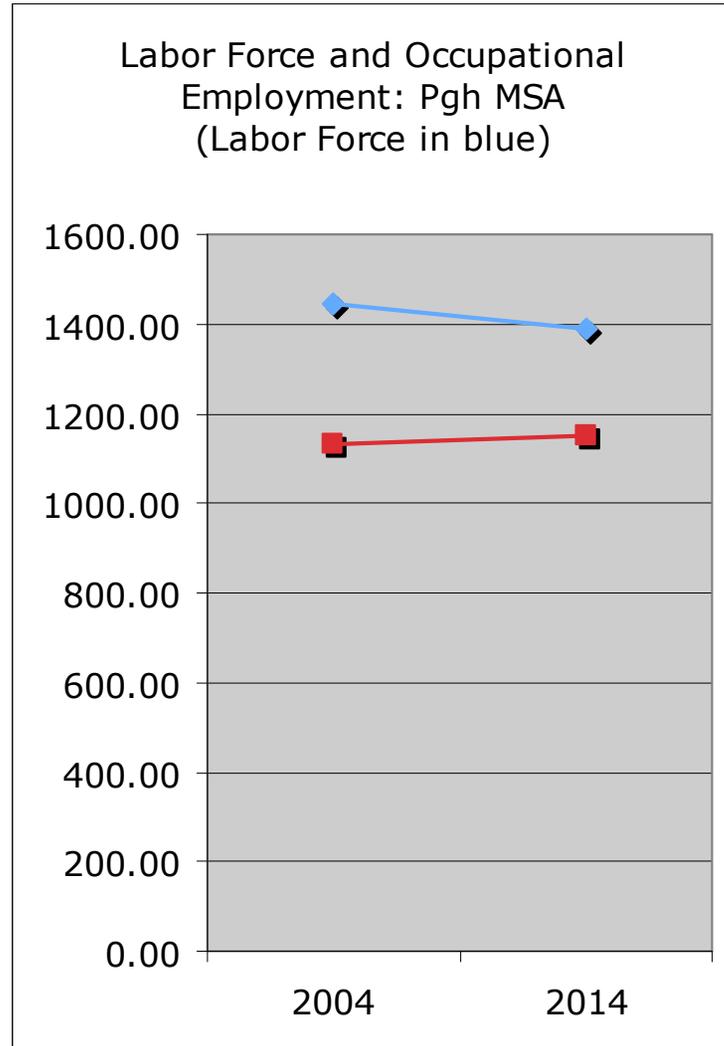
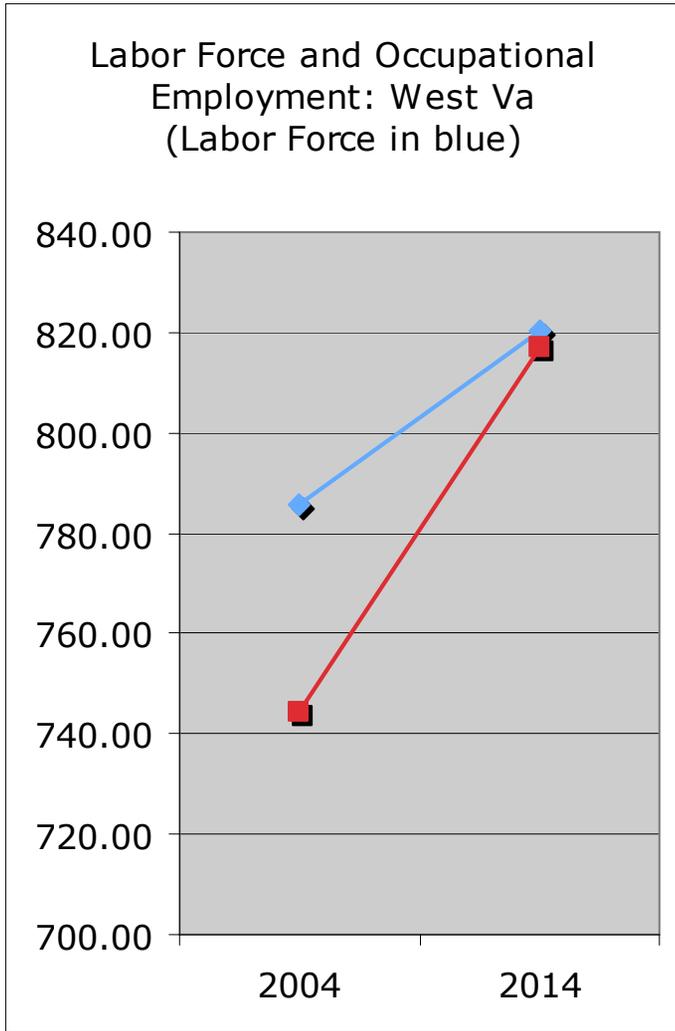


**Workforce Needs in the
Energy Industry in
West Virginia and
Southwestern Pennsylvania**

- Research on workforce demand has been undertaken by David Passmore, Professor of Education and Director of the Institute for Research and Training at Penn State (main campus) utilizing data prepared by Economic Modeling Specialists, Inc. Sources include the West Virginia Bureau of Employment Programs, Research Information and Analysis Division; the Center for Workforce Information and Analysis of the Pa. Department of Labor and Industry; and a variety of federal agencies and data that include the Quarterly Census of Employment and Wages, the Bureau of Economic Analysis (BEA), County Business Patterns and the Occupational Statistics Program of the U.S. Bureau of Labor Statistics.
- Research on workforce supply has been performed by Duquesne University's Center for Competitive Workforce Development. Among other sources, it has utilized information generated by the West Virginia Higher Education Policy Commission, the West Virginia Council for Community and Technical College Education, the West Virginia Department of Education, the Pennsylvania Department of Education, the Pennsylvania Association of Private School Administrators, and interviews with various schools and educators in Pennsylvania and West Virginia.
- The research analyzed more than the energy industry as conventionally defined. It included the energy supply chain, which encompasses sectors of other industries such as manufacturing, transportation, and even some services and government. It focused, in short, on a broadly defined **energy cluster**. In 2007, this cluster encompassed 102,061 employees in West Virginia and 102,769 in Southwestern Pennsylvania; in 2012 the figures were respectively 101,758 and 99,547. The cluster lost 3,222 jobs in Southwestern Pennsylvania (3.1% decline) and 303 jobs in West Virginia (decline of 3/10 of 1%). Nationally, the cluster grew by 4%.

Context



Context

- The labor market is tightening in both areas, but much more so in West Virginia.
 - Both areas are losing population and experiencing modest growth
 - Labor force participation rates are substantially higher in the Pittsburgh MSA.
- Many sub-sectors of the energy cluster are declining and expected to shed jobs.
- Most of the growth occurring in the cluster is an effect of national growth.
- Some sub-sectors display unique regional competitive advantages. In West Virginia, they relate to the state's traditional mining, extractive and utility industries:
 - Bituminous coal and lignite surface mining
 - Support activities for coal mining
 - Electric power distribution
 - Power and communication systems construction
 - All other petroleum and coal products manufacturing

Context

- Other sub-sectors are growing in West Virginia, although at rates equal to or below what would be expected given national growth:
 - Crude petroleum and natural gas extraction
 - Drilling oil and gas wells
 - Support activities for oil and gas operations
 - Engineering services
 - Nonresidential plumbing and HVAC contractors
 - All other nonresidential trade contractors
- Given the growth taking place in West Virginia, our best judgment is that within the next five years there will be a need to recruit and train between 4,000 and 6,000 people as technicians, skilled and semi-skilled laborers.

Context

- The picture is similar in Southwestern Pennsylvania, but with less growth and a job market that appears a lot less tight. There are fewer sub-sectors whose growth is due to unique regional competitive advantages:
 - Natural gas liquid extraction
 - Support activities for oil and gas operations
 - Nuclear electric power generation
 - Electrical equipment and wiring merchant wholesalers
- Other sub-sectors are growing primarily as a result of the national effect:
 - Crude petroleum and natural gas extraction
 - Drilling oil and gas wells
 - Power and communication systems construction
 - Nonresidential plumbing and HVAC contractors
 - All other nonresidential trade contractors

Context

- In addition to more modest growth than West Virginia, Southwestern Pennsylvania appears to have a larger set of training providers -- it has a sizeable network of private proprietary schools. Not only is the overall demand lower in Southwestern Pa., but the ability to meet it is higher.
- Our best judgment is that within the next five years Southwestern Pennsylvania will need to recruit and train between 1,000 and 2,500 people as technicians, skilled and semi-skilled laborers within the energy cluster.

A puzzle

- Given the sense of urgency experienced by the industry, estimated demand appears to be low. How can this be explained?
- Three answers:
 - A methodological answer: the “working life” tables. Estimates of rates of retirement used in modeling are available for occupations, not for occupations by industry.
 - Data: the data do not capture recent developments in the energy industry, such as \$100-plus oil barrels. More generally, this type of modeling is not suited to assess the impact of dramatic events that affect the quantity of demand and the prices for certain goods and services.
 - Most important of all, a substantive reason: demand for labor is unevenly distributed. It is concentrated in a few occupations and in certain local areas (where mines and oil and gas fields are).
- To elaborate the latter point, consider the table that follows.

A puzzle

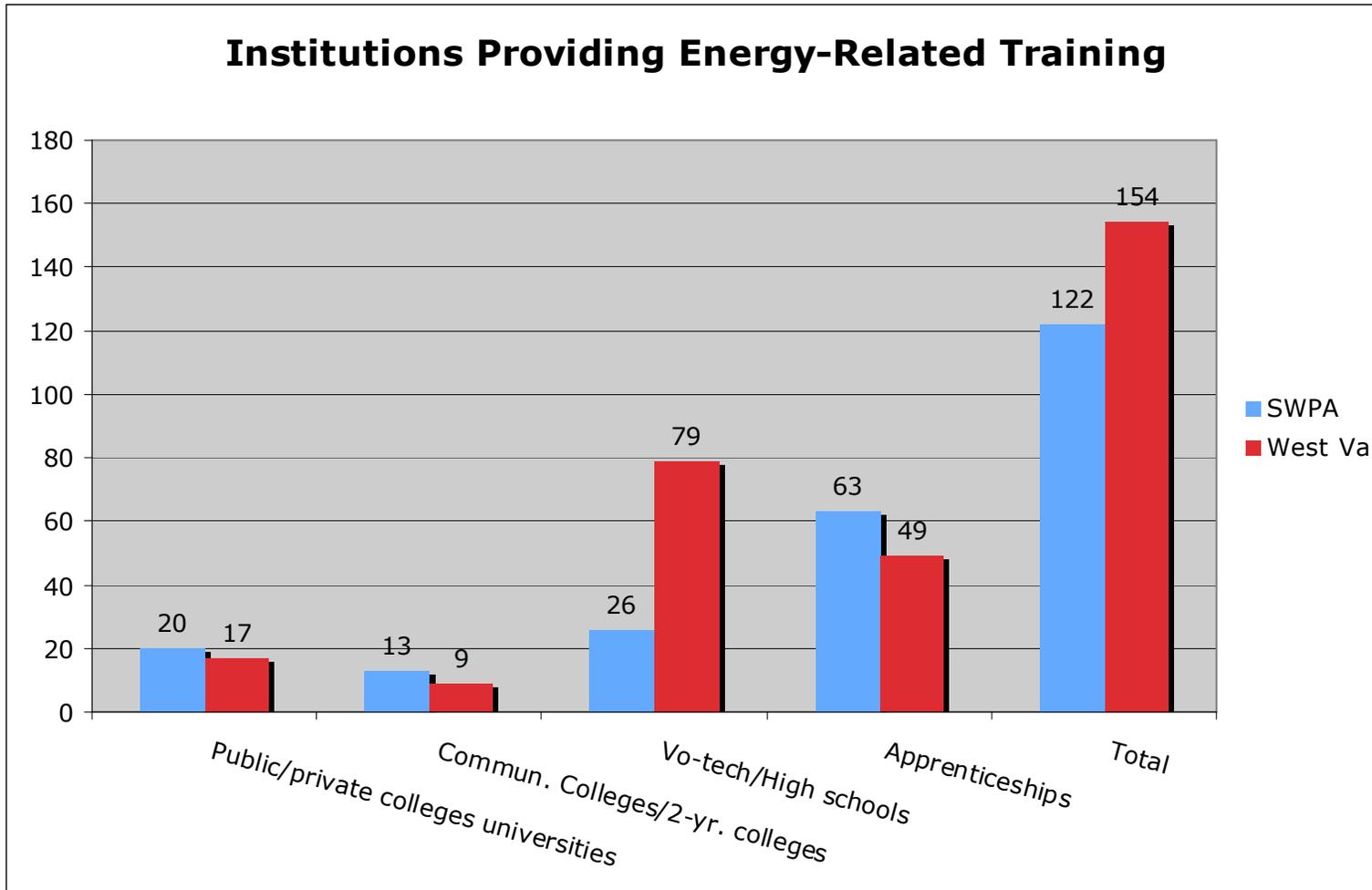
Replacement Rates -- West Virginia	
1st Line Superv./Mngrs. Of Constr./Extr. Occupations	4.4%
Operating Engineers and Other Constr. Equipment Operators	9.5%
Electricians	11.4%
Derrick/Rotary Drill Oper. (Oil & Gas); Serv. Unit Oper. (oil, gas,mng.)	7.8%
Continuous Mining Machine Operators	19.0%
Mine Cutting and Channeling Machine Operators	19.1%
Roof Bolters, Mining	14.8%
Roustabouts, Oil and Gas	16.3%
Helpers, Extraction Workers	14.9%
Industrial Machinery Mechanics	8.3%
Electrical Power Line Installers and Repairers	15.4%
Welders, Cutters, Solderers and Brazers	10.1%
Power Plant Operators	17.3%
Gas Compressor and Gas Pumping Station Operators	27.6%
Pump Operators, Except Wellhead Pumps	24.9%
Wellhead Pumps	25.3%

Replacement Rates -- Southwestern Pennsylvania	
1st Line Superv./Mngrs. Of Constr./Extr. Occupations	3.3%
Electricians	10.3%
Plumbers, Pipefitters and Steamfitters	8.9%
Service Unit Operators, Oil, Gas and Mining	7.8%
Continuous Mining Machine Operators	18.8%
Roustabouts, Oil and Gas	16.4%
Electrical Power Line Installers and Repairers	15.1%
Pump Operators, Except Wellhead Pumps	25.0%
Wellhead Pumps	24.8%

Occupational supply and demand

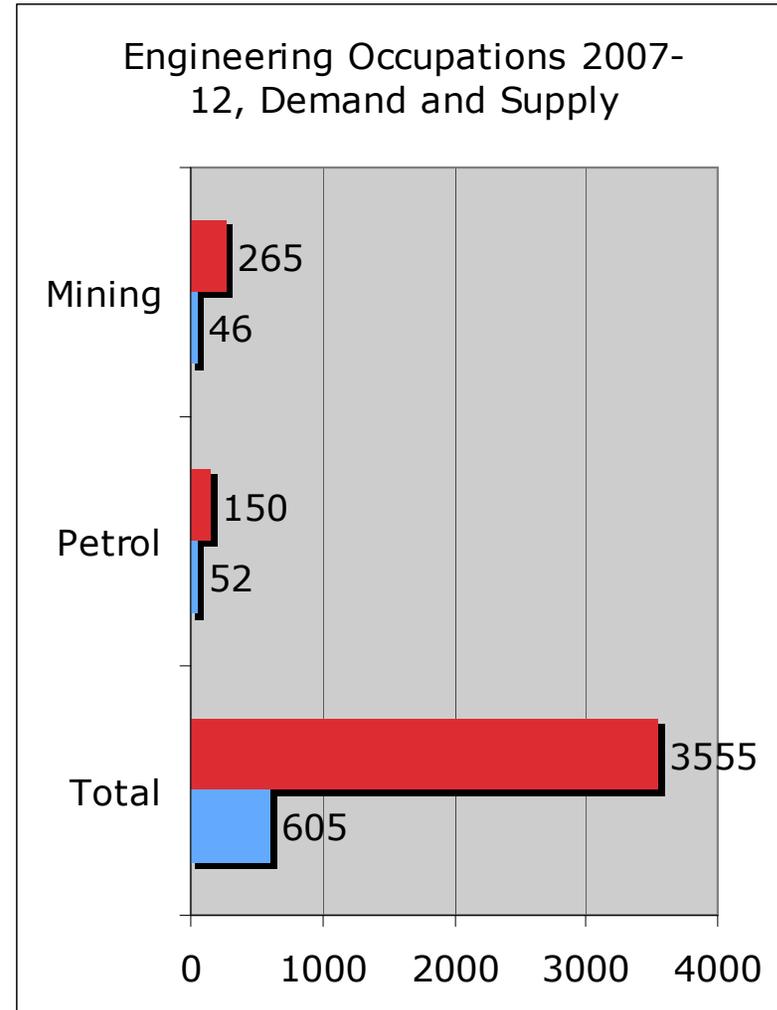
- Estimates of demand by occupation are based on standard econometric procedures -- employment by industry and occupation is seen as a function of the amount and kinds of goods and services sold. In turn, this determines the labor requirements of the economy.
- There are no good ways of estimating the supply of labor available by industry and occupation. We measured the output of the educational and training systems (by numbers of degrees and certificates). Note, however, that this is only one of the sources of supply.
- For West Virginia, we could not secure data for secondary students completing vo-tech training, nor for adults trained in the secondary system and County CTCs.
- It is hard to match the output of educational and training institutions to specific occupations.
- Despite these caveats, the research on occupational supply and demand shows a very clear result: the relative absence of educational and training programs targeting the growing sub-sectors of mining and oil and gas extraction.

Occupational supply and demand



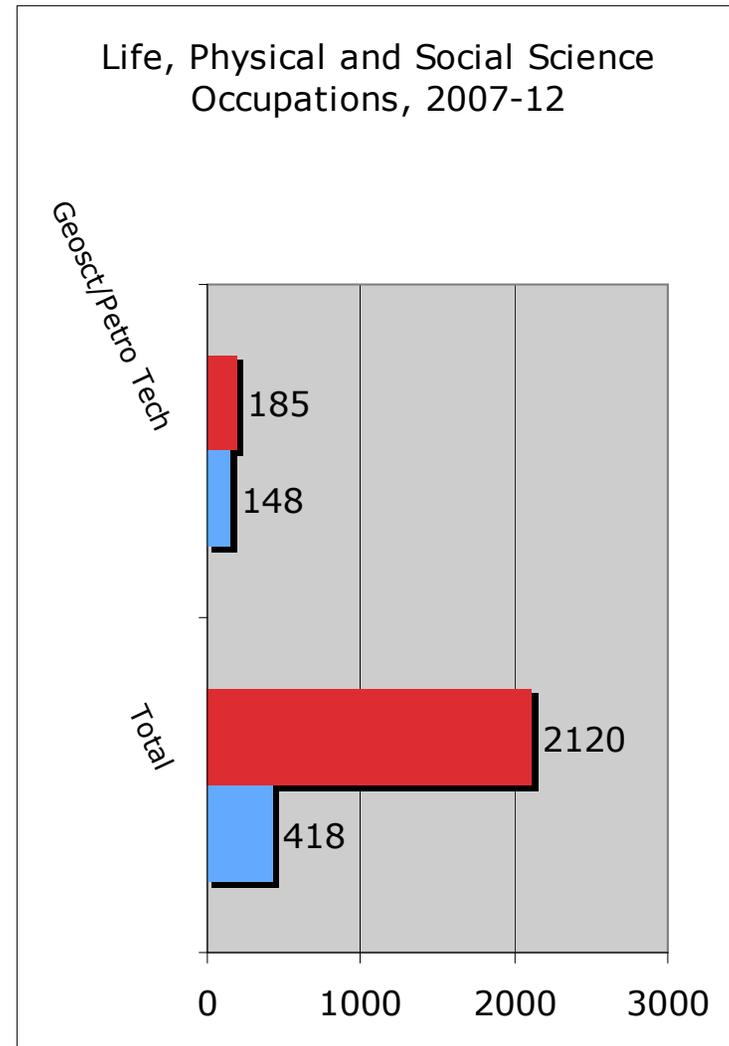
West Virginia

- We could not secure data for secondary students completing vo-tech training, nor for adults trained in the secondary system and County CTCs
- Architecture and Engineering Occupations, SOC Group 17 -- 605 openings projected for 2007-2012, 3,555 degrees projected to be awarded (Associate plus Bachelor's plus Graduate Education degrees).
- To meet demand (in blue), employers would need to capture 17% of the supply (in red), or 1 out of every 6 graduates
- Note that supply is much tighter for petroleum and mining engineers



West Virginia

- Life, Physical and Social Science Occupations, SOC Group 19 -- 418 openings projected for 2007-2012, 2,120 degrees projected to be awarded (Associate plus Bachelor's plus Graduate Education degrees).
- To meet demand (in blue), employers would need to capture 19.7% of the supply (in red), or 1 out of every 5 graduates.
- Note that the supply is much tighter for Geoscientists and Geological and Petroleum Technicians -- employers must capture 8 out of 10 graduates to meet the demand
- Other occupations in demand: environmental scientists and specialists (73 openings) and Hydrologists (53 openings)



West Virginia

- Because we could not secure data for secondary students completing vo-tech training, nor for adults trained in the secondary system and County CTCs, we cannot estimate the share of the supply generated by the education and training systems. In what follows we present estimates of demand for occupations where demand is high, or occupations which are critical to the energy industry. (Occupations in **red** are declining.)
- Group 47, Construction and Extraction Occupations, 2733 openings
 - First Line Supervisors/Managers of Construction Trades and Extraction Workers -- 185 openings
 - **Operating Engineers and Other Construction Equipment Operators -- 192 openings**
 - Electricians -- 587 openings
 - Derrick operators and rotary drill operators, oil and gas; service unit operators in oil, gas, mining -- 178 openings
 - **Continuous mining machine operators -- 336 openings**
 - **Mine cutting and channeling machine operators -- 144 openings**
 - **Roof bolters, mining -- 179 openings**
 - Roustabouts, oil and gas -- 86 openings
 - Helpers, extraction workers -- 366 openings

West Virginia

- Group 49, Installation, Maintenance and Repair Occupations -- 751 openings
 - Industrial Machinery Mechanics, 136 openings
 - Electrical Power Line Installers and Repairers, 164 openings
- Group 51, Production Occupations -- 361 openings
 - Welders, Cutters, Solderers and Brazers -- 78 openings
 - Power Plant Operators -- 51 openings
- Group 53, Transportation and Material Moving Occupations -- 1,501 openings
 - Gas Compressor and Gas Pumping Station Operators -- 280 openings
 - Pump Operators, Except Wellhead Pumpers -- 222 openings
 - Wellhead Pumpers -- 419 openings

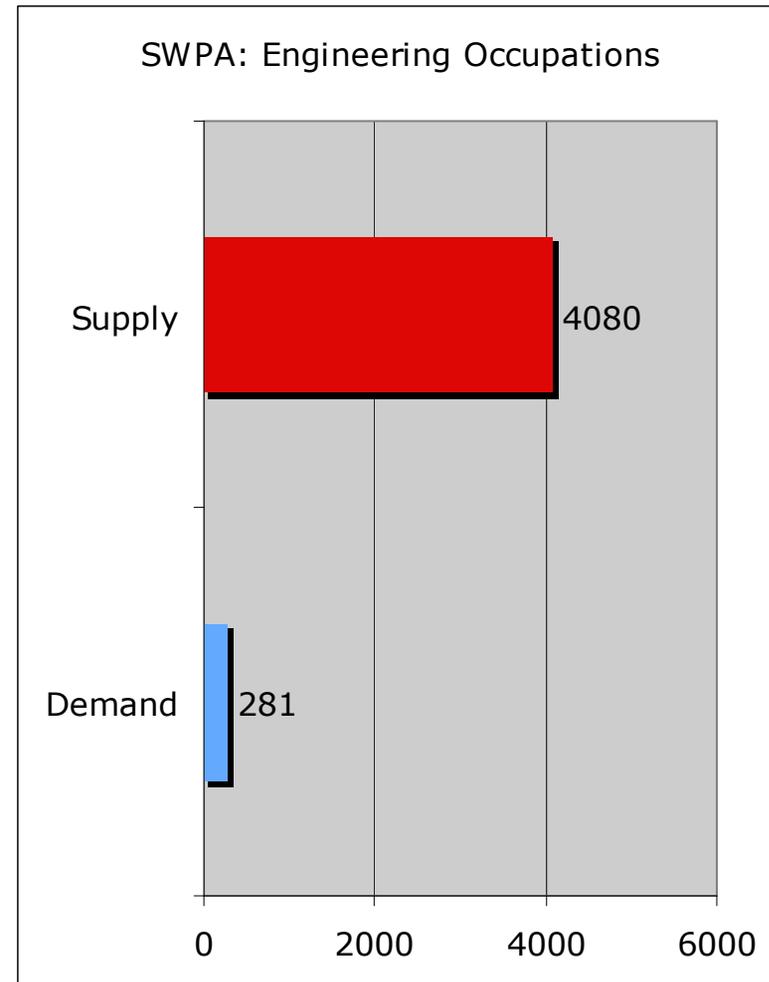
West Virginia

- Final Observations

- It is worth considering jointly the four sets of occupations in Construction and Extraction, Installation Maintenance and Repair, Transportation and Material Moving, and Production. These four groups include highly skilled workers and technicians as well as unskilled and semi-skilled laborers. Adding together the demand for the these groups, we obtain 5,346 openings. If all Associate Degrees expected to be produced between 2007 and 2012-- 1350 -- went to meet demand within these three groups, 3996 openings would be left unfilled. This is the size of the gap that must be met by the career and vocational-educational system of the state of West Virginia in the next five years -- recruit and train approximately 4,000 people for the energy cluster alone. We do not know how much capacity the system has to accomplish this task, since (as noted) we could not acquire the needed data. The challenge, however, appears substantial.

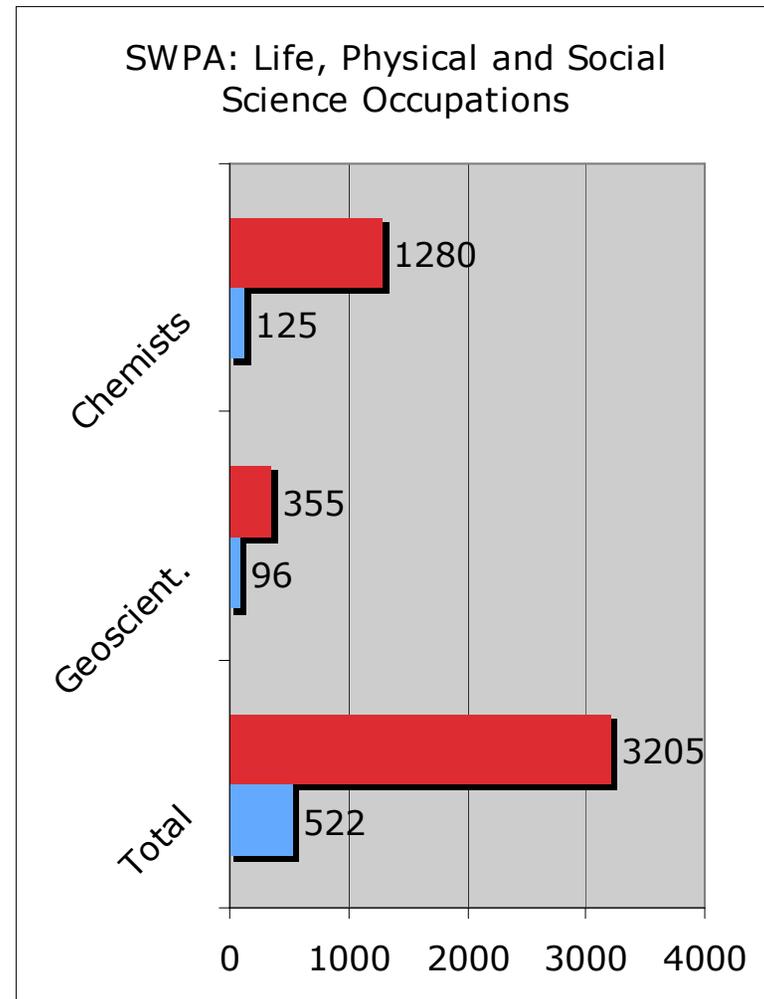
Southwestern Pennsylvania

- Group 17, Architecture and Engineering Occupations -- 281 openings projected for 2007-2012, 4,080 degrees projected to be awarded (Bachelor's plus Graduate Education degrees).
- To meet demand (in blue), employers would need to capture 6.9% of the supply (in red), or 1 out of every 14 graduates.
- Note that there is demand for Mining and Geological Engineers (41 openings) and for Petroleum Engineers (21 openings), but there are no higher education programs in these Specialties in Southwestern Pa.



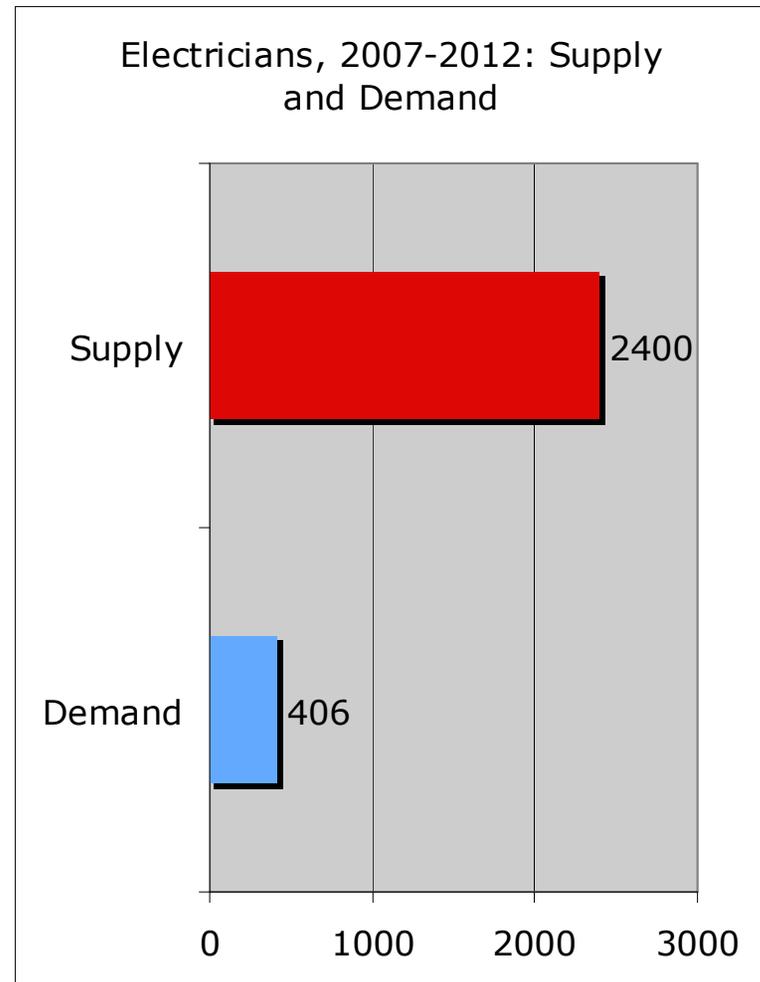
Southwestern Pennsylvania

- Life, Physical and Social Science Occupations, SOC Group 19 -- 522 openings projected for 2007-2012, 3,205 degrees projected to be awarded (Associate plus Bachelor's plus Graduate Education degrees).
- To meet demand (in blue), employers would need to capture 16.3% of the supply (in red), or 1 out of every 6 graduates.
- Note that the demand/supply relationship is tighter for geoscientists and hydrologists (employers must capture 27% of graduates to meet demand, or 1 out of 4) and much looser for chemists and chemical technicians (respective figures are 9.8% and 1 out of 10)



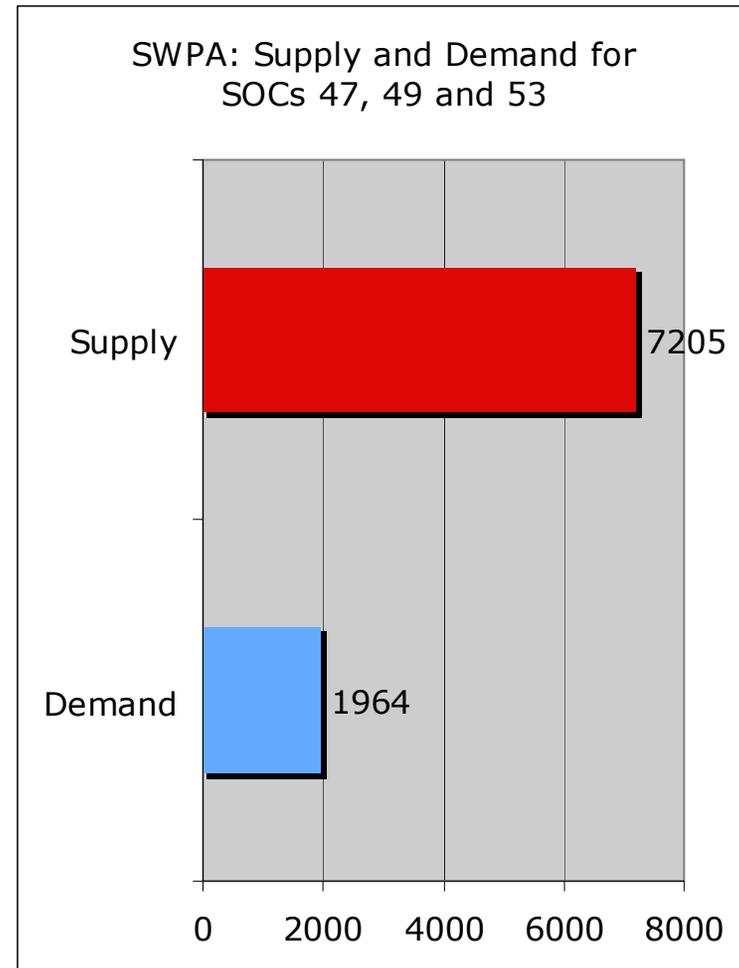
Southwestern Pennsylvania

- Although we obtained vocational-technical data for secondary students and for adults trained by the vo-tech system, as well as for private proprietary schools, the data not always allow for an easy match of graduates with occupations. It is difficult to make fine matches of supply with demand for Construction and Extraction; Installation, Maintenance and Repair; and Transportation and Material Moving occupations.
- One case in which a match is possible is that of Electricians. 406 openings are projected for Electricians between 2007 and 2012; the supply, excluding secondary vo-tech students (likely to go to college in large percentages), equals 2,400. To meet demand employers would need to capture 1 in 6 graduates, or 17% of the supply.



Southwestern Pennsylvania

- It is possible, however, to match the three broad groups (SOC 47, Construction and Extraction; SOC 49, Installation, Maintenance and Repair; and SOC 53, Transportation and Material Moving Occupations) against the programs -- Associate Degrees, vo-tech secondary training and vo-tech adult training -- that supply them.
- Together the three groups are projected to have 1,964 openings between 2007 and 2012. Supply, excluding secondary vo-tech students (likely to go to college in their majority), equals 7,205 individuals. (Including secondary students figure would be 10,750.)
- To meet demand, employers must capture 27% of the supply, or 1 in 4 persons.



Southwestern Pennsylvania

- To add detail, we present estimates of demand for occupations in SOCs 47, 49 and 53 where demand is high, or where the occupations are critical to the energy industry. (Occupations in red are declining.)
- Group 47, Construction and Extraction Occupations -- 1,655 openings
 - First-Line Supervisors and Managers -- 95 openings
 - **Electricians -- 406 openings**
 - Plumbers, Pipefitters and Steamfitters --425 openings
 - Service Unit Operators, Oil, Gas and Mining -- 59 openings
 - **Continuous Mining Machine Operators -- 67 openings**
 - Roustabouts, Oil and Gas --118 openings
- Group 49, Installation, Maintenance and Repair Occupations -- 103 openings
 - **Electrical Power Line Installers and Repairers -- 81 openings**

Southwestern Pennsylvania

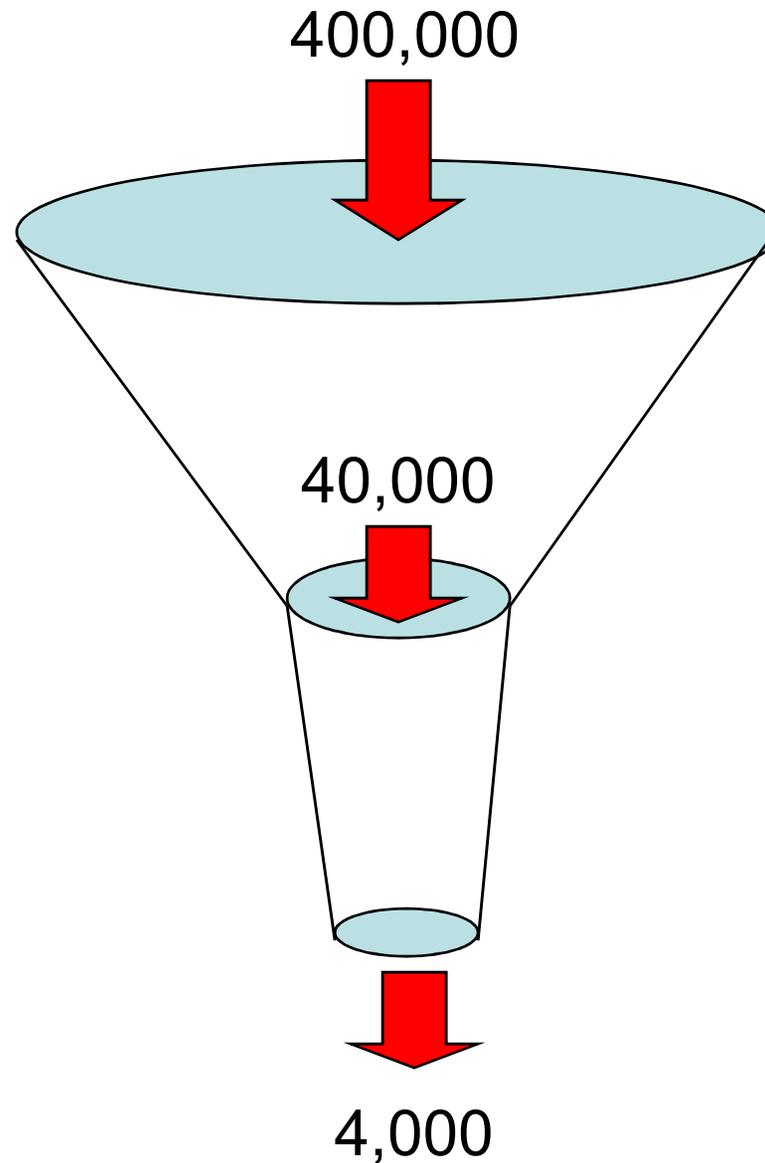
- Group 53, Transportation and Material Moving Occupations -- 513 openings
 - Pump Operators, Except Wellhead Pumpers -- 170 openings
 - Wellhead Pumpers -- 182 openings
- Note that Pump Operators and Wellhead Pumpers are two of the fastest growing occupations in Southwestern Pennsylvania, growing at rates of 20% and 16% respectively over the five-year period.

What to do?

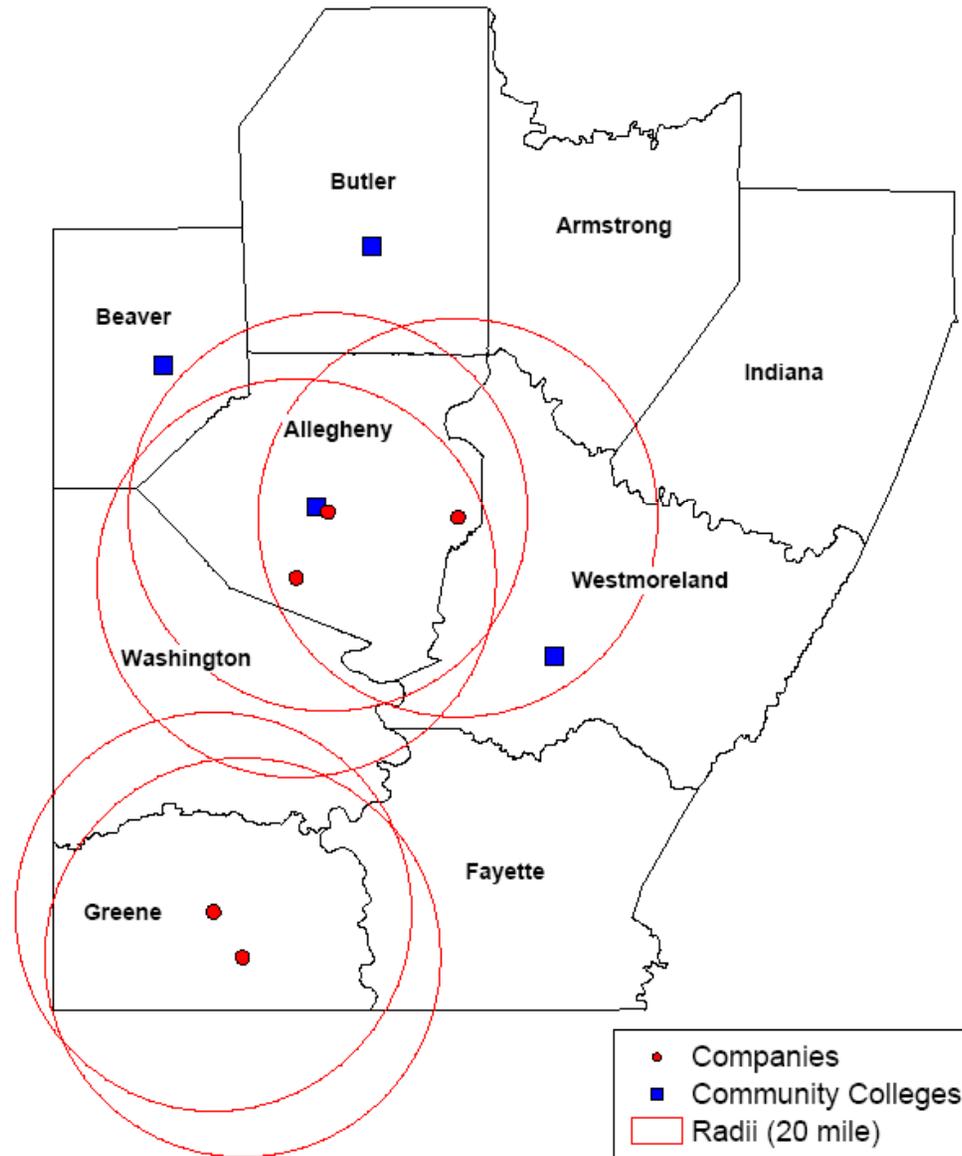
- What are companies doing about recruitment? And training? Here are some comments offered in response to this question in the company survey that was part of this research:
 - “We do little.”
 - “Nothing”.
 - “We take applications.”
 - “Hoping and praying.”
 - “We offer competitive wages and job security.”
 - “We struggle day-to-day to keep employees satisfied.”
 - “We provide benefits.”
 - “Recruitment outside the region.”
 - “in-house training.”
 - “Advertising campaigns, reaching to area schools.”
 - “Partnered with training providers.”
 - “Opened office in the Czech Republic”.
 - “Using temps.”

What to do?

- Assume you need to recruit 4,000 people over 5 years. If you hire 1 in 10 persons, 40,000 people must contact you. If one out of 10 people who hears about your job offer contacts you, it is necessary to reach 400,000 people over 5 years. It is a **BIG** job...
- But it is not impossible. First, it is over 5 years, so you need 80,000 contacts/year. Second, consider the geography...



What to do?



What to do? Recruitment

- Pay attention to geography -- most recruitment is local. Focus on local area first.
- Promote partnerships with training providers, companies, Unions. Training programs based on such partnerships and which offer an immediate or near immediate reward -- job and benefits -- are more successful in recruiting people.
- Create a system of recruitment:
 - A well-structured offer;
 - Clearly targeted audience;
 - Tight response management;
 - Database driven. Data will enable you to learn from your recruitment campaigns, and will provide a start for the following campaign. (Someone who is not the “right” employee today may be perfect for tomorrow.)
- In terms of targeted audience, consider seriously the adult learner/worker: those who did not finish High School or college, those currently working in other occupations, immigrants and minorities. They are numerous, and you do not need to convince them that a job in the energy sector is a good job.

What to do? Recruitment

- At a policy level, consider initiatives that are likely to affect the labor pool available to companies in general:
 - Funding for adult education: educational funds tend to be targeted toward supporting one's first entry into college. There are comparatively few dollars to train and re-train the adult population. Yet, this population is increasingly important as a means of meeting the needs of businesses
 - Immigration policy

What to do? Training

- Promote partnerships with training providers, companies, Unions.
- Develop programs that blend creatively an immediate reward/offer (a job with benefits) with long-term career enhancement. A purely academic model is not the best way to recruit adults.
- Develop the capacity for training needed to work with large numbers of learners:
 - “Train the trainer”;
 - Capital investment where necessary.
- Continue to expand “just-in-time” program in the mining and oil and gas sub-sectors.
- Policy: issue of funding for adult education

What to do? Retention

- Retention has not been the focus of our research, but we will leave you with one thought... Under conditions of a tight labor market, it is more important than ever to look at workers also as customers.