the reader that we employ data on average employment and assume the timing of investments occurs within one year. A lack of data on inputs and sales requires an assumption that excludes these impacts from the analysis.

We also must assume that the multipliers do not change over the period of analysis. The estimated impacts on output may be sensitive to changes in these assumptions and the estimates should be viewed as conditional on the data. This approach avoids the possibility of double counting the impact of OSG's operations on the Virginia economy and provides a more conservative estimate of the overall economic impact of OSG's operations on the Commonwealth economy.

Estimating the Economic Impact of Oran Safety Glass

To estimate the total economic impact of OSG's operations in the Commonwealth of Virginia from 2009 to 2019, we must first estimate the flow of investment expenditures and employment. Table 1 illustrates our estimates regarding these key variables.

Economic output is a measure of the value of the production of goods and services in an area during a given period. Figure 1 displays the annual incremental change in nominal output in the Commonwealth of Virginia from 2009 to 2019. The incremental impact of OSG on the Virginia economy increases from $21.9 million in 2009 to $58.4 million in 2019. In other words, the Commonwealth's economic output was $58.4 million higher in 2019 due to the presence of OSG's facility. Table 2 provides estimates for output, employment, and compensation.

To estimate the cumulative impact on output across time, we must convert the nominal impacts in Figure 1 to real (inflation-adjusted) terms. Figure 2 displays the real (inflation-adjusted) impact of OSG's operations on output in Virginia. We estimate that the total economic impact of OSG's operations in the Commonwealth of Virginia to be approximately $400.0 million in 2019 dollars over the 2009 - 2019 time period.

Figure 3 displays the impact of OSG's investments and continued operations on private nonfarm employment (jobs). While OSG's direct employment increases from 50 in 2009 to 130 in 2019, overall employment in the Commonwealth increases from 107 to 239 over this period. If the increases in investment spending were not associated with increases in OSG employment, then the impact on employment in Virginia would be fleeting. However, as OSG's investments increase the capacity and diversity of its facility, and have and will increase the number of jobs, there are positive spillovers in the Virginia economy.

Table 1

Estimated Investment and Employment

Oran Safety Glass Production Facility in Virginia

2009 – 2019

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Investment Spending (In Millions of Nominal Dollars)	$2.2	$0	$0	$0	$0	$0	$0	$0	$0	$4.45	$0
Employment	50	75	75	75	75	75	75	75	75	75	130

Source: OSG and the Dragas Center for Economic Analysis and Policy. Investment spending is in millions of nominal dollars. Employment is measured in full-time jobs in flat glass manufacturing.

Figure 1

Estimated Impact on Economic Output

Oran Safety Glass Operations in the Commonwealth of Virginia

Millions of Nominal Dollars

2009 - 2019

Source: Dragas Center for Economic Analysis and Policy (2020) and Bureau of Economic Analysis (2019). The estimates represent the contribution of employment and investment to economic output in the Commonwealth for each year. The estimates assume that the multipliers for employment and investment are constant for the period. Data on average employment and investment obtained from OSG.

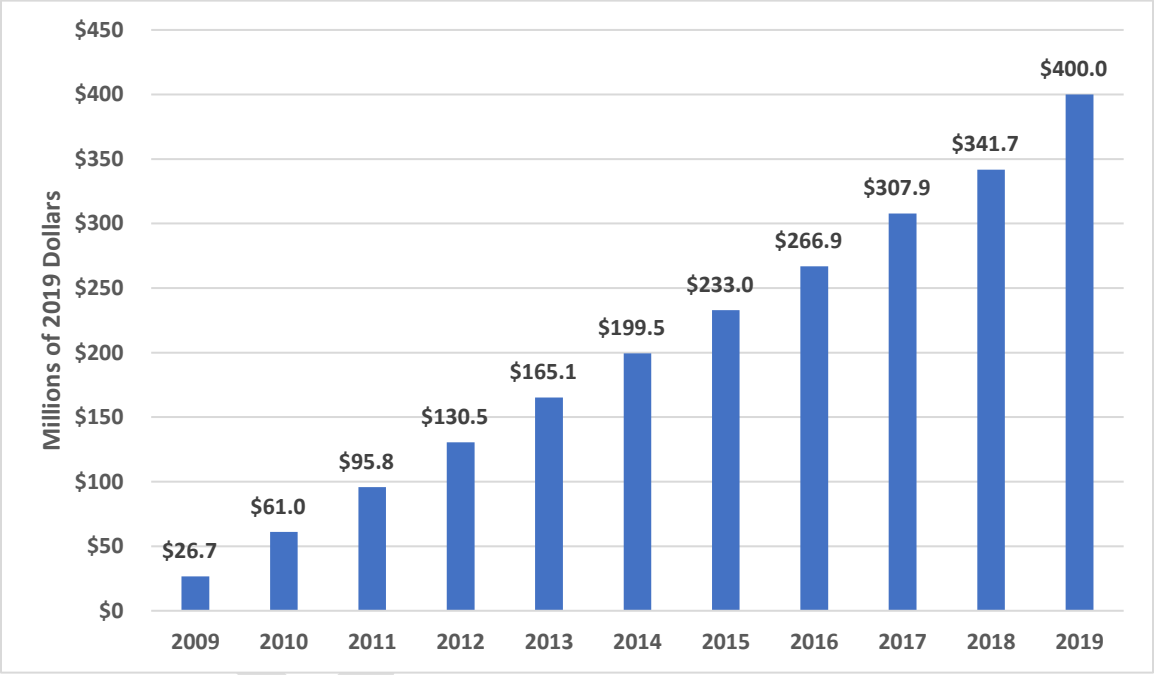
Figure 2

Cumulative Impact on Economic Output

Oran Safety Glass Operations in the Commonwealth of Virginia

Millions of 2019 Dollars

2009 - 2019



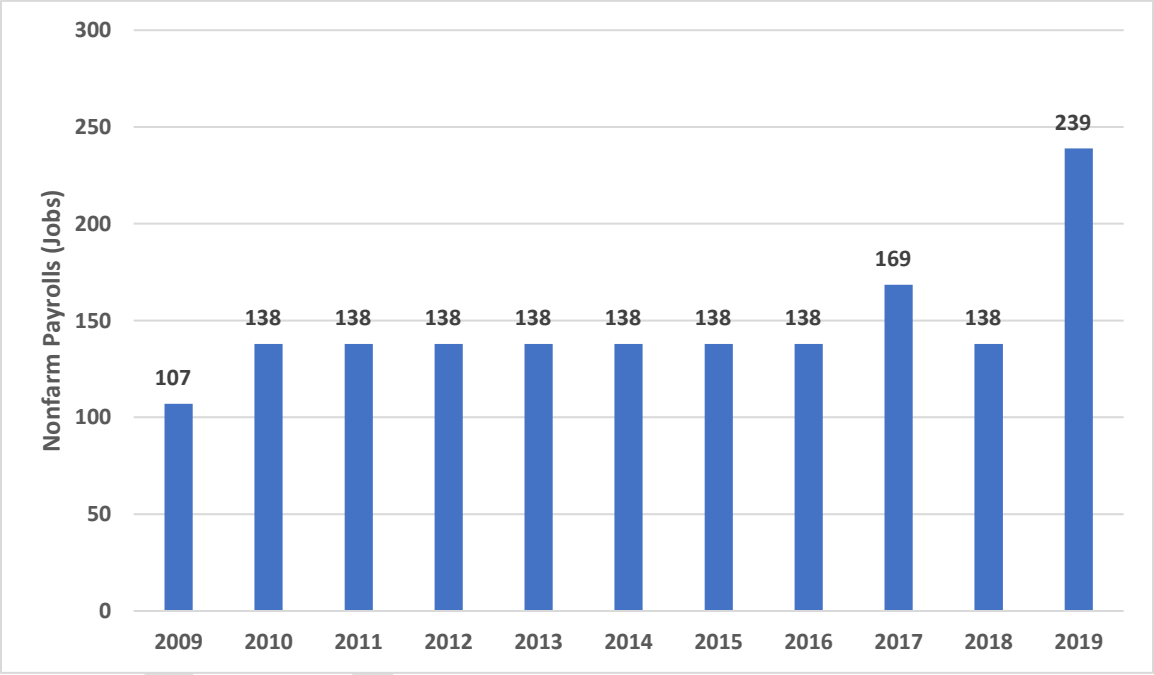
Source: Dragas Center for Economic Analysis and Policy (2020) and Bureau of Economic Analysis (2019). The nominal estimates in Figure 1 are converted to 2019 dollars using the Consumer Price Index for All Urban Consumers. The estimates represent the cumulative impact of employment and investment for OSG's operations in the Commonwealth under the assumptions stated for Figure 2.

Figure 3

Estimated Annual Economic Impact on Private Nonfarm Payrolls (Jobs)

Oran Safety Glass Operations in the Commonwealth of Virginia

2009 - 2019



Source: Dragas Center for Economic Analysis and Policy, 2019. The estimates represent the impact of OSG's operations in the Commonwealth on nonfarm employment given information on OSG's average employment and specific investments over the period.

Table 2
Estimated Incremental Economic Impacts
Oran Safety Glass Operations in the Commonwealth of Virginia
2009 – 2019

Year	Employment	Sales/Output	Compensation
2009	107	$21,941,098	$6,674,706
2010	138	$28,731,969	$8,740,558
2011	138	$29,634,054	$9,014,982
2012	138	$30,248,423	$9,201,879
2013	138	$30,691,856	$9,336,776
2014	138	$31,187,674	$9,487,609
2015	138	$31,224,938	$9,498,945
2016	138	$31,621,498	$9,619,582
2017	169	$39,448,910	$12,000,761
2018	138	$33,083,473	$10,064,330
2019	239	$58,384,324	$17,761,107

Source: JOBSEQ (2019) and Dragas Center for Economic Analysis and Policy. Estimates are in nominal dollars and are based on assumptions regarding OSG's employment and sales based on averages provided by OSG. Estimates include employment and investment impacts only. Estimates include the direct, indirect, and induced impacts and assume that the multipliers are constant for the period of analysis.

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The Virginia Israel Advisory Board is an agency of the Commonwealth of Virginia (Office of the General Assembly) that facilitates Israeli companies to establish and grow their operations in Virginia and Virginia companies to source innovative Israeli technology. Our goals are to increase investment and develop lasting partnerships that expand and enhance the workforce in Virginia.