

## Project 1A

### Student A, Student B, Student D

As we try to engineer the future of solar electricity, we need to predict what our energy use will look like many years from now. We know that we are currently depleting the fossil fuels that we get 86% of our energy from, and our energy consumption is growing at an annual rate of about 2% (according to BP's Statistical Review of World Energy 2009). We are therefore in dire need of a more sustainable way to power our lives. If we continue to run on fossil fuels without looking into more advanced energy techniques, we will dig ourselves into a hole that is nearly impossible to get out of. We therefore must start making and implementing plans that make renewable resources our most prominent energy source. We have chosen to focus on solar power (which currently only constitutes .5% of our energy consumption) on a local scale, allowing homes and businesses to supply their own power without relying on the grid. We are looking to raise the percentage of our energy that comes from solar power to about 50% within 20 years. This is a reasonable goal because the cost of photovoltaics will go down over the next ten years due to research and the large volume of solar startups. Not only would this large change keep us from depleting our resources without anything to fall back on, it would also decrease our carbon footprint because solar power releases no greenhouse gases, whereas fossil fuels release many. The government's role will be large—it is necessary to achieve some sort of standardization in the *long run* to cut cost and have efficient production. However, our team is focused on local energy production through photovoltaics. Thus, the federal government will not play as large a role as it would for a grid scale national system. With SoloLoco's system, local government will be essential. We propose that individual committees in various cities or districts are elected to consider the following topics: size of the city, socioeconomic distribution of the city (to

determine the scale of federal subsidies necessary), and the electrical needs of the city (using a rigorous set standards to measure electrical usage leading up to the implementation of the system). The users can provide input and the committee for local power decisions will have to work with investors to provide funding. However, investment can also be done on the federal and *state* level—government on those levels can talk to corporations and subsidize funding.

In order to get to the point where 50% of our energy comes from solar power, we will have to manufacture millions of solar panels to be installed on roofs, windows, and even automobiles, which will be a very high starting cost, even with our reasonable prediction that the cost of solar power will fall. However, once all of these panels are in place, the cost of maintaining the 50% solar power will be much lower than the cost of producing the energy we currently use. Very few new solar panels will need to be made—they can be used for a long time with low maintenance cost; the largest cost would be the upkeep of existing panels (which is nothing unless some panels break). Because we are using silicon for the material along with silicon nitride, the price of raw materials will be cheap. In addition, machinery can be reused to make solar cells, and can be *shipped* from central locations to localized distributors, according to the SoloLoco plan. We would have to make one or multiple factories to produce these panels, but no land area is necessary if we choose to install the panels on existing windows, roofs, and cars. Our panel-making factories would run on fossil fuels, which would be somewhat counterintuitive, but we could release some greenhouse gases if it means that we'll save the environment with the greenhouse gases we're preventing from being released later. Also, the solar cells would be more efficient than nature itself at converting solar energy (10-15% for solar cells vs. 3% for green plants), so their use would be beneficial to all. Though it is clear that it

will be a while before the price of oil is driven higher than the price of photovoltaics, through government subsidy and private research it is doable. To maintain this target fraction (50%, which we hope to *increase*) for 100 years would not be difficult once an infrastructure has been setup in many communities nationwide. We would measure the effectiveness of our plan by the efficiency and cost of the panels we produce as well as customer satisfaction with our products. Land resource allocation will not be an issue on a local level—government subsidy could be used to purchase land. PV surface area could be spread out on housetops and building-tops, since SoloLoco only deals with local solar development, not a large scale/ huge surface area structure. Environmental issues we might face are the lack of direct sunlight, in which case the district committee will have to introduce installments that use diffuse sunlight and maximize efficiency. With a local system, all structures can be *customized*, increasing overall efficiency. The basics of a representative democracy are that each constituency can be represented best by people who know it—a parallel situation is with a localized solar system. A return on investment for the government and private investors will be apparent after a few years of negative profits—because as local systems standardize procedures, their costs will go down and the profits companies can make from building solar cells will go up.

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