



# **VIRGINIA'S 2021-2022 HIGH DEMAND OCCUPATIONS LIST & UNVERLYING METHODOLOGY**

**FULL REPORT  
NOVEMBER 2021**

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# Executive Summary

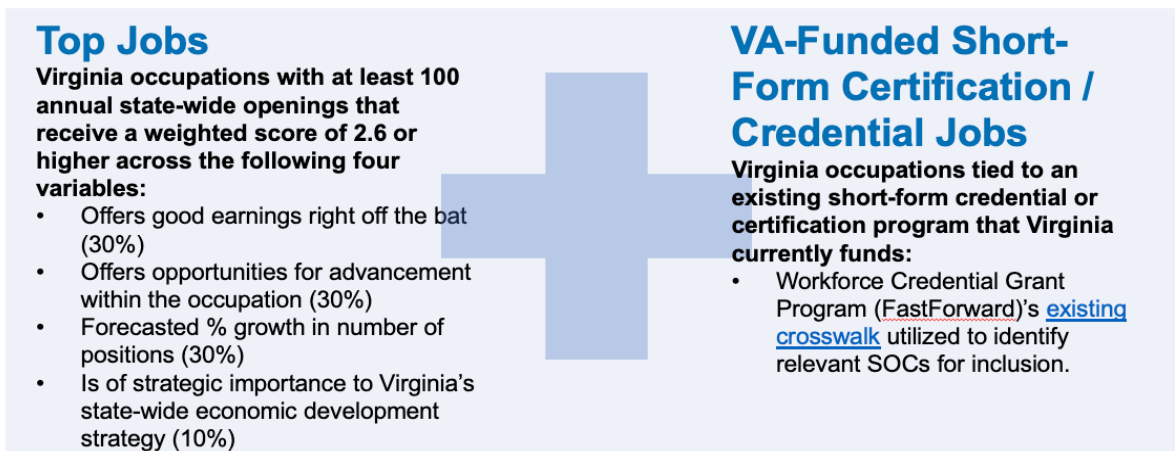
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**CONTEXT.** Virginia State Code § 2.2-2472 (A.9), requires the Virginia Board of Workforce Development (VBWD) to publish a list of jobs, trades, and professions for which high demand for qualified workers exists or is projected. This report details the methodology, process, and the resulting Virginia 2021-22 High Demand Occupations List.

**A COLLABORATIVE VIRGINIA EFFORT.** The 2021-22 Virginia High Demand Occupations List and Methodology Report was developed in close collaboration with numerous stakeholders and rigorous analysis. The work was led jointly by the VBWD and the Virginia Office of Education Economics (VOEE). Stakeholders involved included the Virginia Department of Education, Virginia Community College System, Virginia Employment Commission, Virginia Economic Development Partnership, the Virginia Board of Workforce Development members, and the Virginia Secretariat of Labor. The Virginia Board of Workforce Development also convened and coordinated an ongoing advisory body, called the High Demand Occupations List Workgroup, through which we are grateful for the ongoing feedback of its participants.

**INTENDED USES CASES.** In accordance with code, Virginia's High Demand Occupations List provides data on occupational demand in the state to an array of audiences including employers, education and training entities (including associate-degree-granting and baccalaureate public institutions of higher education), government agencies (including the Department of Education and public libraries), and other users in the public and private sectors. However, Virginia's High Demand Occupations List is not intended to be the sole source of information for any specific policy determination or grant program. Those implementing the list for a specific policy or educational program may need to take into account other considerations additional criteria depending on its target demographics, educational requirements, geographic focus, industry focus, and more.

**SUMMARY OF VIRGINIA'S 2021-22 HIGH DEMAND OCCUPATIONS METHODOLOGY.** The methodology design was based on the guiding principles of 1) employing a rigorous and transparent methodological approach, 2) relying exclusively on publicly available data sources, 3) ensuring regular input and engagement from key stakeholders, 4) leveraging insights from other states and national experts, and 5) ensuring process for ongoing refinements in future year refreshes. The visual below summarizes the two ways in which a Virginia occupation makes it onto the 2021-2022 High Demand Occupations List:



As indicated in the visual above, there are two “paths” through which any given 6-digit Standard Occupational Code (SOC) can be put on Virginia’s 2021-2022 High Demand Occupations List. The first is through rigorous methodological process that was developed in close consultation with stakeholders, which identified Virginia’s “Top Jobs” (156 in total). The methodology section of the report outlines the specific variables and rationale for each step. The second way an occupation makes it onto the list is if it is a 6-digit SOC specifically mapped to an existing state-funded short-form credential or certification training program that Virginia funds. In consultation with stakeholders, it became clear that state-funded initiatives such as the Workforce Credential Grant (WCG) commonly known as FastForward and Get Skilled, Get a Job, Get Ahead (G3) are designed to provide on-ramps to careers and foster more career pathway mobility through stackable credentials. Thus, the decision was made to include these occupations (168 in total, 53 of which already make the list through the with Top Jobs scoring methodology).

**AREAS FOR FUTURE METHODOLOGICAL REFINEMENT.** This is a living document where we as a Commonwealth seek to continually improve upon our methodology, underlying data sources, and approach over time. As per the Virginia Code, Virginia’s High Demand Occupations Methodology and List will be refreshed annually. The Virginia Office of Education Economics will provide analytical and methodological support towards this endeavor in future years. The biggest opportunity for further methodological refinement is incorporating supply-side inputs into our approach, getting closer to the ideal state of assessing supply-demand gaps in the labor market. The Virginia Code § 23.1-627.1 has a definition of what a “high demand field” means, which is “a discipline or field in which there is a *shortage* of skilled workers to fill current job vacancies or anticipated additional job openings.” In Virginia’s 2021-2022 methodology, apart from the filter employed for annual openings greater than or equal to 100, the data utilized is largely demand-side indicators. Getting closer to the concept of shortage (demand – supply) will require a more robust incorporation of supply-side inputs, including but not limited to developing a Virginia-specific CIP-SOC crosswalk methodology, incorporating VEC’s unemployment insurance claimant data, and potentially taking into account worker in-migration and out-migration. See the full report for additional areas for methodological refinement identified in future year iterations.

Please see the subsequent page for Virginia’s 2021-2022 High Demand Occupations List in its entirety. This report also details the complete methodology, process, benchmarking analyses undertaken, and areas for further refinement in the years to come.

# 2021-2022 High Demand Occupations List

## Business/Finance

6-Digit SOC	Virginia Occupation
131041	Compliance Officers
131051	Cost Estimators
131071	Human Resources Specialists
131081	Logisticians
131082	Project Management Specialists (No On-the-Job Training)
131082	Project Management Specialists (Long-term On-the-Job Training)
131111	Management Analysts
131131	Fundraisers
131141	Compensation, Benefits, and Job Analysis Specialists
131151	Training and Development Specialists
131161	Market Research Analysts and Marketing Specialists
131199	Business Operations Specialists, All Other
132011	Accountants and Auditors
132022	Appraisers of Personal and Business Property
132023	Appraisers and Assessors of Real Estate
132031	Budget Analysts
132041	Credit Analysts
132051	Financial and Investment Analysts
132052	Personal Financial Advisors
132054	Financial Risk Specialists
132061	Financial Examiners
132072	Loan Officers
132082	Tax Preparers
132099	Financial Specialists, All Other

## Computers/Math/Engineering/Architecture

6-Digit SOC	Virginia Occupation
171011	Architects, Except Landscape and Naval
172011	Aerospace Engineers
172051	Civil Engineers
172061	Computer Hardware Engineers
172071	Electrical Engineers
172072	Electronics Engineers, Except Computer
172081	Environmental Engineers
172112	Industrial Engineers
172121	Marine Engineers and Naval Architects
172141	Mechanical Engineers
172161	Nuclear Engineers
172199	Engineers, All Other
173022	Civil Engineering Technologists and Technicians
173023	Electrical and Electronic Engineering Technologists and Technicians
173028	Calibration Technologists and Technicians
173029	Engineering Technologists and Technicians, Except Drafters, All Other
173031	Surveying and Mapping Technicians
151211	Computer Systems Analysts
151212	Information Security Analysts
151221	Computer and Information Research Scientists
151231	Computer Network Support Specialists
151232	Computer User Support Specialists
151241	Computer Network Architects
151242	Database Administrators
151243	Database Architects
151244	Network and Computer Systems Administrators
151251	Computer Programmers
151252	Software Developers
151253	Software Quality Assurance Analysts and Testers
151254	Web Developers
151255	Web and Digital Interface Designers
151299	Computer Occupations, All Other (BS/BA)
151299	Computer Occupations, All Other (HS)
152031	Operations Research Analysts
152041	Statisticians

## Art/Design/Entertainment/Sports/Media

6-Digit SOC	Virginia Occupation
271011	Art Directors
271024	Graphic Designers
272012	Producers and Directors
272022	Coaches and Scouts
273031	Public Relations Specialists
273042	Technical Writers
273091	Interpreters and Translators

## Education/Training/Library

6-Digit SOC	Virginia Occupation
211012	Educational, Guidance, and Career Counselors and Advisors
211091	Health Education Specialists
251021	Computer Science Teachers, Postsecondary
251042	Biological Science Teachers, Postsecondary
251066	Psychology Teachers, Postsecondary
251072	Nursing Instructors and Teachers, Postsecondary
252011	Preschool Teachers, Except Special Education
252012	Kindergarten Teachers, Except Special Education
252021	Elementary School Teachers, Except Special Education
252022	Middle School Teachers, Except Special and Career/Technical Education
252031	Secondary School Teachers, Except Special and Career/Technical Education
252032	Career/Technical Education Teachers, Secondary School
252055	Special Education Teachers, Kindergarten
252056	Special Education Teachers, Elementary School
252057	Special Education Teachers, Middle School
252058	Special Education Teachers, Secondary School
252059	Special Education Teachers, All Other
253011	Adult Basic Education, Adult Secondary Education, and ESL Instructors
253011	Self-Enrichment Teachers
254031	Library Technicians
259031	Instructional Coordinators
259044	Teaching Assistants, Postsecondary
259049	Teaching Assistants, All Other

## Construction/Installation/Maintenance/Repair

6-Digit SOC	Virginia Occupation
371012	First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers
471011	First-Line Supervisors of Construction Trades and Extraction Workers
472021	Brickmasons and Blockmasons
472031	Carpenters
472044	Tile and Stone Setters
472071	Paving, Surfacing, and Tamping Equipment Operators
472073	Operating Engineers and Other Construction Equipment Operators
472111	Electricians
472132	Insulation Workers, Mechanical
472152	Plumbers, Pipefitters, and Steamfitters
472211	Sheet Metal Workers
472221	Structural Iron and Steel Workers
473013	Helpers—Electricians
473015	Helpers—Pipefitters, Plumbers, Pipefitters, and Steamfitters
474011	Construction and Building Inspectors
474051	Highway Maintenance Workers
474071	Septic Tank Servicers and Sewer Pipe Cleaners
491011	First-Line Supervisors of Mechanics, Installers, and Repairers
492011	Computer, Automated Teller, and Office Machine Repairers
492022	Telecommunications Equipment Installers and Repairers, Except Line Installers
492098	Security and Fire Alarm Systems Installers
493011	Aircraft Mechanics and Service Technicians
493021	Automotive Body and Related Repairers
493023	Automotive Service Technicians and Mechanics
493031	Bus and Truck Mechanics and Diesel Engine Specialists
493042	Mobile Heavy Equipment Mechanics, Except Engines
493093	Tire Repairers and Changers
499021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers
499041	Industrial Machinery Mechanics
499043	Maintenance Workers, Machinery
499051	Electrical Power-Line Installers and Repairers
499052	Telecommunications Line Installers and Repairers
499071	Maintenance and Repair Workers, General
499098	Helpers—Installation, Maintenance, and Repair Workers
499099	Installation, Maintenance, and Repair Workers, All Other

## Sales

6-Digit SOC	Virginia Occupation
411012	First-Line Supervisors of Non-Retail Sales Workers
413021	Insurance Sales Agents
413031	Securities, Commodities, and Financial Services Sales Agents
413091	Sales Representatives of Services, Except Advertising, Insurance, Financial Services
414011	Sales Representatives, Wholesale and Manufacturing, Tech and Scientific
414012	Sales Representatives, Wholesale and Manufacturing, Except Tech and Scientific
419021	Real Estate Brokers
419031	Sales Engineers

## Art/Design/Entertainment/Sports/Media

6-Digit SOC	Virginia Occupation
271011	Art Directors
271024	Graphic Designers
272012	Producers and Directors
272022	Coaches and Scouts
273031	Public Relations Specialists
273042	Technical Writers
273091	Interpreters and Translators

## Healthcare

6-Digit SOC	Virginia Occupation
211022	Healthcare Social Workers
211013	Marriage and Family Therapists
291021	Dentists, General
291031	Dietitians and Nutritionists
291071	Physician Assistants
291122	Occupational Therapists
291123	Physical Therapists
291126	Respiratory Therapists
291127	Speech-Language Pathologists
291131	Veterinarians
291141	Registered Nurses
291171	Nurse Practitioners
291215	Family Medicine Physicians
291292	Dental Hygienists
292010	Clinical Laboratory Technologists and Technicians
292031	Cardiovascular Technologists and Technicians
292032	Diagnostic Medical Sonographers
292034	Radiologic Technologists and Technicians
292042	Emergency Medical Technicians
292043	Paramedics
292052	Pharmacy Technicians
292055	Surgical Technologists
292056	Veterinary Technologists and Technicians
292061	Licensed Practical and Licensed Vocational Nurses
292072	Medical Records Specialists
292081	Opticians, Dispensing
299021	Health Information Technologists and Medical Registrars
311131	Nursing Assistants
312011	Occupational Therapy Assistants
312021	Physical Therapist Assistants
312022	Physical Therapist Aides
319011	Massage Therapists
319091	Dental Assistants
319092	Medical Assistants
319094	Medical Transcriptionists
319096	Veterinary Assistants and Laboratory Animal Caretakers
319097	Phlebotomists
319099	Healthcare Support Workers, All Other
394031	Morticians, Undertakers, and Funeral Arrangers
395012	Hairdressers, Hairstylists, and Cosmetologists
395094	Skincare Specialists
399031	Exercise Trainers and Group Fitness Instructors

## Production and Transportation/Material Moving

6-Digit SOC	Virginia Occupation
511011	First-Line Supervisors of Production and Operating Workers
512041	Structural Metal Fabricators and Fitters
513092	Food Batchmakers
514121	Welders, Cutters, Solderers, and Brazers
515112	Printing Press Operators
517041	Sawing Machine Setters, Operators, and Tenders, Wood
518031	Water and Wastewater Treatment Plant and System Operators
519041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and
519061	Inspectors, Testers, Sorters, Samplers, and Weighers
519081	Dental Laboratory Technicians
519083	Ophthalmic Laboratory Technicians
519161	Computer Numerically Controlled Tool Operators (NA)
519161	Computer Numerically Controlled Tool Operators (HS)
519162	Computer Numerically Controlled Tool Programmers (NA)
519162	Computer Numerically Controlled Tool Programmers (HS)
519199	Production Workers, All Other
531044	First-line Supervisors of Passenger Attendants
532021	Air Traffic Controllers
533031	Driver/Sales Workers
533032	Heavy and Tractor-Trailer Truck Drivers
533033	Light Truck Drivers
533052	Bus Drivers, Transit and Intercity
535021	Captains, Mates, and Pilots of Water Vessels
537021	Crane and Tower Operators
537081	Refuse and Recyclable Material Collectors

## Miscellaneous

6-Digit SOC	Virginia Occupation
351011	Chefs and Head Cooks
231011	Lawyers
333021	Detectives and Criminal Investigators

## Sales

6-Digit SOC	Virginia Occupation
411012	First-Line Supervisors of Non-Retail Sales Workers
413021	Insurance Sales Agents
413031	Securities, Commodities, and Financial Services Sales Agents
413091	Sales Representatives of Services, Except Advertising, Insurance, Financial Services
414011	Sales Representatives, Wholesale and Manufacturing, Tech and Scientific
414012	Sales Representatives, Wholesale and Manufacturing, Except Tech and Scientific
419021	Real Estate Brokers
419031	Sales Engineers

## Office and Admin Support

6-Digit SOC	Virginia Occupation
431011	First-Line Supervisors of Office and Administrative Support Workers
433011	Bill and Account Collectors
433021	Billing and Posting Clerks
433031	Bookkeeping, Accounting, and Auditing Clerks
433051	Payroll and Timekeeping Clerks
433061	Procurement Clerks
433071	Tellers
434011	Brokerage Clerks
434031	Court, Municipal, and License Clerks
434051	Customer Service Representatives
434071	File Clerks
434081	Hotel, Motel, and Resort Desk Clerks
434111	Interviewers, Except Eligibility and Loan
434121	Library Assistants, Clerical
434131	Loan Interviewers and Clerks
434151	Order Clerks
434161	Human Resources Assistants, Except Payroll and Timekeeping
434171	Receptionists and Information Clerks
434181	Reservation and Transportation Ticket Agents and Travel Clerks
434199	Information and Record Clerks, All Other
435011	Cargo and Freight Agents
435031	Public Safety Telecommunicators
435032	Dispatchers, Except Police, Fire, and Ambulance
435052	Postal Service Mail Carriers
435061	Production, Planning, and Expediting Clerks
435071	Shipping, Receiving, and Inventory Clerks
436011	Executive Secretaries and Executive Administrative Assistants
436013	Medical Secretaries and Administrative Assistants
436014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive
439021	Data Entry Keyers
439041	Insurance Claims and Policy Processing Clerks
439051	Mail Clerks and Mail Machine Operators, Except Postal Service
439061	Office Clerks, General
439199	Office and Administrative Support Workers, All Other

## Management

6-Digit SOC	Virginia Occupation
111021	General and Operations Managers
112021	Marketing Managers
112022	Sales Managers
113012	Administrative Services Managers
113013	Facilities Managers
113021	Computer and Information Systems Managers
113031	Financial Managers
113051	Industrial Production Managers
113061	Purchasing Managers
113071	Transportation, Storage, and Distribution Managers
113121	Human Resources Managers
119021	Construction Managers
119033	Education Administrators, Postsecondary
119041	Architectural and Engineering Managers
119051	Food Service Managers
119072	Entertainment and Recreation Managers, Except Gambling
119111	Medical and Health Services Managers
119121	Natural Sciences Managers
119141	Property, Real Estate, and Community Association Managers
119151	Social and Community Service Managers
119179	Personal Service Managers, All Other
119199	Managers, All Other

## Life/Physical/Social Science

6-Digit SOC	Virginia Occupation
191042	Medical Scientists, Except Epidemiologists
192031	Chemists
192041	Environmental Scientists and Specialists, Including Health
193011	Economists
193033	Clinical and Counseling Psychologists
193034	School Psychologists
193051	Urban and Regional Planners
193094	Political Scientists
193099	Social Scientists and Related Workers, All Other
194042	Environmental Science and Protection Technicians, Including Health
194044	Hydrologic Technicians
194099	Life, Physical, and Social Science Technicians, All Other
195011	Occupational Health and Safety Specialists

# Methodological Design Process

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## Stakeholder Engagement

We are grateful to numerous Virginia stakeholders for their ongoing input into this process, including but not limited to the Virginia Department of Education, Virginia Community College System, Virginia Employment Commission, Virginia Economic Development Partnership, the Virginia Board of Workforce Development members, the Secretariat of Labor, and the Virginia Office of Education Economics. The Virginia Board of Workforce Development also convened and coordinated an ongoing advisory body, called the High Demand Occupations List Workgroup, through which we are grateful for the ongoing feedback of its participants. The methodology in this report represents and reflects input and feedback from all of these stakeholders in various forms.

## Guiding Principles

Before diving into the specific methodology and data, the stakeholders engaged throughout this process stepped back and created a set of guiding principles that underpinned our methodological design approach. From the outset, it was established that the first comprehensive iteration of this exercise should result in a state-wide list of occupations (not individual regionalized lists), though in future years depending on ultimate use cases there may be regional versions created and adapted. In partnership with the High Demand Occupations List workgroup this exercise was determined to be focused on all occupations in Virginia, regardless of typical educational level or training required at entry. In addition, we also committed up-front to the following guiding principles:

- **EMPLOY A RIGOROUS AND TRANSPARENT METHODOLOGICAL APPROACH:** The methodology should be rigorous, clear, concise, logical, replicable, defensible. We will be 100% transparent with all underlying data sources and calculations. We have done so with a detailed appendix shared here in this report such that any interested party could replicate the methodology as needed.
- **RELY ON PUBLICLY AVAILABLE DATA SOURCES:** Although in some instances proprietary data sources would offer different or additional nuances, in service of guiding principle #1 (transparency, replicability), we have relied exclusively on publicly available data sources within our methodology.
- **SET UP PROCESS FOR ONGOING REFINEMENTS AND ANNUAL REFRESH:** With a goal of continually improving and refining, as well as incorporating new data sources as they become available over time, in addition to outlining the methodology and list we have also outlined specific areas for additional refinement in the years ahead. We treat the Virginia High Demand Occupations list as a living document that we anticipate refinements to over the years ahead.
- **ENSURE REGULAR INPUT & ENGAGEMENT FROM KEY VIRGINIA STAKEHOLDERS:** The Virginia Workforce Development Board has regularly engaged with VCCS, VOEE, VDOE, VEC, DHCD, VEDP, SCHEV, money-committee staff, and others to ensure a broad array of input is incorporated.

- **LEVERAGE INSIGHTS FROM OTHER STATES & NATIONAL EXPERTS:** We opted to learn and build on what works, leveraging benchmarking insights from other states as well as national experts who have expertise in this topic.

## State Benchmarking

As mentioned in the guiding principles above, one key input to the design of the methodology was learning from other states' experiences with their respective High Demand Occupations list creation process. Our ultimate methodological design reflects several insights we gleaned through our state benchmarking analysis, leveraging the most relevant insights for Virginia. Some insights we leveraged were very detailed (example: which percentile of wages is most representative of an entry-level wage) and others high level (example: instead of creating 'hard cutoff' thresholds, we opted instead for a 'pathways' methodology wherein high performance in one variable can compensate for lower performance in another variable).

For each of the states we benchmarked, below includes a snapshot of that state's methodology employed for the equivalent of "High Demand Occupations" in their state, as well as main uses cases and miscellaneous learnings. Note there is a lot of heterogeneity amongst what 'use cases' states employ their list for, as well as how varied the methodologies themselves are. Below are snapshots of our key findings from state benchmarking conducted in May-July 2021 of Ohio, Pennsylvania, Colorado, New Jersey, Kentucky, Massachusetts, and Texas:



### QUICK FACTS

**The List:** [Ohio's Top Jobs List \(Statewide\)](#).

*Note: "Ohio's Top Jobs" is defined as "in-demand jobs" + "critical jobs". Interactive tool for only in-demand jobs [avail here](#).*

**The Methodology:** Blog post here (*more detailed methodology word doc also avail*)

**Key contact(s):** [Dan Rizo-Patron](#), Department of Job & Family Services

### MAIN "USE CASES"?

- **WIOA grant eligibility.** WIOA training dollars must be allocated to in-demand occupations. Ohio passed a law mandating this list gets created and refreshed every 2 years.
- **Dept of Education and Dept of Higher Education** also use these lists with students when thinking through careers

### MISCELLANEOUS

- **Why not supply-demand gaps analysis?** Supply-demand gaps is too methodologically complicated. We do get asked about it all the time though. We have a separate tool (our [Workforce Supply Tool](#)) Ohio made to help get at supply Q's.
- Ohio has a state-wide, week-long celebration to highlight its in-demand jobs called the "**In-Demand Jobs Week**" (2021 event info [here](#))

### METHODOLOGY DEEP DIVE

**Step 1: Create baseline List.** Generate list of 6-digit SOCs that meet "baseline requirements", using BLS data:

- Hourly wage  $\geq$  \$14.10 (which is 80% of median wages)
- Annual openings  $\geq$  584
- Annual growth  $\geq$  36

**Step 2: Remove any SOCs where more than 50% of individuals are employed by government.** (Note – this was a political add)

**Step 3: Allow select SOC additions through a "business voice" survey.** Create a new set of possible SOC additions based on the lowered baseline criteria of:

- Hourly wage  $\geq$  90% of \$14.10 (lower threshold), plus EITHER Annual openings  $\geq$  584, OR Annual growth  $\geq$  36.
- Also must require an industry-recognized certificate (USDOL)
- Also must meet a threshold on OhioMeansJobs job ad posting trends (wage 80% of \$14.10, annual avg postings  $\geq$  303, annual average posting growth  $\geq$  36)
- *Note: In addition, each of the 6 JobsOhio regions have (lower) thresholds where for any given region, a metric has to be only 90% the three metrics above*

Then, based on a Governor's Office of Workforce Transformation survey that any Ohio employer can fill out, only if one of the above "maybe" category SOCs is specifically mentioned as a crucial occupation for an employer's hiring needs in 1, 3, or 5 years, it gets added to the list.

**Step 4: Administration Priorities.** A handful of "critical occupations" identified by the Governor's administration to be of particular need / focus for state-wide growth are added to the list (e.g., foster care, lead abatement, STEM teachers)



# PENNSYLVANIA

## QUICK FACTS

**Two lists:** (1) [High Priority Occupations List](#) (HPO) and (2) [In-Demand Occupations List](#) (IDOL)

**The Methodology:** Both are public. IDOL methodology [here](#). HOP methodology [here](#).  
**Key contact(s):** Kimberly DeLellis, Ed Legge

## MAIN "USE CASES"?

**For High-Priority Occupations List: WIOA funding for eligible training providers.**

Targeted list of occupations used to align local workforce training funding to best fit job prospects. List is specific to each Local Workforce Development Area. Is NOT designed for broader use beyond WIOA.

**For In-Demand Occupations List:** State-wide list used as a career exploration tool to identify occupations that are in-demand in PA. CTE programs and education professionals use it to identify new programs and/or evaluate existing ones

## MISCELLANEOUS

- Creating two separate lists was very strategic given the WIOA use case is so unique and different from all other state use cases
- The HPO petition process helps keep local Boards involved, but also can lead to tensions and challenges

## METHODOLOGY DEEP DIVE

**FOR HIGH PRIORITY OCCUPATIONS LIST (HPO):**

**Step 1: Create region-specific lists based on the following criteria:**

- **Annual demand** – Threshold for # of annual openings based on regions (Group 1 - 75, group 2 - 45, group 3 - 20)
- **Annual average wage:** Take the MIN of either the state-wide self-sufficiency threshold for 1 adult and 1 child, which is 200% of the FPL, OR the region-specific self-sustaining wage based on United Way reports

**Step 2:** Because this list includes only SOC's where there exist a shortage of workers, the following "screens" are used to remove any SOC's without shortage:

- **Employment loss** (regional lens): If total employment loss (2016-2018) was greater than -10% it's off the list (note: overall avg employment gain was +2.4%)
- **Nominal wage decline** (regional lens): any SOC's with nominal wage loss across 2017-2019 period gets taken off the list (note: the rate of overall inflation was 4.6% and overall growth in wages was 5.3% during that period).
- **Occupational unemployment rates** (state-wide): We look at average unemployment rate over a 5-year time frame (long time frame given small small n size). Any SOC with unemployment >10% is off the list. (Note: avg is 5.3%)
- **Ratio of training competitors to job openings** (state-wide): PA has developed a unique CIP-SOC crosswalk methodology (that basically solves the one-to-many match problem by assigning a certain % of each CIP code graduate to several different SOC codes. They use this to calculate a ratio. If it's greater than 300% (more than 3 people trained for every 1 job opening), it's OFF the list.

**Step 3:** Local workforce boards can submit a petition if they can demonstrate unmet employer demand, career pathway, or local workforce initiatives/sector performance

**FOR IN-DEMAND OCCUPATIONS LIST (IDOL):**

**Straightforward list with an either/or data criteria. No petition process:**

- **EITHER.** % change in employment (from estimated 2018 to projected 2021) is 150% or more of the overall state growth average across all occupations
- **OR:** Annual demand (as measured by annual openings) is above a certain threshold.

# COLORADO

## QUICK FACTS

**The list:** "[Colorado's Top Jobs 2020](#)"

**The Methodology:** High level methodology shared in Colorado's Talent Pipeline Report ([link](#))

**Key contact(s):** Jean Dougherty, CHDE & CDWC joint staffer

## MAIN "USE CASES"?

- **Colorado Department of Education and Department of Higher Education** use the list for Colorado Opportunity Scholarship Initiative (COSI)

## MISCELLANEOUS

- **Why not supply-demand gaps analysis?** This is the next step everybody needs. Will require funding and a lot of work on CIP-SOC refinement and other considerations. Every stakeholder will have a different perspective (higher ed, employers). Colorado has a really nascent 1.0 version of trying to assess supply-demand gaps through comparing unemployment absolute numbers to job posting absolute numbers ([link](#)), but very inferential and imprecise.

## METHODOLOGY DEEP DIVE

**Colorado's Top Jobs 2020 must meet the following criteria:**

1. **Above average job growth rate** (recently switched it from 1 year to 10 year vantage). Uses Emsi data.
2. **Above average wage** ("living wage"). We break that down by 2 tiers - for an individual, then for a family. And we use the MIT living wage calculator. We do that for state-wide, but that does also break it down by county.
3. **Has to have above 40 annual openings n size.** This is a regional cutoff for region-specific lists (can filter by region in drop-down menu).

Lists are updated on **ongoing basis** every time new LMI projections are released.

# NEW JERSEY

## QUICK FACTS

**The List:** [Labor Demand Occupations List 2020](#)

**The Methodology:** Not posted publicly

**Key contact(s):** Jason Timian, NJ Dept of Labor

## MAIN "USE CASES"?

- **WIOA** is the most active user. The list helps to guide educational/training funding.
- **Students/job seekers** use it as a reference to see what types of jobs, regardless of education, are in demand in NJ
- **Researchers/analysts** use the list as an additional resource of labor market in formation

## MISCELLANEOUS

- NJ code indicates list must be SOCs of "significant excess of demand over supply of adequately trained workers". **How do you address the supply side?** See Step 2 in methodology. We look at 2 supply variables.
- **Why not local / regional "cut" of the list?** Due to geographic size of NJ and limitations on substate data availability, we recognize there may be concentrations of local demand not captured on state-wide list. In these instances, we encourage local training providers and Workforce Development Boards to submit a local waiver. If granted, a SOC may be added in that area.

## METHODOLOGY DEEP DIVE

**Step 1: Develop Demand-Side List.** In order to be on the list, a SOC must meet ALL of the following criteria (83 / 794 SOCs met these):

- **Total employment:** Must have a statewide employment level of at least 2,000 (in 2020, 274 SOCs out of 794 SOCs met this threshold)
- **Historical growth in total employment:** SOC must have experienced historical growth from 2015 to 2018 greater than the statewide average (in 2020, 270 SOCs met this threshold)
- **Strong projected growth rate:** SOC must be projected to add employment at higher rate than state average (in 2020, 301 SOCs).
- **EXCLUDED SOCS - Must NOT be:** (1) a SOCs classified as a management occupation (SOC 11-) or (2) "All Other" SOC (-99).

**Step 2: Add in SOCs where there's "significant excess of demand over supply"** (an add'l 26 SOCs got added through this):

- **Index from 0-1:** 5 demand variables (*total employment, long-term job growth projections, long-term projected employment growth rate, long-term projections of job openings, online job postings*) and 2 supply variables (UI claimants, reported completers by CIP, using [NCES crosswalk](#)) were indexed from 0 to 1 based on min/max value for each measure.
- **Average of indexed values:** All 5 demand indexed values are averaged to create a single value; the 2 supply measures similarly.
- **If demand > supply by .05+, add it:** Any occupations where the demand value was greater than the supply value by at least .05 were considered 'in demand'.

**Step 3: Additions.** NJ DOL reserves the right to add SOCs at their discretion at any point. Local WDB's can also [submit a waiver](#).

# KENTUCKY

## QUICK FACTS

**The List:** The Kentucky Future Skills Report encompasses projected demand for all occupations. Separately, The Kentucky Workforce Innovation Board received a list of occupations from KYSTATS along with demand, wage, and growth data to determine sectors with high-wage/high demand.

**The Methodology:** Technical Documentation [here](#).

**Key contact(s):** KYSTATS

## MAIN "USE CASES"?

- **Kentucky Workforce Innovation Board.** WIOA training dollars must be allocated to in-demand occupations. Engage with Local Areas.
- **Dept of Education and Council on Postsecondary Education,** to align career pathways to high-demand occupations and colleges to look at program evaluation.
- **Kentucky Works Scholarship** created for free associate degree in a high demand sector.

## MISCELLANEOUS

- **Why not supply-demand gaps analysis?** Too methodologically complicated. KYSTATS was tasked with providing information so that others that across the ed/workforce pipeline could make informed decisions for alignment, funding distribution, and program expansion.
- **Multiple reports** now encompass projected demand associated with educational programs.

## METHODOLOGY DEEP DIVE

**Kentucky's "5 Tier Job Hierarchy"** outlines 5 "tiers", each which must meet all of the criteria laid out within that tier. Together, all jobs are included:

### Tier 5 Jobs: High Demand and High Wage

- **Median wage**  $\geq$  \$37,546 (MIT Living Wage for 2 adults 1 children)
- **Required entry wage**  $\geq$  \$22,841 (MIT Living Wage for 1 adult 0 children)
- **Projected annual openings due to growth or replacement**  $\geq$  50 per year over the next 5 years
- **Percentage of projected openings NOT due to transfer**  $\geq$  25%

### Tier 4 Jobs: High Demand and Borderline High Wage

- **Median wage**  $\geq$  \$32,192 (approx. 40<sup>th</sup> percentile of MIT Living Wage for 2 adults 1 children)
- **Projected annual openings due to growth or replacement**  $\geq$  50 per year over the next 5 years
- **Percentage of projected openings NOT due to transfer**  $\geq$  25%

### Tier 3 Jobs: High Demand

- **Projected annual openings due to growth or replacement**  $\geq$  50 per year over the next 5 years

### Tier 2 Jobs: High Growth and Borderline High Wage

- **Median wage**  $\geq$  \$32,192 (approx. 40<sup>th</sup> percentile of MIT Living Wage for 2 adults 1 children)
- **Job Growth**  $\geq$  .451 (which is the average job growth for all jobs in KY)
- **Minimum # of existing jobs**  $>$  500

### Tier 1 Jobs: All Others

- (no criteria – all SOCs that don't get classified under Ties 2-5 get assigned Tier 1)

# MASSACHUSETTS

## QUICK FACTS

**The List(s):** Each of the 7 regions of MA undergoes a [Regional Workforce Skills Planning initiative](#) to identify high-demand and critical occupations.

**The Methodologies:** Each of the region's [blueprints](#) describe the selection methodology as well as identify the high-demand occupations the regions will be focused on

**Key contact(s):** Cheryl Scott, MassHire

## MAIN "USE CASES"?

- Each of the 7 regions uses their respective methodology and high-demand and critical occupations lists for **policy development**.
- Separately, MA's DOL also maintains [industry-occupation projections data](#) that is meant to be a **labor production tool**.

## MISCELLANEOUS

- **Very region-driven.** Unique methodologies for each region, and no state-wide methodology employed.

## METHODOLOGY DEEP DIVE

**Each of the 7 regions defines their own methodology. This description outlines the methodology employed by the [Greater Boston region](#).**



**Step 1: Identify "Four Star" and "Five Star" Occupations.**

*(NOTE: The methodology documentation only gives a qualitative description).* Four and five-star jobs were determined using criteria from EOLWD. These jobs had both high wages and high projected growth. 207 occupations met the criteria to be 4 or 5-star jobs.

**Step 2:** Use supply-side data (specifically: UI claimants data by occupation and number of new college and voced program graduates) to identify the subset of the above occupations that are facing a projected shortage.



**Step 3:** Add in any one or two-star occupations to the list that off "career pathway" for workers to move to higher skills and wages, especially from entry-level start. (Within healthcare, these additions included medical records clerk, patient registrar, patient transporter, receptionist, dietary aide, etc).



# TEXAS

## QUICK FACTS

**The lists** (specific to each local workforce board area): [Link](#)

**The Methodology:** Specific to each Local Workforce Board; not documented or shared

**Key contact(s):** Joel Mullins and Gabriel Guzman, Texas Workforce Commission

## MAIN "USE CASES"?

- **Implementation of WIOA grants.** Eligible training provider approval process is based on a roll-up of the local area lists into one state-wide aggregate list.
- **A handful of state funding programs** use the list as well

## MISCELLANEOUS

- Separate from these lists, Texas also has its Jobs Y'all website – which aims to direct individuals towards 8 industry clusters identified as of strategic importance to the state. In order to map specific occupations within those industry clusters to promote, Texas includes only SOCs within each of the 8 industry clusters in which mean occupational wages (state-wide) are higher than the Texas median wage across all occupations.

## METHODOLOGY DEEP DIVE

The Texas Workforce Commission provides state-wide data as a starting point to Local Workforce Boards, who in turn are asked to each develop three different lists (below). Boards have 100% autonomy in the creation of their lists with no requirement of any methodology to be provided to the state.

**In-Demand Industries:**

- have a substantial current or potential impact (including through jobs that lead to economic self-sufficiency and opportunities for advancement) on the state, regional, or local economy and that contribute to the growth or stability of other supporting businesses or to the growth of other industry sectors; or
- currently have or are projected to have a number of open positions (including positions that lead to economic self-sufficiency and opportunities for advancement) great enough to have a significant impact on the state, regional, or local economy.

**In-Demand Occupations:**

- currently have or are projected to have a number of open positions (including positions that lead to economic self-sufficiency and opportunities for advancement) great enough to have a significant impact on the state, regional, or local economy

**Target Occupations:**

- have or are projected to have a substantial number of openings—due to job growth rather than job turnover—so as to have a significant impact on the state, regional, or local economy; and
- result in occupational wages that meet a Board's self-sufficiency requirements or have been identified by the Board as a career pathway to an occupation that leads to self-sufficient wages.

# 2021-2022 High Demand Occupations

## Methodology

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Our 2021-2022 Virginia High Demand Occupations Methodology has four steps, summarized here and each outlined in further depth in the subsequent sections:

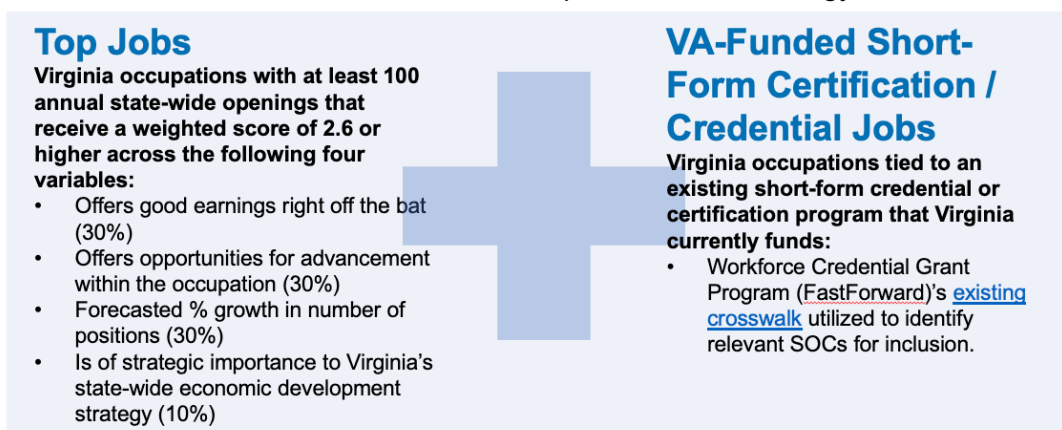
**STEP 1: Every Standard Occupational Code (SOC) in Virginia is scored from 0-5 on four selected variables indicative of high demand occupations.** Through our methodological design process, we identified the four variables that we deem as most relevant, important, quantifiable, and indicative of characteristics of Virginia’s high demand occupations. Every single 6-digit standard occupational code, or “SOC”, was then scored on each of these four variables. The four dimensions we identified include:

1. Offers good earnings right off the bat
2. Offers opportunities for advancement within the occupation
3. Number of jobs forecasted to grow
4. Is of strategic importance to Virginia’s state-wide economic development strategy

**STEP 2: All occupations were filtered by # of state-wide annual openings.** Any occupation in Virginia that has an ‘n size’ of at least 100 annual openings state-wide is eligible for list inclusion.

**STEP 3: Virginia’s “Top Jobs” list generated based on final % weighted score across above variables.** We then assign % weightings to each of the above four variables based on relative importance. We have opted to assign a weighting of 30% - 30% - 30% - 10% across the 4 variables listed above. Any SOC that scores a 2.6 or higher is then included in Virginia’s 2021-22 High Demand Occupations List.

**STEP 4: Addition of existing short-form certification / credential training programs.** In consultation with stakeholders, the decision was made that all SOCs specifically mapped to an existing Virginia state-funded short-form credential or certification training program (such as the Workforce Credential Grant (FastForward) and Get Skilled, Get a Job, Get Ahead) that are designed to provide on-ramps to careers and foster more career pathway mobility through stackable credentials needed to be included. Thus the decision was made to include these occupations as well based on Virginia’s [already-established CIP-SOC crosswalk](#) of these existing programs. The visual below summarizes all four steps of our methodology:



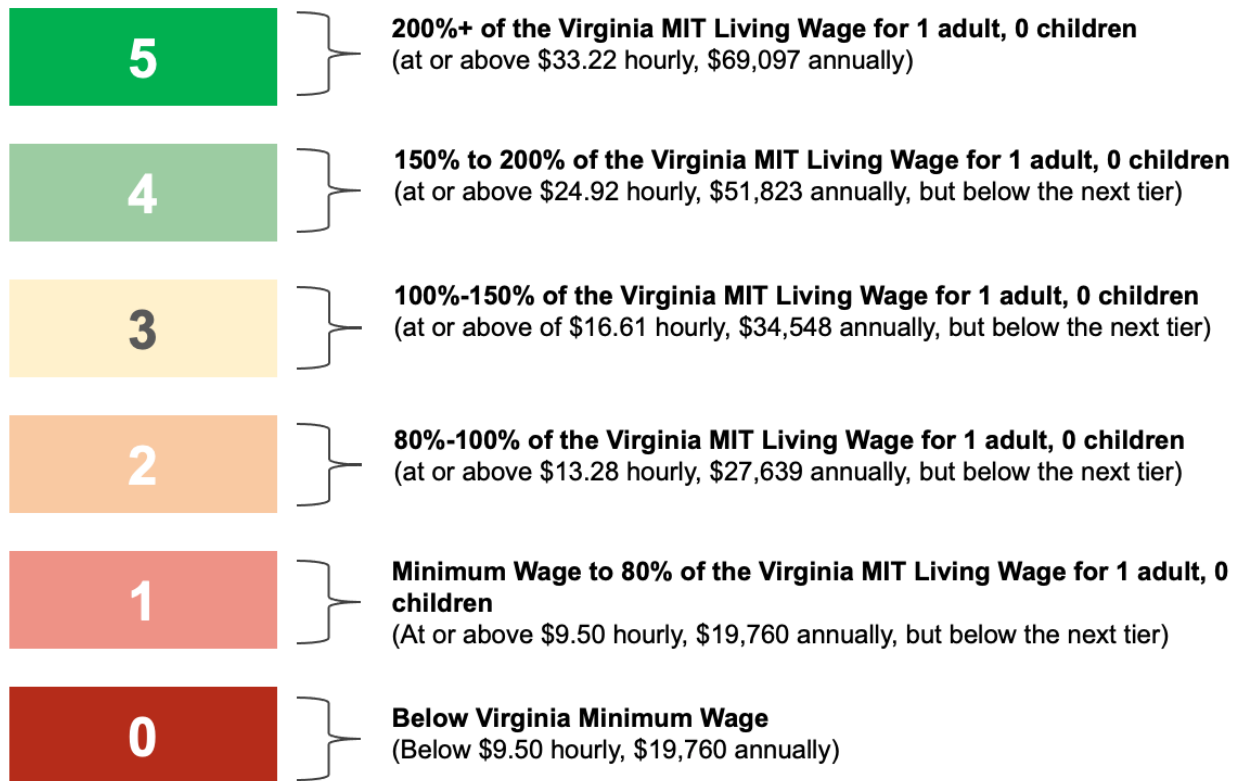
## Step 1: Scoring of all SOCs on Four Dimensions

Each of the four variables is further detailed below. We also have included an appendix section with even further detail of each specific data source employed at each step in the process, such that anyone who seeks to replicate our methodology can do so.

### VARIABLE #1: OFFERS GOOD EARNINGS RIGHT OFF THE BAT

**Why we selected this variable:** Entry-level wages are widely regarded as one of the best indicators of high demand occupations. We had broad stakeholder consensus on this variable and its importance to Virginia's list, especially given possible near-term use cases of this list in informing allocation of training dollars to help new entrants into occupations.

**How we quantify it:** We are leveraging the latest publicly available Bureau of Labor Statistics data on 10<sup>th</sup> percentile occupational wages, which is provided to them by VEC. We determined scoring cutoffs by first leveraging Virginia's minimum wage as the threshold for a 0 score. From there, we tiered the other 5 scoring categories based on the Virginia-specific MIT Living for 1 adult, 0 children family size.<sup>1</sup> Please see graphic below for specific scoring thresholds:



**Example:** Plumbers, Pipefitters, and Steamfitters (SOC code 47-2152) earn an entry-level wage of \$16.22 on average across Virginia. As a result, this occupation receives a score of 2 for this variable.

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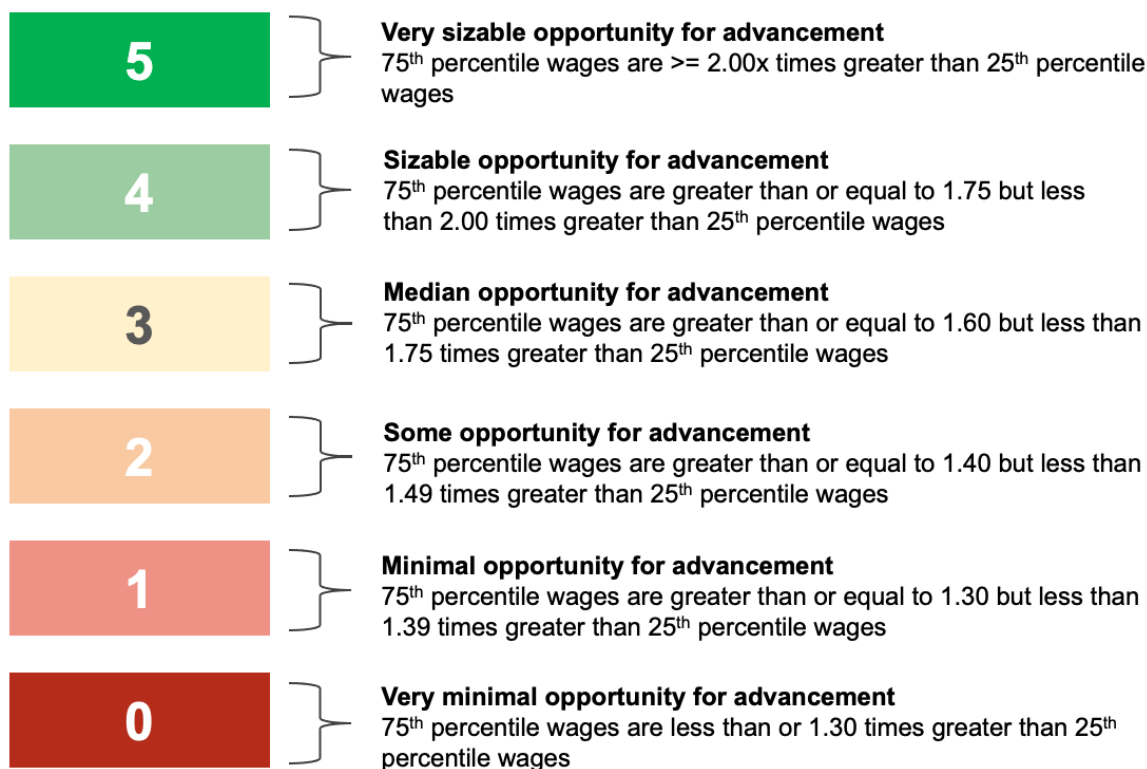
<sup>1</sup> MIT Living Wage calculator widely accepted as industry standard. Specific family size of 1 adult, 0 children chosen for this variable specifically given it pertains most closely to entry-level wages.

**Areas for future year refinement:** Note that given Virginia’s recent minimum wage legislation includes increases in the minimum wage over time, future year methodologies will take into account the latest thresholds (refreshed each year).

## VARIABLE #2: OFFERS OPPORTUNITIES FOR ADVANCEMENT

**Why we selected this variable:** Beyond ensuring good wages off the bat, we also strongly believe that opportunities to grow over time in are important to ensuring not just a job but a career to support an individual or family. Jobs that offer opportunities for advancement are more likely to have higher retention, higher exit opportunities, and create economic value for both the individual and the Commonwealth.

**How we quantify it:** Leveraging the publicly available Bureau of Labor Statistics data for Virginia occupations, we look at Inter-occupational wage growth calculated as the ratio of 75<sup>th</sup> percentile wages: 25<sup>th</sup> percentile wages. Scores are assigned based on this ratio. Please see visual below for specific scoring thresholds.



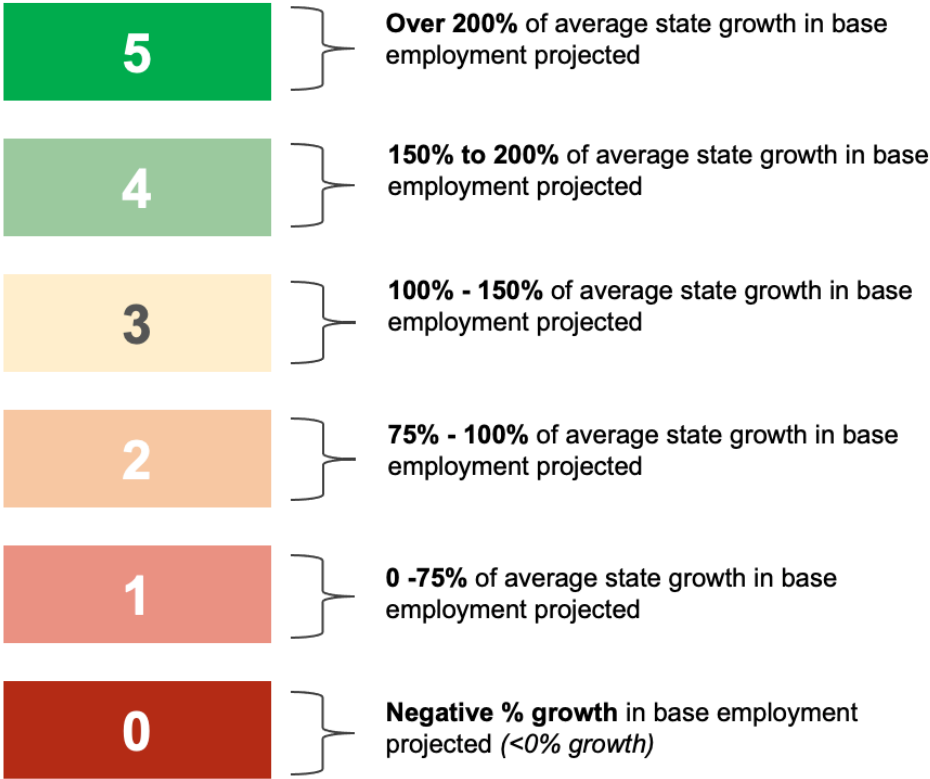
**Example:** Within the transportation / material moving occupational category, Virginia employs over 23,000 light truck drivers (SOC 53-3033). This occupation has a 25<sup>th</sup> percentile wage of \$13.12 in Virginia, and a 75<sup>th</sup> percentile median wage of \$26.30 in Virginia. This is equivalent to a ratio of 2.0x (e.g., this occupation has wages that double over time as you gain seniority and experience). Based on the tiers outlined here, this SOC receives a score of 5 for this variable.

**Areas for future year refinement:** This year’s proposed measurement of this variable is our best option given the current data available. We recognize this measurement approach only captures opportunities for advancement *within* a 6-digit SOC. Opportunities for advancement happen not only from wage growth within one’s current occupation, but through mobility *between* occupations, both within the same industry and between industries. We explored and rejected the alternative approach of utilizing one or multiple of the burgeoning datasets available that attempt to ‘map’ occupations into ‘career clusters’ or ‘career pathways’. Upon close examinations of these datasets, we did not determine them to be an accurate representative of Virginia’s career pathways opportunities. However, as further described in the “Opportunities for Future Methodological Refinement” section, this is one of the three key focus areas for next year we’re planning to keep an eye on as the nascent realm of skills-based career mapping and career pathways and clusters data evolves over time.

**VARIABLE #3: FORECASTED % GROWTH IN NUMBER OF POSITIONS**

**Why we selected this variable:** Forecasted % growth in number of positions is widely regarded as one of the best indicators of high demand occupations – especially given we want to take a forward-looking approach as we think about allocation of training dollars towards jobs where demand for them is likely to grow (or at minimum, not decline).

**How we quantify it:** Leveraging the publicly available Bureau of Labor Statistics data for Virginia occupations, we use projected absolute % growth in base employment from 2018 to 2028 (the latest available data set) and compare it to Virginia’s state-wide average for that same time period. Tiers are delineated accordingly in the visual below.



**Example:** As of 2018, Virginia currently employs 3,831 School Psychologists (SOC code 193034). The Bureau of Labor Statistics forecasts that this number will increase by 18.74% between 2018 and 2028. This is approx. 300% of the overall statewide average growth forecasted in Virginia’s employment base (which is 6.6% over the same time frame). As a result, School Psychologists receive a 5 score for this variable.

**Opportunities for Further Refinement:** This is one area where potential future year methodological refinement may include a mechanism for capturing both emergent trends and crises (e.g., Covid-19 crisis) as well as economic development opportunities or announcements that presently are not accounted for.

#### VARIABLE #4: IS OF STRATEGIC IMPORTANCE TO VIRGINIA’S STATE-WIDE ECONOMIC DEVELOPMENT STRATEGY

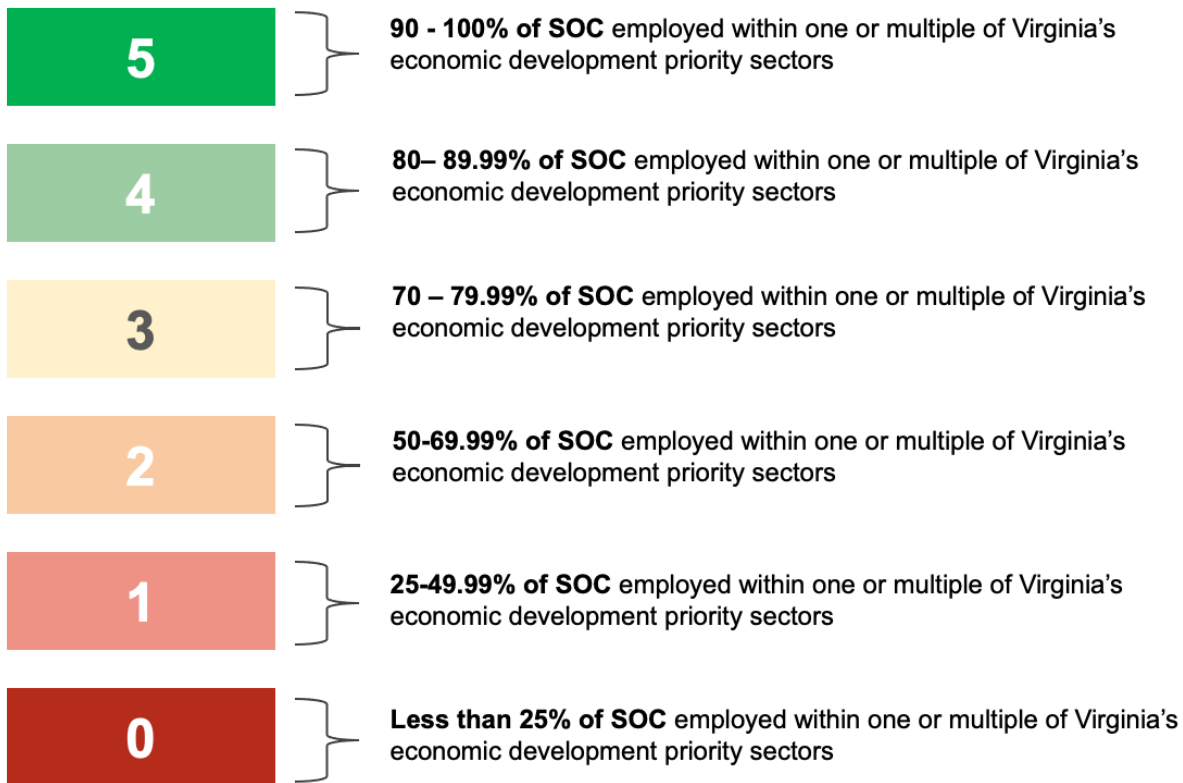
**Why we selected this variable:** Virginia’s state-wide economic development priority sectors are key industry sectors Virginia identifies on an ongoing basis that are the engine of job creation and job growth in our local economies. Sometimes referred to as ‘traded sector industries’, these industries bring in new money and new opportunities to local economies. They are the engine of growth not just within those industries but create job growth in all sectors. As economic development priority sectors grow, so do the number of jobs in nursing, teaching, public safety, and more. Virginia’s economic development plan is developed and periodically updated by Virginia’s state economic development authority (VEDP) in consultation with hundreds of state, regional, and local partners, and is approved by the VEDP Board, which includes private sector leaders representing every region of the Commonwealth who are appointed by the Governor and General Assembly, the money committee staff directors for the House and Senate, and the chair of the GO Virginia Board, as well as members of the Governor’s cabinet.

**How we quantify it:** The Virginia state-wide economic development priority sectors were aggregated to the most generous possible inclusion of as many sectors as possible under this definition. Specifically, this meant looking at 2-digit industry (NAICS) code supersectors which have at least one of its subsectors explicitly listed as a priority sector. The priority industry sectors as of 2021 are as follows (Jim can pick 3-4 to list as examples. Full list is on the slide ‘note’ at the bottom:

- 11 Agriculture, Forestry, Fishing and Hunting
- 31-33 Manufacturing
- 42 Wholesale Trade
- 48-49 Transportation and Warehousing
- 51 Information
- 52 Finance and Insurance
- 54 Professional, Scientific, and Technical Services
- 55 Management of Companies and Enterprises
- 56 Administrative and Support and Waste Management and Remediation Services

We then broke down every single occupation in Virginia into a 2-digit industry supersector crosswalk, detailing what % if the individuals employed in each occupation map onto which 2-digit industry supersectors. The sum-total of the above priority industry supersectors is then calculated, and the SOC is scored accordingly as follows:





**Example:** Virginia employs 1,441 Chemists across the state (SOC code 19-2031). Of these 1,441 chemists, if you break out the occupation by industry supersector, it breaks down as follows: 41% of them work in manufacturing; 27% work in Professional, Scientific, and Technical Services, 12.6% work in Public Administration, 4.5% work in Educational Services (the remaining 14% are scattered across 9 other industry supersectors). The sum-total of Virginia's Chemists that work in one of Virginia's priority sectors is 81%. Thus, this SOC receives a score of 4 for this variable.

**Areas for further methodological refinement:** The tight time frame of this year's methodological development process did not allow for a mechanism for qualitative employer input through focus groups or other mechanisms to be fully incorporated into this variable. We see this as an opportunity for refinement in future years as Virginia seeks to create more ongoing information streams between Virginia's employer base and its government data.

## Step 2: Filtered for Statewide Annual Openings

In order to ensure inclusion only of occupations for which the "n size" of state-wide openings is large enough to warrant list inclusion, we employed a filter in which only SOC's with 100 or more annual openings were eligible for list inclusion, which was in line with other state benchmarks as well as Virginia's 2018 methodology n size.

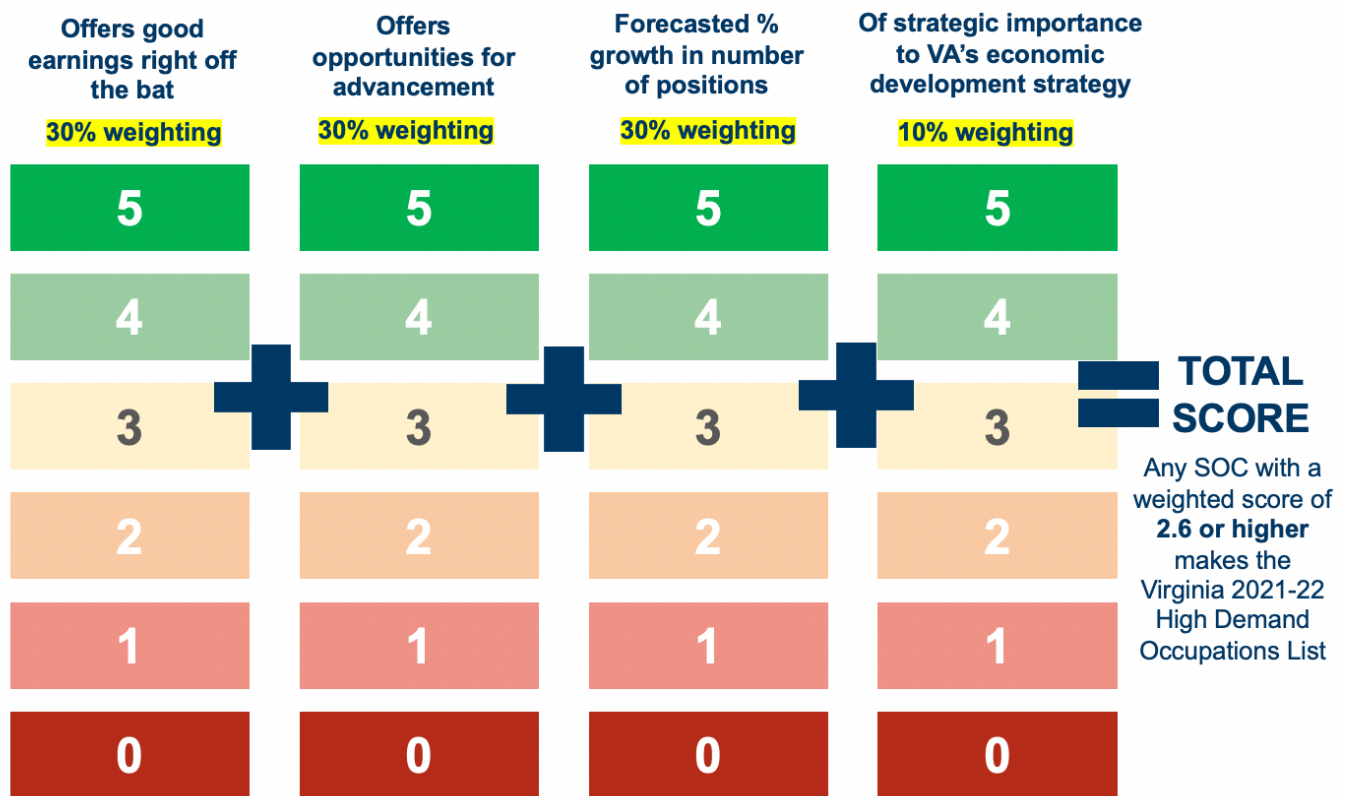
For example, Funeral Home Managers (SOC code 11-9171) has an estimated 43 number of annual openings state-wide in Virginia. Because this not greater than 100 annual openings, this SOC is not eligible for inclusion on the final 2021-22 High Demand Occupations List.

### Step 3: Weighted Scoring Calculated Across Four Variables

For all eligible SOC, we calculated a weighted score based on a weighting of Variables 1, 2, and 3 at 30% each, and Variable 4 at 10%. Based on a lot of stakeholder input, this substantially reduced weighting of Variable 4 vis a vis the other three variables is where we landed in trying to strike a fair balance between both recognizing the importance of aligning Virginia’s state workforce strategy with our state economic development strategy (working towards the same shared goals of inclusive job growth and job creation in every region of Virginia), we also acknowledge there is not always complete overlap between the two sets of priorities.

Any SOC that received a weighted score of 2.6 or higher was then deemed a Top Job (eligible for inclusion on Virginia’s High Demand Occupations List). This cutoff was determined based on two factors considered: 1) percentage of overall SOC represented in list, and 2) percentage of Virginia’s overall employment base represented in list. A threshold score of 2.6 is representative of a Virginia 2021-2022 High Demand Occupations List that inclusive of ~25% of Virginia’s occupations, and in aggregate represent ~33% of the Commonwealth’s total employment base.

The visual below depicts the weighted scoring methodology visually:



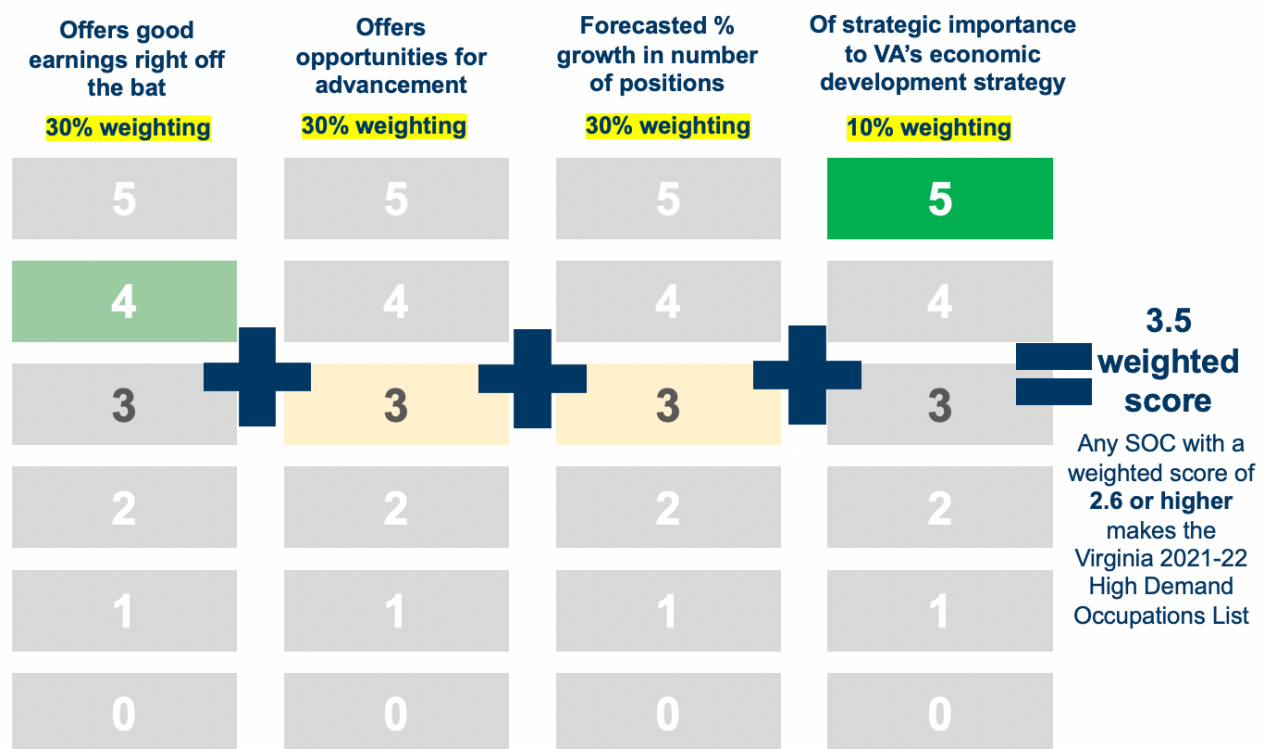
One of the unique design elements of our methodology is that there are multiple ways to make it onto the lists. Other states sometimes employ hard cutoffs on variables, whereas we believe that strength in one area should have an opportunity to compensate for a low score in another area so that any given occupation has multiple “pathways” to achieve list inclusion. For example, an occupation could be low wage at entry level, but offer a lot of opportunities for advancement over time. The example below gives a concrete example of our methodology in practice.

## EXAMPLE: INDUSTRIAL ENGINEERS (SOC 17-2112)

Industrial Engineers (SOC 17-2112) received the following scores based on Virginia’s 2021-22 methodology:

- **Offers good earnings right off the bat:** Hourly 10<sup>th</sup> percentile wages are \$29.01, which is just shy of double Virginia’s MIT Living Wage for 1 adult, 0 children (results in a score of 4)
- **Offers opportunities for advancement:** Although entry-level wages are relatively high, growth in those wages over time is right around state median, with the 75<sup>th</sup> percentile wages being roughly 1.63x the 25<sup>th</sup> percentile wages (score of 3)
- **Number of jobs forecasted to grow:** 8.5% growth in number of positions in Virginia forecasted by 2028, which again is right around state average (score of 3)
- **Is of strategic importance to Virginia’s state-wide economic development strategy:** 96.6% of the nearly 5,000 industrial engineers in Virginia work within one of Virginia’s priority industry supersectors (score of 5)

The calculated weighted score, illustrated below, of the above variables is 3.5. Because this is higher than the 2.6 threshold, this occupation is a Top Job and is thus included in Virginia’s 2021-22 High Demand Occupations List.



### Step 4: Addition of Occupations Linked to Short-Form Certifications and Credentials Virginia Currently Funds

In consultation with stakeholders, the decision was made to also include any occupations tied to short-term certifications and credentials that Virginia currently funds in recognition of the critical role

that these existing programs play in filling high-demand occupations. The Get Skilled, Get a Job, Get Ahead (G3) [program](#) was signed into legislation in March 2021. It makes tuition-free community college available to low- and middle-income students who pursue jobs in high-demand fields. The G3 program can cover tuition, fees, and books and provide wraparound support for eligible students at the Commonwealth's two-year public institutions. The [New Economy Workforce Credential Grant Program](#) commonly referred to as [Fast Forward](#) was developed during the 2016 General Assembly Session to create and sustain a supply of credentialed workers to fill high-demand occupations in fields which support the state's economy. This grant program provides a pay-for-performance model for funding noncredit workforce training that leads to a credential in a high demand field.

These initiatives are designed to provide on-ramps to careers and include career pathways opportunities in high demand fields. Already through the Top Jobs methodology outlined in Steps 1-3, roughly one-third of the occupations mapped to short-form certifications and credentials Virginia currently funds already made the final High Demand Occupations List through the scoring methodology outlined. However, the other two-thirds were grandfathered into the final list in recognition of the strong role these programs play in our existing workforce training landscape. Virginia's existing New Economy. Specific occupational mappings were included based on Virginia's [already-established CIP-SOC crosswalk](#).

# Areas for Future Methodological Refinement

This is a living document where we as a Commonwealth seek to continually improve upon our methodology, underlying data sources, and approach over time. As per the Virginia Code, Virginia’s High Demand Occupations Methodology and List will be refreshed annually. The Virginia Office of Education Economics looks forward to VOEE’s ongoing involvement for annual refreshes in the forthcoming years as needed.

**The biggest opportunity for further methodological refinement is incorporating supply-side inputs into our approach, getting closer to the ideal state of assessing supply-demand gaps in the labor market (not simply demand-side indicators).** The Virginia Code § 23.1-627.1 has a definition of what a “high demand field” means, which is “a discipline or field in which there is a **shortage** of skilled workers to fill current job vacancies or anticipated additional job openings.” In Virginia’s 2021-2022 methodology, apart from the filter employed for annual openings greater than or equal to 100, the data utilized is largely demand-side indicators. Getting closer to the concept of shortage (demand – supply) will require a more robust incorporation of supply-side inputs, including but not limited to developing a Virginia-specific CIP-SOC crosswalk methodology, incorporating VEC’s unemployment insurance claimant data, and potentially taking into account worker in-migration and out-migration.

These methodological enhancements will be driven by the Virginia Office of Education Economics, which, over the next year, is working on the creation of a Virginia supply-demand data set/analysis that strives to identify supply-demand gaps. This is aimed at being an innovative methodological exercise that will push the bounds of what other states have done to date, creating a robust supply-demand gaps methodology that will ideally help inform not only future year Virginia High Demand Occupations methodology iterations, but a wide array of other use cases. The inaugural VOEE staff, hired and onboarded in Fall 2021, will be leading this effort.

In addition, the Virginia Office of Education Economics has also identified several other possible variable-specific opportunities for refinement in future years captured in the table below:

Variable in 2021-22 Methodology	How it is Quantified in 2021-22 Methodology	Limitations of Current Approach	Opportunities for Future Refinement
#1: Offers good earnings right off the bat	Entry-level wages (10 <sup>th</sup> percentile, BLS data), tiered based on Virginia-specific MIT Living Wage Virginia data as well as Virginia’s current 2021 minimum wage	No major limitations	<b>Ensure scoring thresholds align with Virginia’s annually increasing minimum wage.</b> As per recent legislation, Virginia minimum wage will increase annually from 2021 to 2026. We will need to update our ‘0’ score threshold in accordance with this.

#2: Offers opportunities for advancement	Intra-occupational wage growth calculated as the ratio of 75 <sup>th</sup> percentile wages : 25 <sup>th</sup> percentile wages (BLS)	Our measurement of this variable only captures wage advancement <i>within</i> a 6-digit SOC. However, opportunities for advancement happen not only from wage growth within an occupation, but through mobility <i>between</i> SOCs, both within the same industry vertical and between industry verticals.	<b>Enhance measurement approach to include inter-occupational career pathways data in the model.</b> In order to capture opportunities for advancement within a given industry vertical and/or through upward movement along career pathways that leverage underlying skills/credentials development, Virginia will continue to seek and/or create new data sources that capture career clusters, career pathways, and/or skills-based competencies. Currently these data sets are nascent yet showing promise.
#3: Forecasted % growth in number of positions	Projected % growth in base employment (BLS data, 2018 to 2028) relative to state average for that time period	BLS growth forecasts do not effectively capture recent project announcements and/or acute crises (such as Covid-19 pandemic) that may effect growth forecasts of occupations.	<b>Develop quick, responsive, and consistent process for identifying and incorporating emergent critical occupations needs in Virginia.</b> A process for identifying and incorporating recent events and/or economic development projects that may affect growth forecast data can supplement the BLS projections.
#4: Of strategic importance to Virginia's state-wide economic development strategy	% of SOC employment within priority industry clusters, leveraging (source) NAICS-SOC crosswalk	The quantification approach is based on Virginia's state-wide economic development plan's priority industry clusters. Ideally this would be supplemented with qualitative insights from employers, industry associations, post-secondary education providers, workforce boards, policymakers, and others.	<b>Supplement quantitative data with qualitative insights from employers, industry associations, post-secondary providers, workforce boards, and policymakers.</b> Ensuring an ongoing mechanism is in place to create stronger information and data-sharing across these groups will ideally result in even more precise methodology. This enhancement has potential to actually inform multiple variables beyond this specific one.

Finally, it is noteworthy that in the 2021-2022 Virginia High Demand Occupations methodology, approx. one-third of the occupations mapped to Virginia's existing short-form certification and credential training programs make the list through the "Top Jobs" data-driven scoring methodology outlined. The other two-thirds were added to the list despite scoring below the 2.6 weighted score threshold.

This raises larger questions around whether Virginia's existing short-form credential and certification training resources are being best-directed towards occupations that offer the best combination of entry-level wages, opportunities for advancement, forecasted % growth in number of positions, and of strategic importance to Virginia's economic development strategy. Some of these occupations face structural inequities as well that lead to high turnover, persistent part-time work, lack of comprehensive

benefits, and ongoing labor shortages. Research must be done to better understand the challenges posed by these jobs so that the state can move forward in making them function [better](#) as initial opportunities into learning pathways for [career mobility](#). VOEE looks forward to developing a deeper understanding of the labor market dynamics tied to the subset of occupations Virginia is currently funding short-form credential / certifications for yet face low scores in our Top Jobs scoring methodology. This will entail addressing deeper underlying challenges and questions in Virginia's current labor market dynamics.

# Appendix

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## Underlying data sources and methodology notes

As per the guiding principles outlined in this exercise, we were able to use 100% publicly available data sources for this exercise. As per the guiding principles outlined in this exercise, we were able to use 100% publicly available data sources for this exercise. Below outlines the step by step process undertaken to create the complete sandbox of relevant data fields needed to replicate our methodology as well as how to calculate specific scores of each variable once one has the base data fields needed.

### BASE DATA SET

**Step 1:** Download the 2018-2020 Long-Term Occupational Projections from Virginia Works

Link: <https://viriniaworks.com/download-center>

Section: industry\_occupation\_projections

File: IOMATRIX.zip

**Step 2:** Make sure to only select State level data by filtering *areatype* = 'State'

**Step 3:** Only keep 6-digit SOC and remove all groupings (any ending in 0000, 000, 00)

**Step 4:** While the Bureau of Labor Statistics (BLS) transitions sources from 2010 to 2018 SOC, use the crosswalk provided by BLS to update/crosswalk all SOC from 2010 to 2018. The SOC in this source are currently 2010 while other sources are 2018, so a crosswalk converting them all is necessary to join to other tables. Link: <https://www.bls.gov/soc/2018/crosswalks.htm>

**Step 5:** Download the May 2020 Occupational Employment and Wage Statistics, for Virginia, from the Bureau of Labor Statistics:

Link: [https://www.bls.gov/oes/2020/may/oes\\_va.htm](https://www.bls.gov/oes/2020/may/oes_va.htm)

Note: This file will contain all states, so make sure to filter only Virginia.

**Step 5.1:** For any occupation that does not have hourly wages but has annual wages, divide the annual wages by 2080 (number of full-time hours in a year) to calculate hourly wages (10<sup>th</sup>, 25<sup>th</sup>, median, 75<sup>th</sup>, and 90<sup>th</sup> percentile).

**Step 5.2:** For any occupation that does not have annual wages but has hourly wages, multiply the hourly wages by 2080 (number of full-time hours in a year) to calculate the annual wages (10<sup>th</sup>, 25<sup>th</sup>, median, 75<sup>th</sup>, and 90<sup>th</sup> percentile)

**Step 5.3:** Any 'hourly' columns with '#' were converted to \$100/hr (per BLS documentation) and any 'annual' columns were converted to \$208,000/year.

**Step 5.4:** Any occupations with '\*' indicates that a wage estimate was not available at the state level. National rates were imputed using the same link above but for the United States.

**Step 6:** Download the industry by occupation matrix from the BLS.

Link: <https://www.bls.gov/emp/tables/industry-occupation-matrix-industry.htm>

CSV option: <https://www.bls.gov/emp/ind-occ-matrix/occupation.xlsx> (Table 1.9)



Note: The BLS updated to 2020-2030 on Sept 8, 2021. Because the BLS does not provide prior iterations of its files to the public, we have provided CSVs for the 2019-2029 matrix [here](#) that was accessed in August 2021 for the calculations in this year's methodology.

**Step 7:** Sum the '2020 percent of occupation' column for each Industry column called 'line item' Then aggregated at the two digit NAICS. Make sure there is one line per occupation, with multiple columns for each industry group (2 digit NAICS).

**Step 8:** Create a column summing all the available data for a 'total percent' that is accounted for in the non-self-employed industries. This will act as your denominator. Create a column summing the industries of strategic importance (11, 31, 42, 48, 51, 52, 54, 55, 56). This will act as your numerator. Divide the numerator by the denominator for a 'Percent of SOC in Priority NAICS Sector' metric.

**Step 9:** Merge these files together based on 6-digit SOC.

After Steps 1-9 have been completed, the base data set is now complete.

## DETAILED METHODOLOGY NOTES

### **Score 1: Offers Good Earnings Right off the Bat**

- Measured by: Entry-level wages, quantified as 10<sup>th</sup> percentile hourly wages
- Specific data fields required for calculations:
  - 1 adult, 0 children (source: [MIT Living Wage Calculate for Virginia](#), \$16.61/hour)
  - 10<sup>th</sup> percentile wages ([Occupational Employment and Wage Statistics](#), Virginia, 2020; variable: H\_PCT10)
  - Note: In accordance with 'base data set' notes 5.1 and 5.2, for 50 Virginia SOCs in which Bureau of Labor Statistics dataset did not include an hourly 10<sup>th</sup> percentile wage, national 10<sup>th</sup> Percentile Hourly Wages were imputed. 36 occupations had annual wages converted to hourly wages, and 2 had hourly wages converted to annual.)
- Scores were assigned based on the following thresholds:
  - 5: At \$33.22/hour or higher
  - 4: At \$24.92/hour and up to but below \$33.22/hour
  - 3: At \$16.61/hour and up to but below \$24.92/hour
  - 2: At \$13.28/hour and up to but below \$16.61/hour
  - 1: At \$9.50/hour and up to but below \$13.28/hour
  - 0: Below \$9.50/hour

### **Score 2: Offers Opportunity for Advancement**

- Measured by: the ratio of 75<sup>th</sup> percentile hourly wages to 25<sup>th</sup> percentile hourly wages for a specific SOC.
- Specific data fields required for calculations:
  - 75<sup>th</sup> percentile hourly wage (source: [Occupational Employment and Wage Statistics](#), Virginia, variable: H\_PCT75)
  - 25<sup>th</sup> percentile hourly wage (source: [Occupational Employment and Wage Statistics](#), Virginia, variable: H\_PCT25)

- Ratio (divide H\_PCT75 by H\_PCT25)
- Note: In accordance with 'base data set' notes 5.1 and 5.2, for 50 Virginia SOCs in which Bureau of Labor Statistics dataset did not include an hourly 10<sup>th</sup> percentile wage, national 10<sup>th</sup> Percentile Hourly Wages were imputed. 36 occupations had annual wages converted to hourly wages, and 2 had hourly wages converted to annual.)
- Scores were assigned based on the following thresholds:
  - 5: Ratio greater than or equal to 2
  - 4: Ratio greater than or equal to 1.75 and up to but below 2
  - 3: Ratio greater than or equal to 1.60 and up to but below 1.75
  - 2: Ratio greater than or equal to 1.40 and up to but below 1.60
  - 1: Ratio greater than or equal to 1.30 and up to but below 1.40
  - 0: Ratio below 1.30

### **Score 3: Forecasted % Growth in Number of Positions**

- Measured by: Projected percent growth in employment (2018 to 2028 long-term projections) relative to the state average growth for that time period.
- Specific data fields required for calculations:
  - Percent Change (source: [IOMATRIX Download at Virginia Works](#), variable: PCHG)
- Scores were assigned based on the following thresholds:
  - 5: Over 13.2% growth
  - 4: Over 9.9% growth but less than or equal to 13.2%
  - 3: Over 6.6% growth but less than or equal to 9.9%
  - 2: Over 4.95% growth but less than or equal to 6.6%
  - 1: 0% or greater growth but less than 4.95%
  - 0: <0% growth

### **Score 4: Of Strategic Importance to Virginia's State-Wide Economic Development Strategy**

- Measured by: Percent of SOC employment within sectors of strategic importance (NAICS 11, 31, 42, 48, 51, 52, 54, 55, 56).
- Specific data fields required for calculations:
  - Total Percent of Occupation in Specified Industry (source: [BLS Industry x Occupation Matrix Table 1.9](#), variable: 2020 percent of occupation, industry type (value = line item). Aggregated for each occupation. Self-Employed was excluded.
  - Percent in a Strategic Sector: after aggregating the occupations for each 2-digit NAICS (Total Percent of Occupation in Specified Industry), the sum of the sectors identified as strategic importance (11, 31, 42, 48, 51, 52, 54, 55, 56) was calculated.
  - Total Percent of Available Industry Data: Because self-employed was excluded and occasional data was unavailable, the total across all industries will not equal 100% in many cases. Summing the available percents gives us a denominator to create our threshold proportions.

Percent of SOCs in Strategic Sectors – Adjusted: Percent in a Strategic Sector divided by the Total Percent of Available Industry Data. This will be used to assign a score using the thresholds below.

- Scores were assigned based on the following thresholds:
  - 5: Greater than or equal to 90%

- 4: Great than or equal to 80% but less than 90%
- 3: Great than or equal to 70% but less than 80%
- 2: Great than or equal to 50% but less than 70%
- 1: Great than or equal to 25% but less than 50%
- 0: <25%
- After scoring, due to data limitations, approx. 12% of SOCs had to be assigned proxy scores based on closest match SOCs for which data was fully available. The reasons for these cases were one or multiple of the following:
  - Some SOCs had missing data due to various reasons, including some occupations that were combined into one SOC between 2010 and 2018, others that were split into two SOCS between 2010 and 2018, or just data were not available. These were supplemented with scores based on data from EMSI and at the expertise of VOEE staff.
  - The BLS data were available only at the two-digit NAICS. Some of broader industry groups include more granular industries that may not be of strategic importance, resulting in potentially higher scores. EMSI data and expertise of VOEE staff was used to estimate SOC scores in these instances.

### **Annual Openings Filter**

- As per the methodology, we apply a filter to all Virginia 6-digit SOC codes in accordance with list eligibility criteria of the occupation must have greater than 100 annual openings
- Specific data fields required for calculation:
  - (source: [2018-2028 long-term projections](#), variable: annual openings)

## ADDITION OF VIRGINIA-FUNDED SHORT-FORM CERTIFICATION / CREDENTIAL OCCUPATIONS

Any occupation specifically mapped to an existing Virginia state-funded short-form credential or certification training program (such as the Workforce Credential Grant (WCG) commonly known as FastForward and Get Skilled, Get a Job, Get Ahead (G3)) that are designed to provide on-ramps to careers and foster more career pathway mobility through stackable credentials were appended to the list as follows:

- **Step 1:** Leveraging [already-established CIP-SOC crosswalk](#), the list of SOCs was extracted manually
- **Step 2:** The same 2010 SOC – 2018 SOC crosswalk listed above was leveraged to translate the mapped SOCs to be updated to 2018 SOC titles
- **Step 3:** Of the 168 mapped SOCs, 53 were already included on the High Demand Occupations List based on their weighted Top Jobs scoring  $\geq 2.6$ . The remaining (168 – 53 = 115 SOCs) were then appended to the final list.