Occupations Affected by Autonomous Vehicle Adoption in Oregon

In 2018, HB 4063 established the Oregon Department of Transportation (ODOT) as the lead agency for automated vehicle (AV) policy in the state. HB 4063 also requires ODOT to convene and facilitate a Task Force on Autonomous Vehicles.

Oregon’s AV Task Force consists of leaders and experts from various state agencies, labor organizations, private employers, and state lawmakers. The Task Force is currently in its second phase, working primarily through six subcommittees to develop recommendations for the Oregon Legislature related to AV adoption.

Each subcommittee focuses on one subject area related to autonomous vehicles: road and infrastructure design; public transit; vehicle code amendments and public safety; cybersecurity and privacy; land use; and workforce changes. This summary provides labor market information related to occupations most likely to see workforce reductions associated with autonomous vehicle adoption over the next 20 to 30 years in Oregon.

Measuring Employment in Oregon’s AV-Affected Occupations

A 2017 paper from economists in the U.S. Department of Commerce Economics and Statistics Administration identifies primary driving and other on-the-job driving-related (or “secondary”) occupations most likely to be affected by AV adoption in the U.S. Primary driving occupations include light and heavy-duty drivers, whose primary responsibilities include driving cars, vans, small trucks or heavy-duty commercial vehicles on the road. Secondary occupations include those where driving is not

Defining “Affected” Occupations and Timelines

Affected occupations are not synonymous with lost jobs. Some jobs in AV-affected occupations may be eliminated, while others will change substantially over the next 20 to 30 years, but still exist. In other areas of the economy, new jobs and entirely new occupations will also be created due to mainstream AV adoption.

Timelines are also important. One study prepared by the UC-Berkeley Labor Center suggests widespread AV adoption will take between 25 and 30 years for commercial trucks. Another study prepared for Securing America’s Future Energy estimates widespread household AV adoption starting around the year 2030, and full commercial truck automation occurring through the 2040s.
the primary responsibility, but often required, and some jobs could be eliminated by AVs.

Estimates from the Oregon Employment Department’s long-term occupational projections show nearly 95,000 jobs statewide in AV-affected occupations in 2017. That accounts for 5 percent of all employment, with 56,000 jobs across the eight primary driving occupations, and 39,000 jobs in the 14 secondary AV-affected occupations.

Among primary driving occupations, the median (or middle among all jobs) hourly wage in 2019 ranged from a low of $13.56 for taxi drivers and chauffeurs to a high of $25.36 for transit and intercity bus drivers. For secondary affected occupations, median hourly wages varied from $12.31 for service station attendants to $48.80 for supervisors and managers of police and detectives. By comparison, the median wage for all occupations in Oregon was $19.46 per hour.

<table>
<thead>
<tr>
<th>Standard Occupational Classification Title</th>
<th>2017 Employment</th>
<th>2019 Median Hourly Wage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total, All Occupations</td>
<td>2,045,907</td>
<td>$19.46</td>
</tr>
<tr>
<td>All Autonomous Vehicle-Affected Occupations</td>
<td>94,776</td>
<td></td>
</tr>
<tr>
<td>Truck Drivers, Heavy and Tractor-Trailer</td>
<td>24,289</td>
<td>$22.82</td>
</tr>
<tr>
<td>Truck Drivers, Light or Delivery Services</td>
<td>10,532</td>
<td>$17.10</td>
</tr>
<tr>
<td>Driver/Sales Workers</td>
<td>7,282</td>
<td>$15.24</td>
</tr>
<tr>
<td>Bus Drivers, School or Special Client</td>
<td>6,634</td>
<td>$17.44</td>
</tr>
<tr>
<td>Taxi Drivers and Chauffeurs</td>
<td>2,795</td>
<td>$13.56</td>
</tr>
<tr>
<td>Bus Drivers, Transit and Intercity</td>
<td>2,326</td>
<td>$25.36</td>
</tr>
<tr>
<td>Motor Vehicle Operators, All Other</td>
<td>2,167</td>
<td>$14.47</td>
</tr>
<tr>
<td>Ambulance Drivers and Attendants, Except Emergency Medical Technicians</td>
<td>77</td>
<td>$12.71</td>
</tr>
<tr>
<td>Security Guards</td>
<td>8,527</td>
<td>$13.31</td>
</tr>
<tr>
<td>Automotive Service Technicians and Mechanics</td>
<td>7,423</td>
<td>$21.19</td>
</tr>
<tr>
<td>Service Station Attendants</td>
<td>5,912</td>
<td>$12.31</td>
</tr>
<tr>
<td>Police and Sheriff's Patrol Officers</td>
<td>5,289</td>
<td>$35.57</td>
</tr>
<tr>
<td>Postal Service Mail Carriers</td>
<td>3,496</td>
<td>$22.90</td>
</tr>
<tr>
<td>Refuse and Recyclable Material Collectors</td>
<td>2,199</td>
<td>$22.43</td>
</tr>
<tr>
<td>Automotive Body and Related Repairers</td>
<td>1,971</td>
<td>$18.81</td>
</tr>
<tr>
<td>Couriers and Messengers</td>
<td>1,406</td>
<td>$16.43</td>
</tr>
<tr>
<td>Supervisors and Managers of Police and Detectives</td>
<td>1,293</td>
<td>$48.80</td>
</tr>
<tr>
<td>Parking Lot Attendants</td>
<td>745</td>
<td>$12.81</td>
</tr>
<tr>
<td>Automotive Glass Installers and Repairers</td>
<td>271</td>
<td>$15.82</td>
</tr>
<tr>
<td>Travel Guides</td>
<td>82</td>
<td>$15.81</td>
</tr>
<tr>
<td>Electronic Equipment Installers and Repairers, Motor Vehicles</td>
<td>60</td>
<td>$20.10</td>
</tr>
<tr>
<td>Insurance Appraisers, Auto Damage</td>
<td>-s-</td>
<td>$35.96</td>
</tr>
</tbody>
</table>

Cells with "-s-" suppressed for confidentiality or data quality
Sources: Oregon Employment Department, 2017-2027 Employment Projections
2019 Occupational Wage Information

Projected Employment Changes for AV-Affected Occupations

Oregon’s current long-term projections estimate employment changes through 2027, which falls before the window of mainstream AV adoption identified in academic studies.\(^{1,2}\) Between 2017 and 2027, Oregon will add 246,000 jobs, a growth rate of 12 percent (Table 2). Primary driving occupations are also projected to grow by 12 percent,
adding 6,500 new jobs over the decade. The fastest growth among this set of occupations is expected for light truck drivers and taxi drivers and chauffeurs (17% each). *Note these projections include self-employment.*

Secondary AV-affected occupations will add 2,900 jobs (8%). Couriers and messengers’ employment will grow 14 percent by 2027, the fastest among this set of occupations. Meanwhile, two others – postal service mail carriers, and motor vehicle electronic equipment installers and repairers – will see employment declines by 2027.

Across all occupations in Oregon, for every one new job created, there will also be roughly nine job openings requiring newly trained workers to replace those who leave the labor force (largely due to retirement) or make major occupational changes. Among primary driving occupations, that ratio will be 10-to-1, and among secondary affected occupations, projections show 15 replacement openings for every one new job by 2027. Overall, primary driving and secondary AV-affected occupations will account for 117,500 of Oregon’s 2.6 million total job openings.

### 2017-2027 Employment Projections for Primary Driving and Secondary AV-Affected Occupations in Oregon

<table>
<thead>
<tr>
<th>Occupation Title</th>
<th>2017 Employment</th>
<th>2027 Employment</th>
<th>Percent Change</th>
<th>Employment Change</th>
<th>Replacement Openings</th>
<th>Total Openings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Driving Occupations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambulance Drivers and Attendants, Except Emergency</td>
<td>56,102</td>
<td>62,641</td>
<td>11.7%</td>
<td>6,539</td>
<td>65,168</td>
<td>71,707</td>
</tr>
<tr>
<td>Medical Technicians</td>
<td>77</td>
<td>88</td>
<td>14%</td>
<td>11</td>
<td>117</td>
<td>128</td>
</tr>
<tr>
<td>Bus Drivers, Transit and Intercity</td>
<td>2,326</td>
<td>2,571</td>
<td>11%</td>
<td>245</td>
<td>2,921</td>
<td>3,166</td>
</tr>
<tr>
<td>Bus Drivers, School or Special Client</td>
<td>6,634</td>
<td>7,297</td>
<td>10%</td>
<td>663</td>
<td>8,309</td>
<td>8,972</td>
</tr>
<tr>
<td>Driver/Sales Workers</td>
<td>7,282</td>
<td>7,650</td>
<td>5%</td>
<td>368</td>
<td>7,856</td>
<td>8,224</td>
</tr>
<tr>
<td>Truck Drivers, Heavy and Tractor-Trailer</td>
<td>24,289</td>
<td>26,988</td>
<td>11%</td>
<td>2,699</td>
<td>26,977</td>
<td>29,676</td>
</tr>
<tr>
<td>Truck Drivers, Light or Delivery Services</td>
<td>10,532</td>
<td>12,347</td>
<td>17%</td>
<td>1,815</td>
<td>12,036</td>
<td>13,851</td>
</tr>
<tr>
<td>Taxi Drivers and Chauffeurs</td>
<td>2,795</td>
<td>3,270</td>
<td>17%</td>
<td>475</td>
<td>3,028</td>
<td>3,503</td>
</tr>
<tr>
<td>Motor Vehicle Operators, All Other</td>
<td>2,167</td>
<td>2,430</td>
<td>12%</td>
<td>263</td>
<td>3,924</td>
<td>4,187</td>
</tr>
<tr>
<td><strong>Secondary Affected Occupations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inspectors, Claims Examiners and Loss Adjustment Investigators</td>
<td>-s-</td>
<td>-s-</td>
<td>-s-</td>
<td>-s-</td>
<td>-s-</td>
<td>-s-</td>
</tr>
<tr>
<td>Supervisors and Managers of Police and Detectives</td>
<td>1,293</td>
<td>1,376</td>
<td>6%</td>
<td>83</td>
<td>784</td>
<td>867</td>
</tr>
<tr>
<td>Police and Sheriff’s Patrol Officers</td>
<td>5,289</td>
<td>5,663</td>
<td>7%</td>
<td>374</td>
<td>3,456</td>
<td>3,830</td>
</tr>
<tr>
<td>Security Guards</td>
<td>8,527</td>
<td>9,544</td>
<td>12%</td>
<td>1,017</td>
<td>11,732</td>
<td>12,740</td>
</tr>
<tr>
<td>Travel Guides</td>
<td>82</td>
<td>91</td>
<td>11%</td>
<td>9</td>
<td>148</td>
<td>157</td>
</tr>
<tr>
<td>Couriers and Messengers</td>
<td>1,406</td>
<td>1,597</td>
<td>14%</td>
<td>191</td>
<td>1,344</td>
<td>1,535</td>
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<tr>
<td>Postal Service Mail Carriers</td>
<td>3,496</td>
<td>3,354</td>
<td>-4%</td>
<td>-142</td>
<td>2,288</td>
<td>2,146</td>
</tr>
<tr>
<td>Electronic Equipment Installers and Repairers, Motor Vehicles</td>
<td>60</td>
<td>59</td>
<td>-2%</td>
<td>-1</td>
<td>57</td>
<td>56</td>
</tr>
<tr>
<td>Automotive Body and Related Repairers</td>
<td>1,971</td>
<td>2,131</td>
<td>8%</td>
<td>160</td>
<td>1,931</td>
<td>2,092</td>
</tr>
<tr>
<td>Automotive Glass Installers and Repairers</td>
<td>271</td>
<td>289</td>
<td>7%</td>
<td>18</td>
<td>266</td>
<td>284</td>
</tr>
<tr>
<td>Automotive Service Technicians and Mechanics</td>
<td>7,423</td>
<td>7,854</td>
<td>6%</td>
<td>431</td>
<td>7,019</td>
<td>7,450</td>
</tr>
<tr>
<td>Parking Lot Attendants</td>
<td>745</td>
<td>764</td>
<td>3%</td>
<td>19</td>
<td>1,107</td>
<td>1,126</td>
</tr>
<tr>
<td>Service Station Attendants</td>
<td>5,912</td>
<td>6,473</td>
<td>9%</td>
<td>561</td>
<td>10,077</td>
<td>10,638</td>
</tr>
<tr>
<td>Refuse and Recyclable Material Collectors</td>
<td>2,199</td>
<td>2,369</td>
<td>8%</td>
<td>170</td>
<td>2,698</td>
<td>2,868</td>
</tr>
</tbody>
</table>

Cells with “-s-” suppressed for confidentiality or data quality
Source: Oregon Employment Department, 2017-2027 Employment Projections
Primary and secondary occupations as defined by Chief Economist Office, Economics and Statistics Administration, U.S. Dept. of Commerce

### Potential Job Effects from Mainstream AV Adoption

A 2018 report prepared by Groshen, Helper, MacDuffe, and Carson for Securing America’s Future Energy (SAFE) outlines a framework for determining the shares of jobs in primary driving and secondary AV-affected occupations under four different autonomous vehicle adoption scenarios. The report assumes household and
commercial AV adoption occur separately from one another, on slightly different timeframes.

The report identifies two household AV adoption scenarios. In one scenario, most households own their autonomous vehicle ("Cars Personal"). The other household scenario involves the use of AVs through a shared fleet of vehicles owned by a company ("Cars Fleet"). Both scenarios assume household AV adoption begins around 2020, and rapid adoption starts near 2030.

The SAFE report also identifies two commercial AV adoption scenarios. Under "Trucking slow" adoption, Level 1/2 automation becomes mainstream in the 2020s, Level 3/4 automation goes mainstream in the 2030s, and advanced Level 4/5 starts becoming available in the 2040s. Their "Trucking Fast" scenario uses the same progression, and assumes roughly 10 years faster timeline, with Level 4/5 full automation nearly complete in the 2040s.

Under each of these scenarios, the SAFE report estimates the share of jobs affected in primary driving and secondary AV-affected occupations (see Appendix A). The 2027 employment estimates for primary driving and secondary AV-affected occupations in Oregon combined with the SAFE shares of affected jobs in those occupations create a foundation for additional analysis. Using these numbers, we can make rough estimates of the number of Oregon jobs affected by the 2040s under each combination of household and commercial AV adoption scenarios (see Appendix B for more details).

Oregon’s primary driving occupations and secondary AV-affected occupations will still account for 5 percent of total employment with 104,000 jobs in 2027. Over the following 10 to 15 years, the household AV adoption scenarios could affect between 11,700 and 14,700 jobs. That totals between 11 percent and 14 percent of all jobs in those occupations. Commercial trucking scenarios could affect between 29,800 and 32,600 jobs in these occupations looking into the 2040s. Those impacts would be felt for between 29 and 31 percent of all jobs in primary driving and secondary affected occupations.

Estimates of Oregon Jobs Affected by 2040s Under Various Household and Commercial Autonomous Vehicle Adoption Scenarios

<table>
<thead>
<tr>
<th>Combined Household and Commercial Scenario</th>
<th>Jobs Affected*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal cars + slow trucking</td>
<td>41,500</td>
</tr>
<tr>
<td>Fleet cars + slow trucking</td>
<td>44,400</td>
</tr>
<tr>
<td>Personal cars + fast trucking</td>
<td>44,300</td>
</tr>
<tr>
<td>Fleet cars + fast trucking</td>
<td>47,200</td>
</tr>
</tbody>
</table>

*Affected does not always equal "lost." Some affected occupations may still exist, with notably different skills and responsibilities on the job.

Sources: Oregon Employment Department calculations using framework from Preparing U.S. Workers and Employers for an Autonomous Vehicle Future, Groshen et al., June 2018

Taken together, the various combinations of personal and commercial AV adoption scenarios could affect between 41,500 and 47,200 jobs in Oregon, starting around the
year 2030 (see Appendix B). The largest impacts would occur for heavy and tractor-trailer truck drivers under the commercial scenarios, where 16,200 to 17,500 jobs could be affected. Under the household AV adoption scenarios, estimated job effects are largest for automotive service technicians and mechanics (4,000) and service station attendants (2,600 to 3,900).

**Additional Considerations**

Workers in primary driving jobs affected by AV adoption are slightly more likely to be workers nearing retirement. While one out of every four jobs in Oregon is held by a worker age 55 or older, about one-third of workers in primary driving jobs are at least 55 years old (see Appendix C).

The mainstream adoption of autonomous vehicles will also create new jobs and entirely new occupations in transportation, in supplier and support activities related to AVs, and in other areas of the economy. Future research efforts can more fully capture workforce effects by including an analysis of new and emerging occupations related to autonomous vehicles.

In addition, we currently only have the capacity to discuss net employment changes beyond 2027. Yet net employment growth accounts for approximately one-tenth of total job openings. We expect autonomous vehicles to disrupt the pattern of replacement job openings, which account for the bulk of total openings. We currently lack a framework to quantify that change.
References


3Ibid, p.32-33
4Ibid, p.31-32
5Ibid, p.34
6Ibid, p.37
Appendix A: Shares of Jobs Affected by Occupation and Autonomous Vehicle Adoption Scenario

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Employment level in thousands, 2016</th>
<th>Share of jobs eliminated under full implementation of scenario</th>
<th>Number of jobs eliminated under full implementation of scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Trucking-Fast</td>
<td>Trucking-Slow</td>
</tr>
<tr>
<td>Heavy and Tractor-Trailer Truck Drivers³⁸</td>
<td>1,532</td>
<td>0.55</td>
<td>0.6</td>
</tr>
<tr>
<td>Light Truck or Delivery Services Drivers³⁹</td>
<td>781</td>
<td>0.55</td>
<td>0.45</td>
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<tr>
<td>Bus Drivers, School or Special Client</td>
<td>212</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Driver/Sales Workers</td>
<td>383</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Taxi Drivers and Chauffeurs</td>
<td>300</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bus Drivers, Transit and Intercity⁴⁰</td>
<td>75</td>
<td>0.75</td>
<td>0.7</td>
</tr>
<tr>
<td>Ambulance Drivers and Attendants, Except Emergency Medical Technicians</td>
<td>10</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td><strong>Primary Driver Total (percent of total jobs)</strong></td>
<td>3,293</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Security Guards</td>
<td>646</td>
<td>0.024</td>
<td>0.024</td>
</tr>
<tr>
<td>Police and Sheriff’s Patrol Officers</td>
<td>673</td>
<td>0.05</td>
<td>0.04</td>
</tr>
</tbody>
</table>

³⁸ Assumes wider penetration under fast scenario.
³⁹ Assumes wider penetration under fast scenario.
⁴⁰ Assumes wider penetration under fast scenario.

Source: Securing America’s Future
<table>
<thead>
<tr>
<th>Occupation</th>
<th>Total</th>
<th>0.1</th>
<th>0.1</th>
<th>0.5</th>
<th>0.5</th>
<th>71</th>
<th>71</th>
<th>356</th>
<th>356</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automotive Service Technicians and Mechanics</td>
<td>711</td>
<td>0.1</td>
<td>0.1</td>
<td>0.5</td>
<td>0.5</td>
<td>71</td>
<td>71</td>
<td>356</td>
<td>356</td>
</tr>
<tr>
<td>Postal Service Mail Carriers</td>
<td>271</td>
<td>0</td>
<td>0</td>
<td>0.2</td>
<td>0.2</td>
<td></td>
<td></td>
<td>54</td>
<td>54</td>
</tr>
<tr>
<td>Parking Lot Attendants</td>
<td>48</td>
<td>0</td>
<td>0</td>
<td>0.5</td>
<td>0.5</td>
<td></td>
<td></td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Automotive Body and Related Repairers</td>
<td>116</td>
<td>0.05</td>
<td>0.05</td>
<td>0.5</td>
<td>0.5</td>
<td>6</td>
<td>6</td>
<td>58</td>
<td>58</td>
</tr>
<tr>
<td>Refuse and Recyclable Material Collectors</td>
<td>64</td>
<td>0.5</td>
<td>0.5</td>
<td>0.0</td>
<td>0.0</td>
<td>32</td>
<td>32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automotive and Watercraft Service Attendants</td>
<td>57</td>
<td>0</td>
<td>0</td>
<td>0.6</td>
<td>0.4</td>
<td></td>
<td></td>
<td>34</td>
<td>23</td>
</tr>
<tr>
<td>First-Line Supervisors of Police and Detectives</td>
<td>103</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Couriers and Messengers</td>
<td>143</td>
<td>0</td>
<td>0</td>
<td>0.02</td>
<td>0.02</td>
<td></td>
<td></td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td>Automotive Glass Installers and Repairers</td>
<td>15</td>
<td>0</td>
<td>0</td>
<td>0.25</td>
<td>0.25</td>
<td></td>
<td></td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Insurance Appraisers, Auto Damage</td>
<td>14</td>
<td>0.3</td>
<td>0.2</td>
<td>0.25</td>
<td>0.25</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Electronic Equipment Installers and Repairers, Motor Vehicles</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0.5</td>
<td>0.5</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Travel Guides</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0.5</td>
<td>0.5</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total, Other On-The-Job Driver Occupations (percent of total jobs)</strong></td>
<td>2,869</td>
<td></td>
<td></td>
<td>167 (6%)</td>
<td>159 (6%)</td>
<td>620 (22%)</td>
<td>608 (21%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Grand Total (percent of total jobs)</strong></td>
<td>6,162</td>
<td></td>
<td></td>
<td>1,756 (28%)</td>
<td>1,589 (26%)</td>
<td>907 (15%)</td>
<td>745 (12%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: 1. For Phase II of Truck scenarios we use 0.1*full implementation job losses. 2. For combined AV scenarios (such as the “Trucking-Fast” Scenario combined with the Cars-Fleet scenario) the shares displaced are added together. Sources: Occupational employment: Bureau of Labor Statistics Occupational Employment Survey 2015. Share of jobs eliminated based on consultation with industry experts.

41 Assumes more electric vehicles in fleets.
## Appendix B: Estimates of Affected Jobs in Primary Driving and Secondary Occupations in Oregon

### Estimates of Oregon Jobs Affected by 2040s Under Various Household and Commercial Autonomous Vehicle Adoption Scenarios

<table>
<thead>
<tr>
<th>SOC Code</th>
<th>Standard Occupational Classification Title</th>
<th>Household Scenarios</th>
<th>Commercial Scenarios</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Cars Personal</td>
<td>Cars Fleet</td>
</tr>
<tr>
<td>53-3011</td>
<td>Ambulance Drivers and Attendants, Except Emergency</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>53-3021</td>
<td>Bus Drivers, Transit and Intercity</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>53-3022</td>
<td>Bus Drivers, School or Special Client</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>53-3031</td>
<td>Driver/Sales Workers</td>
<td>1,530</td>
<td>1,530</td>
</tr>
<tr>
<td>53-3032</td>
<td>Truck Drivers, Heavy and Tractor-Trailer</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>53-3033</td>
<td>Truck Drivers, Light or Delivery Services</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>53-3041</td>
<td>Taxi Drivers and Chauffeurs</td>
<td>654</td>
<td>2,289</td>
</tr>
<tr>
<td>53-3099</td>
<td>Motor Vehicle Operators, All Other</td>
<td>122</td>
<td>122</td>
</tr>
<tr>
<td>13-1032</td>
<td>Insurance Appraisers, Auto Damage</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>33-1012</td>
<td>Supervisors and Managers of Police and Detectives</td>
<td>69</td>
<td>69</td>
</tr>
<tr>
<td>33-3051</td>
<td>Police and Sheriff's Patrol Officers</td>
<td>283</td>
<td>283</td>
</tr>
<tr>
<td>33-9032</td>
<td>Security Guards</td>
<td>229</td>
<td>229</td>
</tr>
<tr>
<td>39-7010</td>
<td>Tour and Travel Guides</td>
<td>46</td>
<td>46</td>
</tr>
<tr>
<td>43-5021</td>
<td>Couriers and Messengers</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>43-5052</td>
<td>Postal Service Mail Carriers</td>
<td>671</td>
<td>671</td>
</tr>
<tr>
<td>49-2096</td>
<td>Electronic Equipment Installers and Repairers, Motor Vehicles</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>49-3021</td>
<td>Automotive Body and Related Repairers</td>
<td>1,066</td>
<td>1,066</td>
</tr>
<tr>
<td>49-3022</td>
<td>Automotive Glass Installers and Repairers</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>49-3023</td>
<td>Automotive Service Technicians and Mechanics</td>
<td>3,927</td>
<td>3,927</td>
</tr>
<tr>
<td>53-6021</td>
<td>Parking Lot Attendants</td>
<td>382</td>
<td>382</td>
</tr>
<tr>
<td>53-6031</td>
<td>Service Station Attendants</td>
<td>2,589</td>
<td>3,884</td>
</tr>
<tr>
<td>53-7081</td>
<td>Refuse and Recyclable Material Collectors</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td><strong>Combined Household and Commercial Scenario</strong></td>
<td><strong>Jobs Affected</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Personal cars + slow trucking</td>
<td>41,510</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fleet cars + slow trucking</td>
<td>44,440</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Personal cars + fast trucking</td>
<td>44,278</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fleet cars + fast trucking</td>
<td>47,208</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Combined Household and Commercial Scenario</strong></td>
<td><strong>Jobs Affected</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Personal cars + slow trucking</td>
<td>11,706</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fleet cars + slow trucking</td>
<td>14,636</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Personal cars + fast trucking</td>
<td>29,804</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fleet cars + fast trucking</td>
<td>32,572</td>
<td></td>
</tr>
</tbody>
</table>

**Sources:** Preparing U.S. Workers and Employers for an Autonomous Vehicle Future, Groshen et al., June 2018, and Oregon Employment Department

**Notes and Assumptions:**

"Affected does not always equal "lost." Some affected occupations may still exist, with notably different skills and responsibilities on the job."

Affected occupations identified by U.S. Dept. of Commerce Office of Chief Economist; shares of affected jobs in occupations identified by Groshen et al. (p.36-37)

Per report (p.31-32): "In both the fleet and personal ownership light duty scenarios, most AV are initially shared, with initial deployment around 2020, and an inflection point into rapid adoption around 2030. "Cars personal" means a scenario where most households own their own AV, "Cars fleet" means most households use shared AV fleet owned by a company.

Per report (p.33-34): "Trucking slow" means Level 1/2 automation mainstream in 2020s, Level 3/4 automation mainstream in 2030s, and advanced Level 4/5 becoming available in 2040s. "Trucking fast" uses the same progression, and assumes roughly 10 years faster timeline, so Level 4/5 automation is nearly completed in the 2040s."
### Appendix C: Shares of Workers Ages 55 and Older in AV-Affected Occupations


<table>
<thead>
<tr>
<th></th>
<th>All Workers</th>
<th>55 or Older</th>
<th>% Ages 55 and Older</th>
</tr>
</thead>
<tbody>
<tr>
<td>All AV-affected occupations</td>
<td>93,390</td>
<td>25,568</td>
<td>27%</td>
</tr>
<tr>
<td>Primary driving occupations</td>
<td>51,141</td>
<td>17,721</td>
<td>35%</td>
</tr>
<tr>
<td>Other on-the-road driving-related occupations</td>
<td>42,249</td>
<td>7,847</td>
<td>19%</td>
</tr>
</tbody>
</table>

*Source: U.S. Census Bureau, American Community Survey, using IPUMS USA, https://usa.ipums.org*

#### U.S. Workers Ages 55 and Older in Autonomous Vehicle-Affected Occupations, 2018

<table>
<thead>
<tr>
<th></th>
<th>All Workers</th>
<th>55 or Older</th>
<th>% Ages 55 and Older</th>
</tr>
</thead>
<tbody>
<tr>
<td>All AV-affected occupations</td>
<td>8,239,000</td>
<td>2,283,000</td>
<td>28%</td>
</tr>
<tr>
<td>Primary driving occupations</td>
<td>5,000,000</td>
<td>1,589,000</td>
<td>32%</td>
</tr>
<tr>
<td>Other on-the-road driving-related occupations</td>
<td>3,239,000</td>
<td>694,000</td>
<td>21%</td>
</tr>
</tbody>
</table>

*Source: Current Population Survey*