Jobs in the 21st Century
(and the Solar Power Industry)

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21st Century Jobs

Blue Collar Service industry:
1) Easy to find
2) Doesn’t not require an education
3) Without differentiation pay will only become more depressed

White Collar Service industry:
1) Usually requires an advanced education
2) Very competitive
3) Great pay, but really long hours (e.g. >80 hours per week)
4) Awful work life balance

Sci, Tech, Engineering, Math: (STEM)
1) Typically requires a degree
2) Great pay with good hours
3) Great work/life balance
4) Can do ANYTHING with a STEM degree
# The Case For Getting STEM Degrees

Minimum wage in California is $8/hr.

## Table 1. Average Hourly Earnings of Full-Time Private Wage and Salary Workers in STEM Occupations by Educational Attainment, 2010

<table>
<thead>
<tr>
<th>Educational Attainment</th>
<th>Average hourly earnings</th>
<th>Difference</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>STEM</td>
<td>Non-STEM</td>
<td>Dollars</td>
</tr>
<tr>
<td>High school diploma or less</td>
<td>$24.82</td>
<td>$15.55</td>
<td>$9.27</td>
</tr>
<tr>
<td>Some college or associate degree</td>
<td>$26.63</td>
<td>$19.02</td>
<td>$7.61</td>
</tr>
<tr>
<td>Bachelor's degree only</td>
<td>$35.81</td>
<td>$28.27</td>
<td>$7.54</td>
</tr>
<tr>
<td>Graduate degree</td>
<td>$40.69</td>
<td>$36.22</td>
<td>$4.47</td>
</tr>
</tbody>
</table>

STEM Jobs Versus Education Level

**Associates Degree**

**Technicians:**
- Great job security and hours
- Good pay
- Little opportunity to manage or lead teams

**Undergraduate Degree**

**Engineers and Management:**
- Pay and responsibility go up with experience
- Many career paths in and out of lab/factory
- Best jobs in terms of work/life balance
- Likely won’t lead or manage research projects

**Graduate Degrees (Masters & PhD)**

**Researchers and Management:**
- Mainly meant for research
- Can go into Academia
- Almost no pay difference between PhD and Masters degree
Truth About STEM Careers

• Getting a STEM degree is much harder than other degrees.

• STEM jobs are not harder than normal jobs.

• STEM graduates can work in almost any field (e.g. Law, Finance, etc).

• Perseverance is more important than intelligence.
Advice I Gave My Brother
My Story

Dallas, Texas

Texas

England

Switzerland

California
PLANT PV

• Founded in 2010

• Wanted to start a company that focused on prototyping new types of solar cells.

• Based at the Molecular Foundry @ LBNL
Why Join A Start-Up

• Start-ups are fun and dynamic

• Stock options are like lottery tickets

• Critical density of start-ups in the Bay Area to assure STEM grads a job
Solar power primer

Power Conversion Efficiency (PCE) = fraction of the power from sun directly converted into electrical power by the solar cell

Full sun (1kW/m²) → 15% solar module that is 1 m² would produce 150W

Need about twenty seven 150W modules to power your home (i.e. 4 kW system)
Solar power primer

Power Conversion Efficiency (PCE) = fraction of the power from sun directly converted into electrical power by the solar cell

Cost Breakdown (2011):
PV Modules: $1-2/W_p
Installation: $1.80-3/W_p
Total Cost: $2.80-5/W_p

Need about twenty seven 150W modules to power your home (i.e. 4 kW system)
Nanotechnology in Solar

Nanostructured Materials

![Nanostructured Materials Image](image1.png)

Nano-Characterization

1) Study materials at the nanoscale many different tools

2) Defects and interfaces are extremely important in solar

3) Mainly used at the R&D level
Solar Module Manufacturing Industry

- Most solar cell start-ups are going to fail in the next 2-3 years
- Majority of solar module manufacturing is done overseas
- US factories are automated with very few jobs
Solar Module Installation Industry

- Low cost panels increase feasibility
- Well paid jobs
- Lots of opportunity in California
- Can’t be outsourced
Conclusion

• STEM degrees are worth the effort

• Many different STEM careers exist at all education levels

• Living in the Bay Area gives you great access to start ups

• US solar power industry will have a great number of opportunities, but most of them won’t be in a factory.
Resources

STEM Career Info:
• http://www.iseek.org/careers/stemcareers.html

Cleantech Media Sites:
• http://www.greentechmedia.com/
• http://www.pv-tech.org/