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# **Economic and Social Development Stemming from the Electrification of the Housing Stock on the Navajo Nation**

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### **DISCLAIMER**

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This business plan template is meant to provide a guide for prospective entrepreneurs. The financial data presented in this plan are based on general assumptions and the accuracy of said assumptions is in no way promised or guaranteed. It is recommended that professional guidance be sought prior to starting this or any business.

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# Economic and Social Development Stemming from the Electrification of the Housing Stock on the Navajo Nation

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## INTRODUCTION

Using 1990 Census data, in 2000 the Energy Information Administration estimated that 36.8 percent of the 29,375 occupied housing units on the Navajo Nation lacked electricity. The large distances which separate homes make the cost of providing conventional sources of electricity prohibitive. Arizona Public Service estimates the cost of erecting power lines to be roughly \$25,000 to \$30,000 per mile, an impossible sum for most families in this region where the unemployed rate hovers around 50 percent. Given the extremely low population densities, it is simply inconceivable that many houses could be connected to the power grid. More recent estimates show that between 10,000 and 23,000 homes need some type of electricity provision system that is not connected to the grid. As discussed in Appendix 1, an estimate of 18,000 homes appears to be a reasonable target figure. The estimated cost of any program providing electricity and the associated appliances to these homes falls between \$115 and \$350 million. Using the baseline estimate of 18,000 homes, the estimate is roughly \$235 million. These are costs above the typical construction costs for the expected new housing units. (See Appendix 1 for the estimates of demand potential.)

Even a rudimentary understanding of the current demographic, economic and social conditions experienced by the residents of the Navajo Nation points to a clear conclusion that many individual families will be overwhelmed by the financial requirements of paying for these systems. The most favorable estimate is roughly \$60/month over 15 years and this does not cover regular maintenance costs. (See Appendix 3B.) As such, it will be imperative for outside funding and subsidies to be made available if the people of the Navajo Nation are going to be able to participate in an electrified 21<sup>st</sup> Century.

This section details the concomitant secondary consequences of an electrification program as described in the accompanying Business Plan and Demand Potentials portions of this report. As with all economic activity, there are many secondary and resulting influences that will ripple through the economic and social systems of the Navajo Nation.

The low median age of twenty-four years indicates a large segment of the population is made up of young people. This is compared to a median average in the United States of 35.4. On the reservation, 55.6 percent of the population is between the ages of ten and thirty-four years of age. This is the population segment that will make up the majority of the work force in the decade to come. The relative size of this age group exhibits the need for new opportunities for people who will make up the future work force. (U.S. Census, 2000)

Data from the 2000 Census on income and housing differentiates the Navajos from the rest of Arizona's residents. Per capita income is \$7,578 for Navajos as compared to \$20,275 for Arizona and \$19,082 for the rest of the United States. Median household income is \$21,136 as compared to \$40,556 for Arizona. The median value for owner-occupied housing units is an extremely low \$25,500. The median value for Arizona is \$121,300. 24.8% of Navajo housing units are crowded with more than 1.5 occupants per room. This compares with 4.2% for the state as a whole.

The census data shows that only 44% of the working age population is in the labor force. This compares to 61% for Arizona. The unemployment rate among Navajos is 25%, as compared to 5.6% for Arizona. The poverty rate is 41.90% as compared to 13.90% for Arizona. Of the employed civilian population, some level of government employs 47%, as opposed to 15% for Arizona. *Thus roughly 17.5% of the working age population, or 1 in 6 people, works in the private sector, as opposed to roughly half the Arizona population.* As such there is an immense need to develop the private sector of the Navajo Nation's economy.

## ECONOMIC DEVELOPMENT

The Navajo Nation is facing two major needs: employment and economic development. Economic development on the Navajo Nation must not be looked upon in the traditional way where pure profits are the main consideration. Although profits must still be a consideration, the Navajo value system and “ways of knowing” must also be embraced and reflected upon. The culture and traditions must be taken into consideration and highly valued or else no progress will be made (Anderson and Smith, 2000). The drivers for success must operate in spiritual harmony and not threaten the sense of self-identity the culture is preserving. Solar power is an ideal source of development because it does not solely depend on scarce resources in danger of being depleted and instead protects them for future generations. The sun’s rays will not cease to shine in this region, thus making solar power the ideal renewable energy. Harnessing the sun’s energy for use will not only lead to direct opportunities for the people in education and employment, it will also lead to a myriad of secondary opportunities for the people. This can all be done in a way that does not detract from the culture, but helps to preserve it. The Navajo Nation has an opportunity to harness a renewable energy and make it work for them, their burgeoning economic system and also their social and cultural values. It is important to note that the success of an electrification project will have much more substantial social, cultural and economic changes than simply installing solar panels on houses in Scottsdale.

Economic development is a process that weaves throughout the social system. Economic development is a means to the end of sustaining tribal character. As such, it is vital to formulate all development plans with an understanding of how they impact the overall societal makeup. Only when the individual tribe has control of its resources and sustains its identity as a distinct civilization does economic development make sense; otherwise, the tribe must choose between cultural integrity and economic development. A common misconception involves the seeming conflict between maintaining a tribe's cultural heritage and increased economic activity on the reservation. However, a main purpose of this work is to show that developing the economy increases the potential for strengthening and developing the tribal culture. As such, a manifest imperative in Indian country is maintaining the cultures and strengthening sovereign powers. One of the methods of achieving this goal is developing tribal resources, in this case the sun’s rays, within a cultural context. (Smith, 2000)

Economic development occurs when diverse activities and businesses are given the opportunity to prosper and flourish within a stable political background. Smith (2000) argues that the development process occurs when import replacement occurs and new products and markets are a result of creativity and entrepreneurship. Jacobs (2000, page 19) indicates, “Development depends on co-developments. I mean that development can’t be thought of as a ‘line,’ or even as a collection of open-ended lines. It operates as a web of interdependent co-developments. No co-development, no development.” As explained below, the development of a solar electrification program will stimulate a web of economic and social co-developments.

In order for the economic system to benefit fully from an opportunity like solar power the whole system should be examined and planned for. According to a study done on the Navajo Nation, approximately 87 cents out of a dollar earned were taken off of the reservation to border towns where goods and services were purchased. (Yazzie, 1989) This means that only 13 cents of the dollar earned were actually spent on the reservation. The money spent on the reservation is then recycled to be spent again. The term for this is the multiplier effect and it works as follows: “The total effect of that single dollar is \$1.15. If the situation is turned around such that 87 percent of every dollar of income is spent on the reservation, then the single dollar creates up to \$7.69 of additional spending.” (Smith, 2000, page 49) This occurs as those working on the reservation profit from the dollars they bring in rather than losing the money to the commercial entities found off the reservation. Although major efforts have been made to increase retail opportunities in the last decade, additional expansion is possible that can be stimulated by the provision of solar power and the employment opportunities.

By introducing solar power businesses to the reservation the tribe is refueling itself. Refueling is like eating a good meal. When the body and mind are enriched nutritionally then there is power to both gather more nutrients and expand activities elsewhere. When the solar power businesses get started, the results of increasing hours of clean burning indoor light, jobs, and other benefits that come from clean electricity will allow the enrichment of other aspects of life, like the practices of the rich Navajo culture.

As the economic development process continues and a more diverse selection of goods and services is offered on the reservation, less money will be taken off of the reservation to buy goods and services. Rather, people will spend their money at retail and service businesses on the reservation. The term for this is import replacement. It is a vital part of the economic development process. It means that rather than import goods and services from businesses off the reservation, they become available within the Navajo Nation. When this is done, the dollar can be recycled within and less money will leak out of the nation.

In order to replace imports with domestically produced goods and services the whole economy must participate in development. The goal is to seek diversification rather than mere expansion of existing goods and services. There needs to be co-development in the form of quality rather than exclusively an increase in the quantity of goods and services already offered. When electricity becomes available, diversification on the economic landscape will become fertile. A new demand for goods and services never before experienced will flourish. Business opportunities will blossom for providing small appliances like light fixtures, bulbs, and accessories. Potential for both retail and manufacturing business will arise. There will be a newfound need for items like refrigerators, fans, extension cords and computers, which could be sold on the reservation. If the tribe allows for or provides businesses that sell these items, then the extent to which goods are imported from border towns will be cut down. Leakage of money off the reservation will decrease. The tribe will profit from the increase of revenue as well as employment.<sup>1</sup> As the number of businesses increases, less monopoly power will be present as local competition for dollars increases. This was true in the case of grocery stores. When there was only one trading post/store in large geographical regions of the reservation the prices were high. A study completed in 1993 showed a price comparison between trading posts and on and off reservation grocery stores. The isolated trading posts had higher prices than the on reservation grocery stores and substantially higher prices than the off reservation stores. (Smith et al., 1994) As more stores opened, prices were forced down by competition. As more opportunities develop for purchases, the monopoly power diminishes as more substitutes become available for each dollar.

The opportunity for manufacturing of goods could also take place. As the technicians working for the solar power businesses begin to develop their skills installing and implementing the systems, entrepreneurial ideas could arise. Small components of the systems may be locally produced. Alternatively, new and better designs for components may result from the creativity of the entrepreneurs. Since solar power is still an evolving renewable resource technology, there is room for improvement. The Navajo Nation will be ahead of the rest of the world in the implementation of a tool the rest of the planet needs to implement. This is what Jacobs discusses as the web of co-developments. There is no way of foretelling the future, but the strong entrepreneurial nature of the Navajo culture almost assures development of new opportunities, products and services.

Implementing solar power on the Navajo Nation addresses not only economic needs but social needs as well. Lack of jobs and income are two of the most pressing issues reservation communities face. (Smith, 2000, page 95) These tend to create a downward spiral in the quality of life of individuals living on any reservation because people do not see opportunities for improvement. The result is often substance abuse and domestic unrest. Those who seek highly specialized jobs tend to leave the reservation where they can find this work; a brain drain takes away the most talented of the population. With the creation of the solar power industry and the subsequent economic development, jobs and income will be created. Following this development there is an expected reduction in social ills. The brain drain effect will decrease because there will be more opportunities for people to use their talents on the reservation. The experience of earning a steady income will give hope for improvement. With this increase of activity there will be an expected reduction in substance abuse. Individuals will begin to see opportunity to enrich their lives rather than feel hopeless. This is another example of where refueling can lead to a better future.

The employment opportunities within the solar power businesses themselves expect to be seen immediately and continue to exist into the future. Dine College, the tribal college, is a perfect location at which to hold training classes. There, people will learn about how the solar panels work, and their installation, maintenance, and repair. In addition to the development of technical skills, general education requirements of typical Associate degrees will lead to secondary social development as described below.

With this highly specialized niche of the economy filled by Navajo people, business is developed and skills refined and thus there will be an opportunity for an export of products and services from the solar power businesses to areas outside of the reservation. There is an expected increase in the use of this renewable power as the United States and other nations move away from their dependency on fossil fuels. The Navajo Nation will be ahead of the game and have a more comprehensive understanding of the systems and their uses. This is a perfect opportunity for the Nation to get ahead and begin to export the skills and service to markets outside of the reservation.

When solar power begins to be used on the reservation the tribe will begin to experience a new secondary need for goods and services. This is where an opportunity for diversified businesses comes into play. It is essential that the tribe anticipate these secondary needs to avoid the leaking of dollars to businesses off the reservation; to keep the power of the dollar strong. When homes are electrified there will be a need for a myriad of goods that were not needed before electricity came to the homes. New jobs will appear at the stores that service these needs. More employment opportunities in maintenance and repair will manifest themselves as activity increases. Some of these items could begin to be produced locally, creating even more job opportunities.

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<sup>1</sup> However, it is recommended that the Nation waive the Navajo Business Activity Tax. See below.

In February, 2001, the Arizona Corporation Commission (ACC) adopted the Environmental Portfolio Standard (EPS) which requires all regulated utility companies that sell retail electricity in Arizona to generate a percentage of their electricity from renewable resources. The EPS requires regulated utilities to generate a minimum of 0.2 percent of their total retail energy sales from renewable sources in 2001. The percentage will increase to 1.1% in 2007.

As a result, Arizona Public Service (APS) has adopted an EPS Credit Program. Customers in APS service territory that live in remote areas without access to electricity from APS' distribution system (the grid) and who purchase and have installed complete solar systems to provide their electricity are also eligible for the EPS Credit Purchase Program. Customers purchasing a new solar electric system of 5 kW or less for their remote (off-grid) homes can receive an EPS Energy Purchase rebate of \$2.00 per photovoltaic watt of DC electricity. Remote Solar customers must sign an EPS credit Purchase Agreement assigning APS access to the EPS credits for 12 years.<sup>2</sup> Again, as an example, a 1,000-watt solar system qualifies the customer to receive \$2,000 from APS.

The Navajo Nation should seize the opportunity to work to get ahead. Electrifying the Nation by solar power would be a starting point. As the electrification process continues within the reservation borders, a generation of specialized technicians will be developed. Then, as the rest of the state and other locations move towards renewable power, a high demand for this type of labor will occur. At this point, a need for the now specialized, skilled and experienced Navajo work force will be in demand. A specialized work force such as this can demand a high wage. The specialization in solar power is potentially a large development vector for the Navajo people.

Locally, as the number of homes powered by solar power increases, so will the need for the inputs that makeup these machines. These are the ingredients needed to make the solar systems work; the wires, circuits, and batteries. The Nation could choose to make this an opportunity that works for them. The demand for these goods from hardware stores could go to businesses off the reservation to be imported by residents. Or stores on the reservation could replace the imports with goods that are sold from hardware stores within the borders of the nation. As more dollars stay on the reservation, its residents make more money and the people there benefit more.

In April 2000, President Clinton visited the Navajo Nation and expressed a somewhat naïve understanding of the true circumstances on the reservation, while suggested the potential to have computer and Internet access in houses he stated, "I am here because I believe that new technologies like the Internet and wireless communications can have an enormous positive impact on the Navajo nation," (Lilleston et al., 2000) Although it may be a little far fetched to imagine a near future where every home has this access, an electrification program will certainly stimulate the demand for a variety of goods and services associated with computer and wireless technologies. These include hardware, education and culturally appropriate software programs.

The expenditure of up to \$500 million over the next decade or more in an effort to provide electricity to the Navajo population will act as a stimulus for a wide variety of secondary economic development and economic development leads to other aspects of social development.

### **SOCIAL AND CULTURAL DEVELOPMENT**

Electricity is a convenience that most take for granted. Imagine an elementary aged child trying to complete homework with lighting from a kerosene lamp. This is after the child woke up at 5:00 a.m. to catch a bus and begin a 60-mile ride to school, with 60 percent of that distance on an unimproved road. After a full day of school and a long drive home, the young child is then responsible for various household chores, and then she sits down to try her homework. Already, this child is placed at a disadvantage in a very competitive western society.

Wilkinson (1999, pages 58-9) provides the following discussion between President Peterson Zah and a second individual concerning the Navajo creation story and recent evidence showing migration patterns. The individual asked how the creation story could be true.

Pete paused, to show respect, I think, rather than to reflect. Then he replied: "Both versions are true."

"How can that be?" the non-Indian asked.

"It depends," Pete said, "on where you are, in what context you are in."

An electrification program holds powerful social development possibilities for the Navajo population. Wilkinson continues to explain the importance of oral traditions and how those traditions are passed down from generation to generation. The child described above will have increased opportunity to not only do homework in a

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<sup>2</sup> This will be limited to the Arizona portion of the Navajo Nation.

more suitable atmosphere, but will also have the opportunity to spend more important and meaningful time with her elders and parents.

Electrification allows for major timesaving activities from cooking and cleaning to heating. The benefits of electricity include the opportunity to improve formal and informal education. If the student needs help with her homework, then perhaps she will be able to access information on her computer and then spend time with her grandmother and learn various traditions and stories. As Wilkinson (1999, page 70) describes “How can you have education without Coyote? Education without grandfather?” Or grandmother? Allowing for timesaving household activities and an improved educational atmosphere provides an opportunity for developing dignity and respect for traditions and culture. So the children in *thousands* of households will gain the opportunity to improve their education of skills necessary in the modern economy and simultaneously the skills and knowledge necessary to carry forth Navajo culture. In the words of Peterson Zah, the children will be able to not only function in both places and contexts, but also to bridge the contexts.

Improved lighting and heating and timesaving devices will allow for further social and cultural development opportunities. The extensive Hogan based industry of arts and crafts on the Navajo Nation has been discussed by Smith (2000, page 64) and many others. Electrification can lead to increased opportunity for residents to engage in weaving, smithing, and other artistic activities. This will lead to both increased economic activity and additional interest in the cultural activities and significance, and thereby more informal education as discussed above.

Language preservation will also be enhanced. Two aspects of an electrification program come into play here. The sharing of oral traditions most certainly are improved when told in the indigenous language, so the informal education is likely to take place in Navajo. The installation teams and the “sales” staff are far more likely to be successful if they speak Navajo. Since many of the most isolated homes are maintained by people with limited skills in English, the program will be far more successful and respectful if the installation and service staff speak Navajo.

The use of Navajo as the language of choice also points to secondary educational developments. Many potential employees do not currently speak Navajo. At both Dine College and Northern Arizona University, Navajo language programs are in high demand. Since many of the potential employees will need to acquire technical training – based at Dine College – they will also have the opportunity to fulfill their general education requirements. They are likely to take courses in English and mathematics. They will also have the opportunity to take language and culturally based courses as part of the education program.

As the developments prosper, various interesting and unforetold diverse co-developments will occur as new technologies merge with traditional values and knowledge. Jacobs discusses the importance of maintaining prior knowledge and combining that knowledge with new ideas and technologies. This is likely as the younger generation converges new ideas with traditional wisdom.

The social and cultural consequences of the electrification program will hold unknown opportunities for development and expansion. In addition to the economic and cultural aspects of the electrification program, various health aspects also come into play.

### **HEALTH IMPLICATIONS**

Associated with an electrification program is a wide variety of potential health benefits. These are due to the opportunity for refrigeration of food and medicines and improved interior air quality.<sup>3</sup>

Nutritional variation will be greatly improved with refrigeration.<sup>4</sup> Fresh milk, vegetables and fruit can be stored for extended periods. These foods can substitute for the current high levels of dried and canned foods, which tend to be of much lower nutritional value. A better diet will enable families to avoid some of the causal sources of diabetes and other diseases that are prevalent within the Navajo population.

Insulin and other medications can be kept cool in a refrigerator. Many Navajo families have a need to maintain supplies of various medicines, but are unable to do so without refrigeration, so their treatable diseases go untreated.

The opportunity to run electric lights at night avoids use of kerosene lamps in houses, thereby improving the interior air quality of homes. This will reduce the incidence of various respiratory ailments.

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<sup>3</sup> First Solar is currently experimenting with a 50w solar refrigeration system. These units will sell for less than \$2000.

<sup>4</sup> Sandra Begay-Campbell of Sandia National Laboratories highlighted the importance of nutritional variation.

Electrification will also enable wireless communications such as telemedicine.<sup>5</sup> Patients with various illnesses, such as diabetes or hypertension, could take physical readings and transmit the data to a health clinic. The health clinic staff could then analyze the results and respond to the patient as necessary. Such communication would require an electricity source.

## RECOMMENDATIONS AND CONCLUSIONS

The Navajo Nation has the highest level of homes that do not have electricity in the United States. As the Nation moves into the new century and searches for solutions for self-sufficiency and self-determination, the need for electrification looms as an important part of the overall strategies. Providing families independence for basic needs is possible if individual solar and storage units are made available. This will require an overall investment of between \$115 and \$350 million. Using a baseline and reasonable estimate of 18,000 homes, the estimate is around \$235 million. The most important barrier to completing an electrification program is the cost. Yet the benefits, as explained above, are far more significant than simply placing a solar panel on a house in Scottsdale.

The Navajo Nation is in the process of developing a comprehensive energy policy<sup>6</sup> to address many of the needs of the tribe. One component of the recommended policy is targeting of energy-derived revenues for rural electrification. These funds will provide funding to begin a program, but will not meet the entire need. The existing program between NTUA and Sandia National Laboratories to install 200 units is a good start, but is barely 1% of the estimated need. Although the required investment is substantial, it is not as much as, say, annual forest fire suppression costs in the United States. As such, it is recommended that the Navajo Nation explore a variety of funding opportunities.

The development of an electrification program holds potential for improving the lives of many Navajo families. However, it is recommended that winter heating be done with a fuel source other than electricity. Seventy-six percent of homes are heated using either LP gas or wood. These sources should still be used because electrical heating can be unreliable during extended periods of bad weather if the storage batteries run down.

Through the Division of Economic Development, procedures to facilitate small business startup can be developed. It is expected that several small installation, maintenance and repair businesses could be successful.<sup>7</sup>

It is recommended that the Navajo Nation adopt a business activity tax exemption program for the sale and installation of systems akin to the Arizona Sales Tax Exemption.<sup>8</sup>

Copies of this report are being sent to each of the Chapters comprising the Navajo Nation. It is recommended that chapter-level workshops be developed, with bilingual presentations, to explain the social, cultural and economic possibilities of an electrification program. The workshops should also include a discussion of the potential negative aspects of said program.

It is recommended that a survey instrument be developed and administered to gain a clearer understanding of the population's concerns and interest in an electrification program. The interview team should be bilingual.

Although the range of between \$115 million and \$350 million is rather imprecise based on current data, there is no doubt that substantial business opportunity exists on the Navajo Nation related to the installation and maintenance of solar units and the provision of the appropriate appliances over the next decade or so. Conversely, there is a large need for financial resources if the people of the Navajo Nation are going to be able to participate in an electrified 21<sup>st</sup> Century.

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<sup>5</sup> Shirley Ann Becker of NAU indicated the important potentials of telemedicine.

<sup>6</sup> <http://www.navajonationenergypolicy.com/miscFileSr.asp?CustComKey=6751>

<sup>7</sup> See the Business Plan in Appendix 3.

<sup>8</sup> <http://www.azsolarcenter.com/benefits/solarsalestax.html>

## REFERENCES

- Anderson, Joseph, and Dean Howard Smith, "Managing Tribal Assets: Developing Long Term Strategic Plans," in *Science and Native American Communities*, Keith James, editor, University of Nebraska Press, 2001.
- Jacobs, Jane, *Cities and the Wealth of Nations*, Random House, New York, 1984.
- Jacobs, Jane, *The Nature of Economies*, Random House, New York, 2000.
- Lilleston Randy, McCaleb, Ian Christopher and Garrett, Major, "Clinton Highlights Public-Private Partnership To Bridge Technology Gap" April 17, 2000,  
<http://www.cnn.com/2000/ALLPOLITICS/stories/04/17/digital.divide/index.html>
- Smith, Dean Howard; "Native American Economic Development: A Modern Approach," *Review of Regional Studies*, Summer 1994, Volume 24, #1, pages 87-102. (1994a)
- Smith, Dean Howard; "The Issue of Compatibility Between Cultural Integrity, and Economic Development Among Native American Tribes," *American Indian Culture and Research Journal*, Fall 1994, Volume 18:3, pages 177-206. (1994b)
- Smith, Dean Howard, *Modern Tribal Development: Paths to Self-Sufficiency and Cultural Integrity in Indian Country*, Altamira Press: Walnut Creek, Ca., 2000.
- Smith, Dean Howard, with Merle-Katrin Alex, Patrick Kiley, Patrick Magnuson, Fritz Matter, Jasson Ott, Steven Nicoluzakis, Steven Soli and Rebecca Warfield, "Locating Retail Facilities within the Navajo Partioned Lands: A Field Test," College of Business Administration, Northern Arizona University, May, 1994.
- U.S Census, 2000:  
[http://factfinder.census.gov/bf/lang=en\\_vt\\_name=DEC\\_2000\\_SF1\\_U\\_DP1\\_geo\\_id=25000US2430.html](http://factfinder.census.gov/bf/lang=en_vt_name=DEC_2000_SF1_U_DP1_geo_id=25000US2430.html)  
<http://www.de.state.az.us/links/economic/webpage/popweb/280042430.pdf>  
<http://www.de.state.az.us/links/economic/webpage/popweb/04004.pdf>
- Wilkinson, Charles, *Fire on the Plateau: Conflict and Endurance in the American Southwest*, Island Press: Washington, D.C., 1999.
- Yazzie, R., "Convenience Stores: The Third Wave of Navajo Retail Outlets", *Navajo Nation Economic Development Forum*, #1, November December 1989.

## DISCUSSIONS

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## APPENDIX 1

### **Demand Potentials for Solar Energy on the Navajo Nation**

Based on 1990 Census data the Energy Information Administration estimated that 36.8 percent of the 29,375 occupied housing units on the Navajo Nation lacked electricity. The large distances which separate homes make the cost of providing conventional sources of electricity prohibitive. Arizona Public Service estimates the cost of erecting power lines to be roughly \$30,000 per mile, an impossible sum for most families in this region where the unemployment rate hovers around 50 percent. Given the extremely low population densities, it is simply inconceivable that many houses could be connected to the power grid. Thus from 1990, around 10,000 homes lacked electricity service. To estimate the current demand, data from the 2000 Census can be used with a series of assumptions to determine a range of potential current and future demand.

The 2000 Census shows a total of 47,600 occupied homes. This shows an increase of 18,200 homes. An assumption must be made regarding the percentage of these new homes that are electrified. The Navajo Nation has been following a policy of building more housing units in the urban centers such as Tuba City and Chinle. For estimation purposes a range of 50-70% is used for the proportion of new homes being electrified. This provides a range of 5,460 to 9,100 of the new homes requiring electrification.

In addition to the un-electrified homes, the business should also include homes that are going to be built on the reservation in the near future. An economic development conference sponsored by the Navajo Nation in 2000 reported a need for 30,000 new homes on the Navajo Nation. Two assumptions are required with regards to these new homes. According to the Regional Haze Rule, 10% of produced electricity should be produced using renewable sources by 2005 and 20% by 2015 (see [www.wrapair.org](http://www.wrapair.org)). As such it is presumed that new housing construction will take the rule into account. Certainly variations of this assumption are possible, primarily because the assumption does not concern itself with existing electricity production. This assumption shows a range of between 3,000 and 6,000 homes requiring renewable electrification.

The second assumption concerning new construction involves the percentage of replacement housing. For baseline estimations, it is assumed that between 10% and 30% of all new construction replaces existing unelectrified housing. This results in a reduction in the total of between 3,000 and 9,000 homes. NTUA indicates that the smaller number of 10% is more reasonable.

To simplify this initial estimate, compounding of these assumptions is ignored. Using the calculations, a minimum estimate for the need of electrification in the foreseeable future is 10,000 homes and the maximum estimate is 23,000. Paul Denetclaw of NTUA agrees with an estimate of 18,000 homes and the 2000 Census indicates an estimate of 17,234 homes lacking telephone service. Therefore, the potential number of units appears to be toward the higher end of the interval.

## APPENDIX 2

### **Business Potentials for Solar Energy on the Navajo Nation**

The demand estimates can be used to determine the potential business for solar energy installation. Again, initial assumptions are necessary. The following are used for the baseline estimates.

It is assumed that a typical work year for the installation crews is 40 weeks. Due to weather interruptions and the uncertainty of actual demand and financial capabilities during the initial few years of operation, this number seems reasonable. As more customers are financially able to purchase units, the average may increase; however, weather interruptions will continue to be expected.

It is assumed that a typical installation will take roughly 2.5 days for a 2-person crew. Thus, each 2-person crew will be able to install an estimated 80 units per year. A small business operating 10 crews can then be expected to install 800 units per year. In addition to the installation crews, the business will need a business manager and support staff to work with clients and suppliers. Once the installations have been completed, periodic maintenance of the systems is required. The maintenance staff will start off small and will grow over the years as the existing stock of installations increases. As such it is assumed that an operation with 10 installation crews will begin with a total employment of between 25 and 30 employees. The staff will increase as customer service and maintenance requirements expand.

Additional business is possible in the area of retrofitting homes that are not currently wired. Many existing homes were constructed with no intention of electrification, so they need to be wired. Other homes may require modification of existing systems. Excess power could also be used to pump water for family use or stock tanks.

In conjunction with Indigenous Communities Enterprises<sup>9</sup>, there is also potential business for assembly of the hogan kits. ICE is building kits for hogans made of small roundwood and will be selling the units for \$75,000 through the Navajo Housing Authority.

Based on the demand potentials above, the installation portion of the operation of a single enterprise will require 12.5-29 *years* to complete installations. It can certainly be expected that by the end of this time period, replacements and upgrades will be in demand. Additional population growth, and the concurrent growth of the housing stock, will increase future demands and business potentials. Depending on the financial capability to pay for the installation of units, there appears to be the potential for several operations as described above.

Assumptions concerning the financial requirements to achieve electrification of the Navajo Nation are necessary. Using the system presented in the Business Plan model of a 720w system at a cost of around \$10,000 for equipment a total expenditure of between \$100 million and \$230 million will be required to meet the demand estimates for the equipment. Maintenance, replacement and upgrade expenditures will also be required.

Given the extreme poverty present within the targeted population, outside funding will be required to meet these expenditures. While residents may be expected to participate in the payment for installation and maintenance, the required monthly payments are likely to be out of reach for many families. The best case scenario in the Business Plan is monthly payments of roughly \$60/month for 15 years, which do not include maintenance. The Energy Information Agency estimated that in addition to unelectrified homes, 10% of all Indian households spend 20% of their income on electricity. The targeted population may face a similar dilemma if they are required to pay the full cost of the systems.

In addition to the installation and maintenance of the systems, there will be additional financial needs to pay for the new appliances, lights and computers. Based on estimates of between \$1,500 and \$5,000, total expenditures can be expected to be between \$15 million and \$115 million. An estimate of 18,000 homes with an average expenditure of \$3,000 results in \$54 million.

Although the range of between \$115 million and \$350 million is rather imprecise based on current data, there is no doubt that substantial business opportunity exists on the Navajo Nation related to the installation and maintenance of solar units and the provision of the appropriate appliances over the next decade or so. Conversely, there is a large need for financial resources if the people of the Navajo Nation are going to be able to participate in an electrified 21<sup>st</sup> Century.

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<sup>9</sup> <http://www.cba.nau.edu/ice/>

### APPENDIX 3

#### **Business Plan Template**

The following template and financial projections can be used by individuals to begin the process of designing an installation, maintenance and repair business. It is recommended that individuals interested in starting a business contact Sustainable Energy Solutions and the Center for American Indian Economic Development at Northern Arizona University for additional information and assistance.<sup>10</sup>

#### **Disclaimer**

The College of Business Administration, Sustainable Energy Solutions and Northern Arizona University do not warrant or assume any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, or process disclosed in this plan.

This business plan template is meant to provide a guide for prospective entrepreneurs. The financial data presented in this plan are based on general assumptions and the accuracy of said assumptions is in no way promised or guaranteed. It is recommended that professional guidance be sought prior to starting this or any business.

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<sup>10</sup> <http://www.cba.nau.edu/ses> and <http://www.cba.nau.edu/business/caied> respectively.

**NAME OF THE COMPANY**

Company Address

Company Phone Number

**LOGO**

Name of Owner, Title of Owner

Address and Phone number of Owner

Plan Prepared Date

Plan Prepared by:

## **PLAN FOR A SOLAR ENERGY INSTALLATION, MAINTENANCE, AND REPAIR BUSINESS**

### **Statement of Purpose**

The purpose of the business is to provide residents of the Navajo Nation with an alternative source of electrical power. The business will accomplish this by installing, maintaining, and repairing solar photovoltaic power systems. The business owner will need to add his/her vision for the company and the company's mission statement to this section.

### **The Business**

#### **Legal Structure**

The business will be a sole proprietorship run by a resident of the Navajo Nation. The reason for this is to help keep money earned by the Navajo people a part of the reservation's economy. In order to set up a sole proprietorship on the Navajo Nation, the owner must apply to the Navajo Nation Division of Economic Development.

#### **Description of the Business**

The business will install, maintain, and repair solar photovoltaic power systems. The business will concentrate on providing solar energy to the un-electrified homes on the Navajo Nation. The business will be located on the reservation and be operated solely by residents of the Navajo Nation.

The solar system components will be ordered in lots from a manufacturer and installed in individual homes on the Navajo Nation by employees of the business. After installation, the business will provide scheduled maintenance and necessary repairs on the systems.

The business will have installation crews that install new solar photovoltaic energy systems and maintenance/repair crews that work on the systems after they are installed. Each crew will consist of one electrician and one journeyman. The business owner should try to avoid being a crewmember because he/she will need to devote his/her time to overseeing the general operations of the business as a whole.

It is estimated that it will take each installation crew approximately two and a half days to complete the installation of one solar energy system. Some systems may take slightly longer to install because the house needs to be retrofitted with electrical wiring. Maintenance and repairs should take less than one day per system. The vast distances present on the Navajo Nation also need to be accounted for when scheduling projects. As the number of installed systems increases, maintenance schedules need to take into account the geographic clustering of the systems.

#### **Service**

The service rendered by the business will be the installation, maintenance, and repair of solar photovoltaic power systems to un-electrified homes on the Navajo Nation. The business will work with the system and its components. The components of these systems include solar modules (to convert energy into electrical current), batteries (to receive and store electrical current), a converter (to convert DC energy captured from the solar modules to AC energy), a charge regulator (to regulate the solar current into the battery) and use loads (anything that runs on electricity, such as lights). In some instances, existing houses may also need to be retrofitted with electrical wiring and outlets.

#### **Residential Off-Grid Systems**

In order to meet the needs of different customers, highly versatile stand alone solar electric power systems were designed for individual houses. The main feature of the systems are that they can be expanded in output capacity to meet the increase in energy requirements of customers. There are two designs offered: System I meets the basic lighting and refrigerator (2.9 cubic feet) loads of a one bedroom dwelling and System II meets the requirement of System I and the additional loads of a personal computer, radio, and television. The two systems are designed to be stand alone power systems without a back-up power source. For ease of installation and to offer reliable and efficient operation, the system designs are standardized for all customers based upon local irradiation, weather data, and a generalized power consumption model (see Appendix 3A).

There is also the possibility that large installations will be done. These installations would be for clusters of housing, where there is more than one single dwelling (or other needs) at a location. The system needs will vary depending upon the size of the housing cluster. There may also be a need for a meter at each housing unit.

## **Location**

The business will be located at a site on the Navajo Nation. This will provide the business with easy access to the installation/maintenance locations. The sole proprietor may choose to begin the business out of his/her home.

If the owner decides to operate the business using a store-front, a business-site lease will have to be obtained from the Navajo Nation's Division of Economic Development.<sup>11</sup> The Division of Economic Development will supply the owner with any and all documents required to complete the business-site lease application. The business-site lease process can be a very protracted one.

## **Management**

In this section, the owner of the business must describe him/herself. He/she must describe his/her skills in relation to this business (how he/she will bring value to the business). He/she must also describe his/her weaknesses, and how he/she plans to improve him/herself in those areas. If he/she is not planning on improving him/herself, he/she must explain how he/she will hire other people to take care of those tasks. The owner should take business courses either through a college or in a seminar in order to get complete training in running a small business. The courses that the owner plans to take should be described in this section. The owner must include a resume in the supporting documents section of the business plan. It is also a good idea for the owner to include personal letters of reference from past associates.

The Center for American Indian Economic Development at NAU holds workshops several times a year that may meet the needs of an entrepreneur who does not have the necessary business skills to run a business. The Center can be contacted for information on these workshops and other technical assistance.<sup>12</sup>

## **Personnel**

This section is used to describe each job required by the business, the estimated number of employees, and the business' hiring procedures. A job description for all personnel is required, as well as the wage and hiring procedures for each position.

The business will employ licensed electricians and journeymen trained in the installation, maintenance, and repair of solar photovoltaic systems. The business will also have a manager, presumed to be the owner, and at least one support staff person. How the employees will be trained, what courses they must take, etc. should be described in this section. This section may also be used to describe any employee benefits that the company will be offering and how the company will handle extremely busy and/or slow times with regard to personnel.

## **Methods of Record Keeping**

Record keeping methods will vary. Part of the business plan will be to train either the business owner or an employee in appropriate business practices. An accounting software program such as Quickbooks can provide the record keeper with a template of commonly used financial documents, such as invoices, receipts, income statements, etc. These templates can be customized to suit the needs of the business.<sup>13</sup>

## **Insurance**

The business will be required to obtain full coverage motor vehicle insurance for its work trucks under its automobile loan provisions. Under Navajo Nation rules, the business owner will not be required to purchase liability bonding and insurance unless the department contracting the business' work requires it.<sup>14</sup>

Additionally, the business owner may choose to purchase employer's liability or workmen's compensation insurance to protect the business owner from liabilities that may arise as a result of employee injury while on the job. He or she may also wish to obtain public liability or general liability insurance to protect himself/herself from liability to third parties who may be injured during the operation of the business. However, neither of these types of insurance is strictly required for conducting business on the Navajo Nation.

## **Legal Aspects**

Since the business will be owned and operated by Navajos on the Navajo Nation, state laws and requirements do not apply to the business. However, the business and its employees must abide by the laws and regulations set forth by

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<sup>11</sup> "Doing Business on Arizona Indian Lands." Center for American Indian Economic Development. CBA, NAU. January 2000.

<sup>12</sup> 928-523-7320

<sup>13</sup> A Quickbooks accounting system is being developed by SES.

<sup>14</sup> Navajo Nation Business Regulatory Division

the Navajo Nation. The business will need to obtain licensing and certification from the Navajo Nation's Business Regulatory agency in order to perform electrical work on tribal lands. There is no fee associated with the license and certification. Additionally, if the business begins to operate outside of the Navajo Nation, it will then have to follow the rules and regulations set forth by Arizona law for electrical contractors.<sup>15</sup>

In order to start a sole proprietorship on the Navajo Nation, an application must be filled out and presented to the Navajo Nation's Division of Economic Development. The Division of Economic Development will explain any and all supplemental laws that the business must follow.

### **Navajo Nation Taxes<sup>16</sup>**

Currently, the Navajo Nation does not levy a franchise tax, an income tax, a personal property tax, or an unemployment tax. However, the Nation does levy business oriented taxes such as the business activity tax. The business activity tax for a general contractor engaged in construction activity, as defined by the Office of the Navajo Tax Commission<sup>17</sup>, is 3% of taxable gross receipts with no deductions. Such taxes are payable to the Navajo Tax Commission for every calendar quarter and are due by the fifteenth day of the second month after the end of the quarter. Currently, returns are due on May 15, August 15, November 15, and February 15 of each calendar year. A sample of the current business activity tax return is provided in Appendix 3C.

## **Marketing**

### **Summary of the Marketing Plan**

#### *Target Market*

The target market that the business will want to focus on during its start-up stage is the un-electrified homes on the Navajo Nation. According to the United States Year 2000 census data, there are a total of 41,041 homes on the Navajo Nation. Historical data has shown that approximately 37% of all homes on the reservation do not have electricity. Therefore, the target market includes the approximately 15,185 homes that are currently un-electrified. Note that this is an estimate projected from the census data and current housing markets.

In addition to the un-electrified homes, the business should also consider targeting homes that are going to be built on the reservation in the near future. It is possible that some homes will be built with access to electricity, and others may be cluster dwellings that may be serviced through larger solar systems. An economic development conference sponsored by the Navajo Nation in 2000 reported a need for 30,000 new homes on the Navajo Nation. It is estimated that approximately 10 percent, or 3,000, of the newly built homes will be outside of the APS distribution area (often referred to as off-grid). The business should have a plan to market their services to the companies that are planning to build these new homes. This creates a demand potential of about 18,185 homes that should be a part of the target market. Note that while all of these homes may not use solar, (some may be close enough for conventional electrical lines to be run, or for other renewable energy sources to be utilized) all of these homes are potential customers. (See Appendix 1 for estimates of demand potentials.)

It must be pointed out that given the income demographics of the Navajo Nation, few families will be able to independently afford to purchase the systems outright. The recommendations in the main body of this report<sup>18</sup> include having the Navajo Nation finding alternative funding for the electrification program. Unless the secondary funding is found, the demand potential shrinks considerably. But if secondary funding is indeed found, then the pro forma statements in the later appendices show a good potential for a profitable business enterprise.

#### *Growth Potential*

Although the business will begin with only installation crews, it will become necessary to expand its operations to include maintenance and repair crews within three months due to the photovoltaic system's quarterly maintenance schedule. Using the demand potential of 18,185 homes, it will take 10 installation crews many years to fulfill the possible need for solar power. This creates a large potential for business growth.

As the business expands, its customer base should also grow. In the future, the business may plan to market its services to all homes on the Navajo Nation, including ones with access to electrical power. It may begin servicing other remote regions of Arizona as well. Additionally, other uses for solar systems may develop such as water pumping for animal tanks, remote signage, and water heating.

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<sup>15</sup> These requirements include that electricians be licensed and bonded. See <http://www.rc.state.az.us> for more information on these requirements.

<sup>16</sup> <http://www.navajotax.org>

<sup>17</sup> <http://www.navajotax.org/BAT%20STATS.htm>

<sup>18</sup> Also in Bain et al., 2002.

### *Current Providers*

The only existing providers of solar photovoltaic power on the Navajo Nation are NTUA and Native American Photovoltaics (NAPV). NTUA has a 200 home solar test program currently in process. Sandia Laboratories is collaborating with NTUA on the program and has plans to assist them in developing a maintenance program for the solar electric systems.

There is also currently a program being run by NAPV in which Native Americans residing on reservations have the opportunity to own a solar generator system after leasing it. The systems installed provide one kilowatt of power and are priced at approximately \$10,000 each. The NAPV is a non-profit organization that began this endeavor with funding from a federal grant. NAPV's program also includes a plan for maintaining the solar generator systems that it installs by training Navajo workers how to perform the required maintenance.

APS is the electrical provider for Arizona, including the Navajo Nation. It provides electric service to homes on the reservation by hooking them up to a grid. The cost of electricity itself is not higher on the reservation than elsewhere in Arizona; however, the price to be hooked up to the grid can become substantial for some homes on the reservation. This is due to the home's distance from the grid and the difficulty of getting the electric lines to remote locations.

### *Methods of Distribution*

This business will be working primarily from customer orders. The business will have to work with the supplier to set up a system where the solar power systems are delivered to the business as quickly as possible after being ordered. Since sufficient time must be allowed for the units to be shipped, the business will have to keep an adequate inventory of solar system components on hand. The installation crews will drive company vehicles to each customer's location in order to install the systems.

This method of distribution will require several things. First, it will require a good working relationship with a supplier of the solar power systems. Second, it will require the service of a reliable shipping company, as well as a good working relationship with the shipper. Finally, it will require well maintained trucks, preferably with four-wheel drive, in order to get the systems to customers located in remote places.

### *Advertising*

During the start-up phase of the business, little capital should be spent on advertising. In fact, the business should only advertise enough to let the owners of un-electrified homes know about the business. This can be done through the use of advertisements that are sent to homes through the mail or displayed in local market places or Chapter Houses. The advertisements should be brief, but include information about the business, what the business does, how to contact the business, and possibly a general price. This will effectively inform the target market of the business's purpose.

In the future, the business may decide to expand its customer base. In order to do this, the business will need to increase advertising. The business should plan to advertise in local newspapers or newsletters and on local radio stations in order to access a larger customer base on the reservation and elsewhere. Partial day workshops for educational purposes may also be a viable advertising medium. Working with local Chapter Houses will be a critical component in educating the Navajo people about the costs and benefits of solar energy systems. Working with NTUA will also provide the business owner with additional information about the potential market.

The business may also advertise in statewide newspapers, on television, and over the radio in order to increase their customer base throughout the state.

### *Pricing*

The business should price installations to include the cost of the system components, labor costs and overhead. It takes approximately two and a half days for a two person crew to install a solar system. Using an assumed labor rate of \$35.00 an hour per crew, labor costs will be around \$700 per system. The cost of the system itself varies depending on the size of the system and the manufacturer. The components for a complete 720 watt system will cost about \$7,200<sup>19</sup> and \$12,400 for a 1,440 watt system. Some houses will also need to be retrofitted with electrical wiring and the business could charge an additional \$1,000 for this service. The financial implications of charging different prices are explored in the financial documents section and shown in Appendix 3D.

The price ultimately paid by customers will decrease if they apply for a utility credit buy down. One of the programs offered by APS is the EPS Credit Purchase Program. Customers in APS service territory that live in remote areas without access to electricity from APS's distribution system (the grid) and who purchase and have

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<sup>19</sup> Based on quote from American Solar Electric for 500 systems per year.

installed complete solar systems to provide their electricity are eligible for the EPS Credit Purchase Program. Customers purchasing a new solar electric system of 5 kW or less for their remote (off-grid) homes can receive an EPS Energy Purchase rebate of \$2.00 per photovoltaic watt of DC electricity. For example, a 1,000-watt solar system qualifies the customer to receive \$2,000 from APS. In order to receive the credit, remote solar customers must sign an EPS Credit Purchase Agreement assigning APS access to the EPS credits for 12 years.

Estimates of customer's monthly loan payments for purchasing either a 720 watt or a 1.44 kW solar power system are presented in Appendix 3B. This includes the APS EPS discount for the system, \$2,880 for 1.44 kW and \$1,440 for 720 watts, and shows possible monthly payments based on different interest rates and different system costs.

### **Training**

Training encompasses many aspects of the overall business. The business owner may need to learn more about entrepreneurship, operating a business, or using business software. The record keeper may need to be trained on the use of an accounting software system or other computer systems.

One member of each crew must be a trained electrician, meaning that he/she must have some formal education and apprenticeship. The journeymen will also have had some formal training. All installation and maintenance/repair workers must be trained on solar photovoltaic energy systems. Due to the nature of the job, the maintenance/repair crews may require more training than the installation crews.<sup>20</sup>

### **Financing**

#### **Start-up Costs**

The start-up costs associated with this business may be significant because a work truck and toolkits must be purchased for each crew. The business will need to have a sufficient inventory of solar system components in order to allow time for more to be ordered and delivered from the manufacturer. Current estimates indicate that the lead time for component delivery may be as much as six to eight weeks. Also, the business should have enough cash on hand to pay for 100 days worth of operating expenses while waiting for customer payments to come in. This is essential because some customers may be slower to pay than others and the business must have enough funds available to continue operating.

#### **Funding**

There are two primary means of financing the business: loans and grants. Loans must be repaid and generally accrue interest, whereas, grants do not have to be repaid. Loans and grants may be pursued through a variety of venues including: the Small Business Administration, the United States Department of Agriculture, the Department of Energy, the Department of Labor, the Bureau of Indian Affairs, and the Navajo Nation. The Center for American Indian Economic Development provides technical assistance on loan and grant applications.

### **Financial Documents<sup>21</sup>**

#### **Recommendation**

For the purposes of this plan, it is recommended that the business owner obtain funding in the amount of approximately \$400,000 to finance the start-up of the business. This will cover the costs of purchasing three electrician toolkits, three work trucks equipped with racks for storing tools and equipment, enough solar units for six weeks worth of work, 100 days worth of wages and operating expenses, and office supplies. This recommendation is slightly inflated to ensure that the business will have enough cash on hand to pay for expenses as they come due while waiting for customer payments to come in.

#### **Income Statement**

The income statement shows the revenues and expenses of the business for the first two years. The "bottom line" of the income statement tells how much total profit the business produced that year. The pro forma income statement (see Appendix 3D) details the most common expenses associated with this type of business. Undoubtedly, the business will incur other expenses that cannot be anticipated and are not included in the income statement provided.

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<sup>20</sup> One suggestion is that a prospective business owner work with an existing installation company for a year.

<sup>21</sup> The numbers presented in the financial documents are estimates and should not be used for decision-making purposes.

### *Sales*

Assuming that there are 40 weeks available for work in a year, given disruptions due to weather, demand, and financial capabilities, each crew should be able to install 80 solar units per year. If the business prices the systems using a percentage markup of cost including labor, revenue would be approximately \$10,000, \$11,000, \$12,000, or \$13,000 on each 720 watt system sold at respective markups of 25%, 30%, 40%, and 50%. The revenue from sales would be \$16,500, \$17,000, \$18,000, and \$19,000 for the same markups for a 1.44 kW system. The income statements in Appendix 3D show the results of the different markups assuming that 75% of the systems installed are 720 watts and 25% are 1,440 watts. This revenue figure is reported as sales on the income statement.

### *Cost of Goods Sold*

The cost of goods sold will depend on the size of the systems installed. For simplicity, it will be assumed that 75% of the ones installed are 720 watt systems costing approximately \$7,200<sup>22</sup> each and 25% are 1.44 kilowatt systems costing \$12,400 each. The cost of goods sold amount includes only the price of the system components to the business. It does not include the cost of labor or transportation associated with the installation, maintenance, and repair of the systems.

### *Operating Expenses*

Operating expenses include any costs necessary for the business to function. This category includes selling, general, and administrative costs. It is assumed that the entrepreneur will begin the business out of his/her home and therefore not incur expenses associated with a separate office or warehousing facility.

It is assumed that a small business such as this, operating with 2-person installation crews consisting of one electrician and one journeyman, will begin with three crews. Electricians and journeymen earn approximately \$20/hour and \$15/hour, respectively. The work crews should receive a raise in year two because they will be experienced. A 5% raise would be the equivalent of approximately \$1.00 per hour. In addition to the work crews, the business will need a business manager, assumed to be the entrepreneur, and support staff to work with clients and suppliers. It is assumed that the business will begin with one part-time support staff person to perform general bookkeeping and secretarial duties, who will be paid a wage of \$9 per hour.

The business owner's salary is equal to the amount of profit after taxes generated by the company in a year. As a sole proprietor, the business owner is entitled to withdraw money out of the business throughout the year as his/her salary. It is important to note that the business owner cannot withdraw more money from the business than the business has available. Also, the business owner should try to keep the business' cash balance at least equal to 100 days worth of operating expenses. It would be appropriate in this scenario for the business owner to withdraw a salary of \$35,000 from the business.

The business is required to pay certain federal taxes and benefits associated with payroll. The company is responsible for paying an amount equal to 6.2% of the employee's first \$84,900 (for 2002) of gross wages for Social Security, an additional 1.45% on all wages for Medicare, and 6.2% of the first \$7,000 of gross wages for federal unemployment.<sup>23</sup> Consequently, the figure that appears on the income statement is an estimate based on the assumptions already made. The business will not be required to pay any state unemployment tax if all employees are residents and members of the Navajo tribe.<sup>24</sup>

If the business owner were to purchase three new work vans (Ford Econoline or similar) they would cost approximately \$81,000 or \$27,000 each. It is currently possible to finance many automobile loans with zero percent interest. Assuming the business owner is able to obtain zero percent financing, with a \$1,000 down payment, the loan for each van will cost about \$750 per month for 36 months.

Transportation costs are based on the average cost of maintenance and repairs to own such a work van on a per mile basis<sup>25</sup>, plus the cost of fuel. The assumption was made that each of the three vans would be driven approximately 25,000 miles per year. It is important to note that these estimates are for normal driving conditions. Many of the roads in the Navajo Nation are not well-maintained causing excessive wear and tear, which may decrease the useful life of the automobile. The business will also incur expenses associated with maintaining insurance on the work vans. Motor vehicle insurance is estimated at \$4,000<sup>26</sup>, assuming full coverage is necessary due to financing requirements.

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<sup>22</sup> Based on quote from American Solar Electric for 500 systems per year.

<sup>23</sup> <http://www.payroll-taxes.com/payrolltaxes/00000448.htm>

<sup>24</sup> State taxes will apply to any non-Navajo employees

<sup>25</sup> <http://applications.edmunds.com/products/tco/TCOintroController?id=lin9167>

<sup>26</sup> Shannon Mills, Flagstaff Insurance, September 6, 2002.

Depreciation expense is based on the assumption that tools and equipment have a useful life of seven years, while the trucks or vans have useful lives of three years and that neither asset has a salvage value. The amount of depreciation expense presented is an estimate based on the straight-line method.

The amount of miscellaneous expenses will vary from year to year depending on the business' operations. For the first year, the business is estimated to incur \$5,000 in office supplies expense to purchase a computer, a printer, a desk, and all of the necessary materials to perform the administrative functions of the business.

#### *Interest Expense*

If the business owner obtains a loan to finance the start-up of the business, he or she will have to pay back the loan plus any associated interest. The amount of interest paid on the loan for one year will appear as interest expense on the income statement. The amount shown on the income statement is an estimate for a 15-year loan in the amount of \$400,000 at 7% interest.

#### *Taxes*

The business owner is responsible for paying the taxes (both federal and Navajo business activity) associated with the business. The amount of federal income tax to be paid will vary depending on the amount of income generated by the business. The business owner will pay the federal income taxes on his/her own personal tax return.

The Navajo Nation business activity tax will be 3% of gross sales. Given the conditions set forth above, the owner will be in the 39% marginal tax bracket according to the current federal tax rates.<sup>27</sup> The federal tax amount shown on the income statement includes the self-employment tax for social security, Medicare, and federal unemployment.<sup>28</sup>

#### **Balance Sheet**

The balance sheet shows the company's assets, liabilities, and owner's equity account balances at the end of the year. The account balances are shown at historical cost for assets and future costs for liabilities (see Appendix 3E).

#### *Assets*

It is recommended that the business have at least enough cash on hand at any given time to pay for 100 days worth of expenses. For the first year of business, this is estimated to be \$75,000 based on the assumption given above. The business should have at least six weeks worth of inventory on hand at any given time as well. This would be the equivalent of 36 complete systems.

The business' fixed asset account consists of the assets that are expected to have useful lives beyond one year. These items are also referred to as capital assets. In the beginning, the business' fixed asset account will consist of its work vans and electricians' toolkits. Included in the value of the work vans are the \$1,000 tool racks they must be equipped with. These assets are valued according to how much they were worth when the business acquired them, minus any accumulated depreciation. The business may also have other assets such as accounts receivable and pre-paid expenses, depending upon the business' financial policies.

#### *Liabilities*

The business' liabilities account consists of amounts that are to be paid in the future for goods or services the business already received. The note payable for the work vans is a long-term liability, while the portion of the loan due within the next year is classified as the current portion of the long-term liability. If the business owner funds the business start-up with loans, the total amount of payments remaining at the end of the year will be classified as liabilities. At the end of the first year of operations, the business would have long-term liabilities in the amount of \$275,000 for the start-up loan and \$51,000 for the automobile loans. It would also have current liabilities for these loans in the amount of \$13,000 for the start-up loan and \$27,000 for the automobile loans. The business may also have additional liabilities such as accounts payable and wages payable depending upon its financial policies.

#### *Owner's Equity*

The owner's equity account is the difference between the asset account and the liability account. It reflects the amount of income earned by the business and the amount of capital invested by the owner. This account also tracks the owner's ongoing deposits and withdrawals with respect to the business (see Appendix 3F). This account may also be referred to as the net worth of the business.

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<sup>27</sup> <http://www.irs.gov>

<sup>28</sup> Taxable income is not the same as operating income from the income statement and may result in a different amount of federal income tax than estimated.

## APPENDIX 3A

### Technical Specifications for Stand Alone Solar Power System

#### *PV-Inverter-Battery Solar System Description*

##### **A.- Solar Array**

There are 6 solar modules wired 3 in series by 2 in parallel for a rated power equal to 0.72 KW DC @ 50.4 VDC (rated voltage).

We have specified BP solar modules, model BP SX-120S. This is a 120 watt multi-crystalline photovoltaic module. For detailed information please visit: <http://www.bpsolar.com/ContentDetails.cfm?age=38>

##### **B.- Charge Controller**

This device controls the charge from the PV into the battery bank. We are using the OutBack MX60 controller which use the MPPT technology (Maximum Power Point Tracking) enabling your PV system to achieve its highest possible performance. For detailed information please visit: <http://www.outbackpower.com/MX60.pdf>

##### **C.- Inverter-Charger**

The FX2024 from OutBack is the newest sine-wave inverter on the market and leads the way in the next generation of inverter technology. We decided to include the 2 KW (AC) units in our design in order to offer you a strong and reliable power system and to provide the customer with the option to expand the system in the future.

The FX2024 inverter it is designed to survive harsh environments. All electronics are located in a sealed enclosure and the unit is designed to be “field repairable” in the event that a failure occurs.

For detailed information please visit: <http://www.outbackpower.com/FX2000.pdf>

##### **D.- Battery Bank**

The battery bank constitutes eight flooded lead-acid batteries, wired 4 in series by 2 in parallel, 24 VDC. The cell brand and model is Trojan T-105, respectively, and the total rated capacity for the battery bank is 500 Ah @ C/100, 12 KW. Spill containment trays are provided for the battery bank.

For detailed information about T-105 battery please visit:

[http://www.trojanbattery.com/golf\\_card\\_2001.pdf](http://www.trojanbattery.com/golf_card_2001.pdf)

##### **E.- System Integration**

The electrical equipment (Inverter and controller) are installed on an OutBack mounting plate. A Power System DC (PSDC) enclosure is located on one side and a Power System AC (PSAC) enclosure on the other side, leaving the central area of the plate available for the installation of up to four FX2024 inverters. The MX60 charge controller will be installed beside the PSDC. A DC Ground Fault Protection System, the PV array breaker and a 175 A DC rated battery breaker will be installed in the PSDC. For detailed information please visit:

<http://www.outbackpower.com/psdc.htm>

<http://www.outbackpower.com/psac.htm>

<http://www.outbackpower.com/pwrpnl.htm>

##### **F.- Mounting Structure**

We have specified RoofTrac from Professional Solar Products in order to roof-mount the PV modules. The structure it is very light and easy to install.

For detailed information please visit: <http://www.rooftrac.com/ROOFTRAC.htm>

##### **G.- Electric Load Estimation**

In order to design the system, several assumptions were made on what the average daily energy consumption will be, based on the initial information provided by the customer:

##### **Navajo Indian Reservation**

Latitude: 35°37'29", 35.62474

Longitude: 111°15'01", -111.25053

Altitude: 4360 feet

Extreme condition: 3days without sunshine.



The lights specified for both systems are made with high intensity white LED's (Light Emitting Diodes). These units have very low power consumption (10 mA per LED) and a significantly longer life expectancy when compared to fluorescent light fixtures. The units operate on 12 VDC, therefore a 24 to 12 VDC converter will be needed to step down the voltage.

For more information please visit:

[http://www.hollysolar.com/dc\\_led\\_lights/dc\\_led\\_lights.html](http://www.hollysolar.com/dc_led_lights/dc_led_lights.html)

**Note:**

It is important to note that the actual daily energy consumption of the loads fed by the system must be near the calculated load in order to obtain desirable system reliability and operation. This means educating the system owner on the operational capabilities of their system.

**APPENDIX 3B**

**Customer Payments under Loan Options**

<b>720 watt System Price</b>	<b>Monthly Cost</b>		
	<b>5 year loan</b>	<b>10 year loan</b>	<b>15 year loan</b>
<b>8% interest</b>			
\$ 8,560	\$ 173.73	\$ 104.04	\$ 82.00
\$ 9,560	\$ 194.03	\$ 116.19	\$ 91.58
\$ 10,560	\$ 214.32	\$ 128.35	\$ 101.16
\$ 11,560	\$ 234.62	\$ 140.50	\$ 110.74
<b>7% interest</b>			
\$ 8,560	\$ 169.50	\$ 99.39	\$ 76.94
\$ 9,560	\$ 189.30	\$ 111.00	\$ 85.93
\$ 10,560	\$ 209.10	\$ 122.61	\$ 94.92
\$ 11,560	\$ 228.90	\$ 134.22	\$ 103.90
<b>6% interest</b>			
\$ 8,560	\$ 165.49	\$ 95.03	\$ 72.23
\$ 9,560	\$ 184.82	\$ 106.14	\$ 80.67
\$ 10,560	\$ 204.15	\$ 117.24	\$ 89.11
\$ 11,560	\$ 223.49	\$ 128.34	\$ 97.55

<b>1,440 watt System Price</b>	<b>Monthly Cost</b>		
	<b>5 year loan</b>	<b>10 year loan</b>	<b>15 year loan</b>
<b>8% interest</b>			
\$ 13,620	\$ 276.43	\$ 165.54	\$ 130.47
\$ 14,120	\$ 286.57	\$ 171.61	\$ 135.26
\$ 15,120	\$ 306.87	\$ 183.77	\$ 144.84
\$ 16,120	\$ 327.16	\$ 195.92	\$ 154.42
<b>7% interest</b>			
\$ 13,620	\$ 269.69	\$ 158.14	\$ 122.42
\$ 14,120	\$ 279.59	\$ 163.95	\$ 126.91
\$ 15,120	\$ 299.39	\$ 175.56	\$ 135.90
\$ 16,120	\$ 319.20	\$ 187.17	\$ 144.89
<b>6% interest</b>			
\$ 13,620	\$ 263.31	\$ 151.21	\$ 114.93
\$ 14,120	\$ 272.98	\$ 156.76	\$ 119.15
\$ 15,120	\$ 292.31	\$ 167.86	\$ 127.59
\$ 16,120	\$ 311.64	\$ 178.97	\$ 136.03

The tables assume that an APS EPS Credit Purchase Agreement has been deducted from the sales price for prior to financing.

APPENDIX 3C

Navajo Nation Business Activity Tax Return

FORM 401



BUSINESS ACTIVITY TAX RETURN

TIN/SSN : # \_\_\_\_\_

Please Check Appropriate Box :

- Separate Return
- Combined Return
- Check box if AMENDED and enter correct Reporting Period (below) being "amended"

Taxpayer Name	Reporting Period (Quarter) <small>[Due 45 days after end of Quarter]</small>	<b>ONTC OFFICE USE ONLY</b>
Mailing Address	Business Activity	
<input type="checkbox"/> Check here if mailing address has changed. RELATED BRANCH INFORMATION: Form 404 must be filed if one of a group of related branches.		
<b>Gross Receipts</b> <span style="float: right;">(Enter Whole Dollars)</span>		
1. Navajo goods .....	<input style="width: 100%;" type="text"/>	<input style="width: 100%; background-color: #cccccc;" type="text"/>
2. Navajo services .....	<input style="width: 100%;" type="text"/>	<input style="width: 100%; background-color: #cccccc;" type="text"/>
3. Total gross receipts (Add Line 1 and Line 2) .....	= <input style="width: 100%;" type="text"/>	= <input style="width: 100%; background-color: #cccccc;" type="text"/>
<b>Deductions</b>		
4. Standard deduction - \$125,000 <input type="checkbox"/> or 10% of Line 3 <input type="checkbox"/> .....	<input style="width: 100%;" type="text"/>	<input style="width: 100%; background-color: #cccccc;" type="text"/>
5. Salaries, wages, & other compensation paid to Navajos, Form 402 ....	<input style="width: 100%;" type="text"/>	<input style="width: 100%; background-color: #cccccc;" type="text"/>
6. Purchase of Navajo goods, Form 403 - Part A .....	<input style="width: 100%;" type="text"/>	<input style="width: 100%; background-color: #cccccc;" type="text"/>
7. Purchase of Navajo services, Form 403 - Part B .....	<input style="width: 100%;" type="text"/>	<input style="width: 100%; background-color: #cccccc;" type="text"/>
8. Payments made to the Navajo Nation government, Form 403 - Part C .-	<input style="width: 100%;" type="text"/>	<input style="width: 100%; background-color: #cccccc;" type="text"/>
9. Total Deductions (Add Lines 4 through 8) .....	= <input style="width: 100%;" type="text"/>	= <input style="width: 100%; background-color: #cccccc;" type="text"/>
10. Navajo source gains (Line 3 less Line 9) .....	= <input style="width: 100%;" type="text"/>	= <input style="width: 100%; background-color: #cccccc;" type="text"/>
11. Business Activity Tax (Line 10 times 5%) .....	= <input style="width: 100%;" type="text"/>	= <input style="width: 100%; background-color: #cccccc;" type="text"/>
12. Tax paid with extension request (Form 145 must have been timely filed) .....	- <input style="width: 100%;" type="text"/>	- <input style="width: 100%; background-color: #cccccc;" type="text"/>
13. Balance of Tax Due (Line 11 less Line 12) .....	= <input style="width: 100%;" type="text"/>	= <input style="width: 100%; background-color: #cccccc;" type="text"/>
14. Interest(s) - if applicable. Calculate interest owed & enter amount (attach calculations) . . . .	+ <input style="width: 100%;" type="text"/>	+ <input style="width: 100%; background-color: #cccccc;" type="text"/>
15. Penalty(s) - if applicable. Calculate penalties owed and enter amount (attach calculations) . . .	+ <input style="width: 100%;" type="text"/>	+ <input style="width: 100%; background-color: #cccccc;" type="text"/>
16. TOTAL TAXES DUE .....	= <input style="width: 100%;" type="text"/>	= <input style="width: 100%; background-color: #cccccc;" type="text"/>
For payments <i>under</i> \$10,000 make check payable to the order of & mail to: Office of the Navajo Tax Commission Post Box 1903 Window Rock, Arizona 86515-1903 Phone: (928) 871-6681 Fax: (928) 871-7608		
Payments <i>over</i> \$10,000 must be wire transferred to the following account: The Navajo Nation Account Number: 4000901560 Wells Fargo Bank - Window Rock Branch Window Rock, Arizona 86515 Bank Routing Number: 091000019		
		<input type="radio"/> Check here if payment is made by wire transfer Amount <input style="width: 100%;" type="text"/> \$
I declare that the information contained in this document and any attachments thereto is true and correct to the best of my knowledge and belief pursuant to all Navajo Nation laws and regulations.		
x _____ Taxpayer or Duly Authorized Agent Signature	_____ ( ) _____ Print or Type Name	_____/_____/_____ Telephone Number
_____ Date		

ONTC

BAT - Form 401

Revised: 2/12/02

Source: Office of the Navajo Tax Commission, [http://www.navajotax.org/BAT\\_401.pdf](http://www.navajotax.org/BAT_401.pdf)

**APPENDIX 3D**

**Pro Forma Income Statement Year 1 (25% markup on cost plus labor)**

<b>Income Statement For the Year Ended XX (Year 1)</b>		
Sales <sup>1</sup>		\$ 2,790,000
Cost of Goods Sold <sup>2</sup>		(2,040,000)
<b>Gross Profit</b>		<b>750,000</b>
Operating Expenses:		
Salaries and wages <sup>3</sup>	\$ (178,000)	
Payroll taxes <sup>4</sup>	(17,000)	
Transportation <sup>5</sup>	(19,000)	
Depreciation <sup>6</sup>	(28,000)	
Insurance <sup>7</sup>	(4,000)	
Office supplies & miscellaneous <sup>8</sup>	(5,000)	(251,000)
<b>Operating Profit (Loss)</b>		<b>499,000</b>
Interest Expense <sup>9</sup>		(28,000)
<b>Net profit (loss) before taxes</b>		<b>471,000</b>
Navajo business activity taxes <sup>10</sup>		(83,700)
Federal income tax (assessed to owner) <sup>11</sup>		(198,000)
<b>Net income (loss) after taxes</b>		<b>\$ 189,300</b>

1 - Installing 240 systems per year; 75% at \$10,000 and 25% at \$16,500
2 - 240 systems; 25% cost \$12,400 and 75% cost \$7,200
3 - 3 crews at \$35/hr; \$9/hr part-time office employee
4 - 6.2% Social Security, 1.45% Medicare, and 6.2% of \$7,000 federal unemployment for each employee salary
5 - Driving 25,000 miles/yr costs \$.45 per mile of maintenance and \$1.50 for gallon of gas
6 - \$4,200 tools and equipment depreciated for 7 years; \$81,000 vans depreciated for 3 years
7 - Full coverage at \$1,300 per van
8 - Computer, desk, and office supplies
9 - \$400,000 loan for 7 years at 15% interest
10 - 3% of sales
11 - Tax on profits at 39% for owner plus payroll taxes for owner (see note 4 above)

**Pro Forma Income Statement Year 1 (30% markup on cost plus labor)**

<b>Income Statement</b>		
<b>For the Year Ended XX (Year 1)</b>		
Sales <sup>1</sup>		\$ 3,000,000
Cost of Goods Sold <sup>2</sup>		(2,040,000)
<b>Gross Profit</b>		<b>960,000</b>
Operating Expenses:		
Salaries and wages <sup>3</sup>	\$ (178,000)	
Payroll taxes <sup>4</sup>	(17,000)	
Transportation <sup>5</sup>	(19,000)	
Depreciation <sup>6</sup>	(28,000)	
Insurance <sup>7</sup>	(4,000)	
Office supplies & miscellaneous <sup>8</sup>	(5,000)	(251,000)
<b>Operating Profit (Loss)</b>		<b>709,000</b>
Interest Expense <sup>9</sup>		(28,000)
<b>Net profit (loss) before taxes</b>		<b>681,000</b>
Navajo business activity taxes <sup>10</sup>		(90,000)
Federal income tax (assessed to owner) <sup>11</sup>		(296,000)
<b>Net income (loss) after taxes</b>		<b>\$ 295,000</b>

1 - Installing 240 systems per year; 75% at \$11,000 and 25% at \$17,000  
2 - 240 systems; 25% cost \$12,400 and 75% cost \$7,200  
3 - 3 crews at \$35/hr; \$9/hr part-time office employee  
4 - 6.2% Social Security, 1.45% Medicare, and 6.2% of \$7,000 federal unemployment for each employee salary  
5 - Driving 25,000 miles/yr costs \$.45 per mile of maintenance and \$1.50 for gallon of gas  
6 - \$4,200 tools and equipment depreciated for 7 years; \$81,000 vans depreciated for 3 years  
7 - Full coverage at \$1,300 per van  
8 - Computer, desk, and office supplies  
9 - \$400,000 loan for 7 years at 15% interest  
10 - 3% of sales  
11 - Tax on profits at 39% for owner plus payroll taxes for owner (see note 4 above)

**Pro Forma Income Statement Year 1 (40% markup on cost plus labor)**

<b>Income Statement</b>		
<b>For the Year Ended XX (Year 1)</b>		
Sales <sup>1</sup>		\$ 3,240,000
Cost of Goods Sold <sup>2</sup>		(2,040,000)
<b>Gross Profit</b>		<b>1,200,000</b>
Operating Expenses:		
Salaries and wages <sup>3</sup>	\$ (178,000)	
Payroll taxes <sup>4</sup>	(17,000)	
Transportation <sup>5</sup>	(19,000)	
Depreciation <sup>6</sup>	(28,000)	
Insurance <sup>7</sup>	(4,000)	
Office supplies & miscellaneous <sup>8</sup>	(5,000)	(251,000)
<b>Operating Profit (Loss)</b>		<b>949,000</b>
Interest Expense <sup>9</sup>		(28,000)
<b>Net profit (loss) before taxes</b>		<b>921,000</b>
Navajo business activity taxes <sup>10</sup>		(97,200)
Federal income tax (assessed to owner) <sup>11</sup>		(408,000)
<b>Net income (loss) after taxes</b>		<b>\$ 415,800</b>

1 - Installing 240 systems per year; 75% at \$12,000 and 25% at \$18,000  
2 - 240 systems; 25% cost \$12,400 and 75% cost \$7,200  
3 - 3 crews at \$35/hr; \$9/hr part-time office employee  
4 - 6.2% Social Security, 1.45% Medicare, and 6.2% of \$7,000 federal unemployment for each employee salary  
5 - Driving 25,000 miles/yr costs \$.45 per mile of maintenance and \$1.50 for gallon of gas  
6 - \$4,200 tools and equipment depreciated for 7 years; \$81,000 vans depreciated for 3 years  
7 - Full coverage at \$1,300 per van  
8 - Computer, desk, and office supplies  
9 - \$400,000 loan for 7 years at 15% interest  
10 - 3% of sales  
11 - Tax on profits at 39% for owner plus payroll taxes for owner (see note 4 above)

**Pro Forma Income Statement Year 1 (50% markup on cost plus labor)**

<b>Income Statement</b>		
<b>For the Year Ended XX (Year 1)</b>		
Sales <sup>1</sup>		\$ 3,480,000
Cost of Goods Sold <sup>2</sup>		(2,040,000)
<b>Gross Profit</b>		<b>1,440,000</b>
Operating Expenses:		
Salaries and wages <sup>3</sup>	\$ (178,000)	
Payroll taxes <sup>4</sup>	(17,000)	
Transportation <sup>5</sup>	(19,000)	
Depreciation <sup>6</sup>	(28,000)	
Insurance <sup>7</sup>	(4,000)	
Office supplies & miscellaneous <sup>8</sup>	(5,000)	(251,000)
<b>Operating Profit (Loss)</b>		<b>1,189,000</b>
Interest Expense <sup>9</sup>		(28,000)
<b>Net profit (loss) before taxes</b>		<b>1,161,000</b>
Navajo business activity taxes <sup>10</sup>		(104,400)
Federal income tax (assessed to owner) <sup>11</sup>		(520,000)
<b>Net income (loss) after taxes</b>		<b>\$ 536,600</b>

1 - Installing 240 systems per year; 75% at \$13,000 and 25% at \$19,000  
2 - 240 systems; 25% cost \$12,400 and 75% cost \$7,200  
3 - 3 crews at \$35/hr; \$9/hr part-time office employee  
4 - 6.2% Social Security, 1.45% Medicare, and 6.2% of \$7,000 federal unemployment for each employee salary  
5 - Driving 25,000 miles/yr costs \$.45 per mile of maintenance and \$1.50 for gallon of gas  
6 - \$4,200 tools and equipment depreciated for 7 years; \$81,000 vans depreciated for 3 years  
7 - Full coverage at \$1,300 per van  
8 - Computer, desk, and office supplies  
9 - \$400,000 loan for 7 years at 15% interest  
10 - 3% of sales  
11 - Tax on profits at 39% for owner plus payroll taxes for owner (see note 4 above)

**Pro Forma Income Statement Year 2 (assuming 25% markup)**

<b>Income Statement</b>		
<b>For the Year Ended XX (Year 2)</b>		
Sales <sup>1</sup>		\$ 2,790,000
Cost of Goods Sold <sup>2</sup>		(2,040,000)
<b>Gross Profit</b>		<b>750,000</b>
Operating Expenses:		
Salaries and wages <sup>3</sup>	\$ (187,000)	
Payroll taxes <sup>4</sup>	(17,400)	
Transportation <sup>5</sup>	(19,000)	
Depreciation <sup>6</sup>	(28,000)	
Insurance <sup>7</sup>	(4,000)	
Office supplies & miscellaneous <sup>8</sup>	(5,000)	(260,400)
<b>Operating Profit (Loss)</b>		<b>489,600</b>
Interest Expense <sup>9</sup>		(27,000)
<b>Net profit (loss) before taxes</b>		<b>462,600</b>
Navajo business activity taxes <sup>10</sup>		(83,700)
Federal income tax (assessed to owner) <sup>11</sup>		(194,000)
<b>Net income (loss) after taxes</b>		<b>\$ 184,900</b>

<sup>1</sup> - Installing 240 systems per year; 75% at \$10,000 and 25% at \$16,500  
<sup>2</sup> - 240 systems; 25% cost \$12,400 and 75% cost \$7,200  
<sup>3</sup> - 5% pay increase from previous year for installation crews  
<sup>4</sup> - 6.2% Social Security, 1.45% Medicare, and 6.2% of \$7,000 federal unemployment for each employee salary  
<sup>5</sup> - Driving 25,000 miles/yr costs \$.45 per mile of maintenance and \$1.50 for gallon of gas  
<sup>6</sup> - \$4,200 tools and equipment depreciated for 7 years; \$81,000 vans depreciated for 3 years  
<sup>7</sup> - Full coverage at \$1,300 per van  
<sup>8</sup> - Computer, desk, and office supplies  
<sup>9</sup> - \$400,000 loan for 7 years at 15% interest  
<sup>10</sup> - 3% of sales  
<sup>11</sup> - Tax on profits at 39% for owner plus payroll taxes for owner (see note 4 above)

**Pro Forma Income Statement Year 2 (assuming 30% markup)**

<b>Income Statement</b>		
<b>For the Year Ended XX (Year 2)</b>		
Sales <sup>1</sup>		\$ 3,000,000
Cost of Goods Sold <sup>2</sup>		(2,040,000)
<b>Gross Profit</b>		<b>960,000</b>
Operating Expenses:		
Salaries and wages <sup>3</sup>	\$ (187,000)	
Payroll taxes <sup>4</sup>	(17,400)	
Transportation <sup>5</sup>	(19,000)	
Depreciation <sup>6</sup>	(28,000)	
Insurance <sup>7</sup>	(4,000)	
Office supplies & miscellaneous <sup>8</sup>	(5,000)	(260,400)
<b>Operating Profit (Loss)</b>		<b>699,600</b>
Interest Expense <sup>9</sup>		(28,000)
<b>Net profit (loss) before taxes</b>		<b>671,600</b>
Navajo business activity taxes <sup>10</sup>		(90,000)
Federal income tax (assessed to owner) <sup>11</sup>		(292,000)
<b>Net income (loss) after taxes</b>		<b>\$ 289,600</b>

1 - Installing 240 systems per year; 75% at \$11,000 and 25% at \$17,000  
2 - 240 systems; 25% cost \$12,400 and 75% cost \$7,200  
3 - 5% pay increase from previous year for installation crews  
4 - 6.2% Social Security, 1.45% Medicare, and 6.2% of \$7,000 federal unemployment for each employee salary  
5 - Driving 25,000 miles/yr costs \$.45 per mile of maintenance and \$1.50 for gallon of gas  
6 - \$4,200 tools and equipment depreciated for 7 years; \$81,000 vans depreciated for 3 years  
7 - Full coverage at \$1,300 per van  
8 - Computer, desk, and office supplies  
9 - \$400,000 loan for 7 years at 15% interest  
10 - 3% of sales  
11 - Tax on profits at 39% for owner plus payroll taxes for owner (see note 4 above)

**Pro Forma Income Statement Year 2 (assuming 40% markup)**

<b>Income Statement</b>		
<b>For the Year Ended XX (Year 2)</b>		
Sales <sup>1</sup>		\$ 3,240,000
Cost of Goods Sold <sup>2</sup>		(2,040,000)
<b>Gross Profit</b>		<b>1,200,000</b>
Operating Expenses:		
Salaries and wages <sup>3</sup>	\$ (187,000)	
Payroll taxes <sup>4</sup>	(17,400)	
Transportation <sup>5</sup>	(19,000)	
Depreciation <sup>6</sup>	(28,000)	
Insurance <sup>7</sup>	(4,000)	
Office supplies & miscellaneous <sup>8</sup>	(5,000)	(260,400)
<b>Operating Profit (Loss)</b>		<b>939,600</b>
Interest Expense <sup>9</sup>		(28,000)
<b>Net profit (loss) before taxes</b>		<b>911,600</b>
Navajo business activity taxes <sup>10</sup>		(97,200)
Federal income tax (assessed to owner) <sup>11</sup>		(404,000)
<b>Net income (loss) after taxes</b>		<b>\$ 410,400</b>

<sup>1</sup> - Installing 240 systems per year; 75% at \$12,000 and 25% at \$18,000  
<sup>2</sup> - 240 systems; 25% cost \$12,400 and 75% cost \$7,200  
<sup>3</sup> - 3 crews at \$35/hr; \$9/hr part-time office employee  
<sup>4</sup> - 6.2% Social Security, 1.45% Medicare, and 6.2% of \$7,000 federal unemployment for each employee salary  
<sup>5</sup> - Driving 25,000 miles/yr costs \$.45 per mile of maintenance and \$1.50 for gallon of gas  
<sup>6</sup> - \$4,200 tools and equipment depreciated for 7 years; \$81,000 vans depreciated for 3 years  
<sup>7</sup> - Full coverage at \$1,300 per van  
<sup>8</sup> - Computer, desk, and office supplies  
<sup>9</sup> - \$400,000 loan for 7 years at 15% interest  
<sup>10</sup> - 3% of sales  
<sup>11</sup> - Tax on profits at 39% for owner plus payroll taxes for owner (see note 4 above)

**Pro Forma Income Statement Year 2 (assuming 50% markup)**

<b>Income Statement</b>		
<b>For the Year Ended XX (Year 2)</b>		
Sales <sup>1</sup>		\$ 3,480,000
Cost of Goods Sold <sup>2</sup>		(2,040,000)
<b>Gross Profit</b>		<b>1,440,000</b>
Operating Expenses:		
Salaries and wages <sup>3</sup>	\$ (187,000)	
Payroll taxes <sup>4</sup>	(17,400)	
Transportation <sup>5</sup>	(19,000)	
Depreciation <sup>6</sup>	(28,000)	
Insurance <sup>7</sup>	(4,000)	
Office supplies & miscellaneous <sup>8</sup>	(5,000)	(260,400)
<b>Operating Profit (Loss)</b>		<b>1,179,600</b>
Interest Expense <sup>9</sup>		(28,000)
<b>Net profit (loss) before taxes</b>		<b>1,151,600</b>
Navajo business activity taxes <sup>10</sup>		(104,400)
Federal income tax (assessed to owner) <sup>11</sup>		(516,000)
<b>Net income (loss) after taxes</b>		<b>\$ 531,200</b>

<sup>1</sup> - Installing 240 systems per year; 75% at \$13,000 and 25% at \$19,000  
<sup>2</sup> - 240 systems; 25% cost \$12,400 and 75% cost \$7,200  
<sup>3</sup> - 3 crews at \$35/hr; \$9/hr part-time office employee  
<sup>4</sup> - 6.2% Social Security, 1.45% Medicare, and 6.2% of \$7,000 federal unemployment for each employee salary  
<sup>5</sup> - Driving 25,000 miles/yr costs \$.45 per mile of maintenance and \$1.50 for gallon of gas  
<sup>6</sup> - \$4,200 tools and equipment depreciated for 7 years; \$81,000 vans depreciated for 3 years  
<sup>7</sup> - Full coverage at \$1,300 per van  
<sup>8</sup> - Computer, desk, and office supplies  
<sup>9</sup> - \$400,000 loan for 7 years at 15% interest  
<sup>10</sup> - 3% of sales  
<sup>11</sup> - Tax on profits at 39% for owner plus payroll taxes for owner (see note 4 above)

APPENDIX 3E

Pro Forma Balance Sheet Year 1 (assuming 25% markup)

<b>Balance Sheet</b>		
<b>As of the End of Year 1</b>		
<b>Assets</b>		
<b>Current Assets</b>		
Cash and short-term investments <sup>1</sup>	\$ 252,100	
Inventory <sup>2</sup>	<u>306,000</u>	
<b>Total Current Assets</b>		\$ 558,100
Fixed Assets <sup>3</sup>		85,200
Less: Accumulated depreciation <sup>4</sup>		<u>(28,000)</u>
<b>Total Assets</b>		<b><u>\$ 615,300</u></b>
<b>Liabilities and Owners Equity</b>		
<b>Current liabilities</b>		
Current portion of long-term liabilities <sup>5</sup>	<u>\$ 44,000</u>	
<b>Total Current Liabilities</b>		\$ 44,000
Notes payable <sup>6</sup>		<u>417,000</u>
<b>Total Liabilities</b>		<b>461,000</b>
<b>Owner's Equity <sup>7</sup></b>		<b>154,300</b>
<b>Total Liabilities and Owner's Equity</b>		<b><u>\$ 615,300</u></b>
<p><sup>1</sup> - Balance of net income not withdrawn by owner or spent on expenses or investments</p> <p><sup>2</sup> - 36 systems; 25% cost \$12,400 and 75% cost \$7,200</p> <p><sup>3</sup> - 3 vans at \$81,000; tools and equipment at \$4,200</p> <p><sup>4</sup> - Vans - \$81,000/3 yrs; tools and equipment - \$4,200/7 yrs</p> <p><sup>5</sup> - Next year's payments for vans - \$27,000 and start-up loan - \$17,000</p> <p><sup>6</sup> - Remainder due for vans - \$51,000 and start-up loan - \$366,000</p> <p><sup>7</sup> - Net income for year minus owner's withdraws for year (see Statement of Owner's Equity)</p>		

**Pro Forma Balance Sheet Year 1 (assuming 30% markup)**

<b>Balance Sheet</b>		
<b>As of the End of Year 1</b>		
<b>Assets</b>		
<b>Current Assets</b>		
Cash and short-term investments <sup>1</sup>	\$ 357,800	
Inventory <sup>2</sup>	<u>306,000</u>	
<b>Total Current Assets</b>		\$ 663,800
Fixed Assets <sup>3</sup>		85,200
Less: Accumulated depreciation <sup>4</sup>		<u>(28,000)</u>
<b>Total Assets</b>		<b><u>\$ 721,000</u></b>
<b>Liabilities and Owners Equity</b>		
<b>Current liabilities</b>		
Current portion of long-term liabilities <sup>5</sup>	<u>\$ 44,000</u>	
<b>Total Current Liabilities</b>		\$ 44,000
Notes payable <sup>6</sup>		<u>417,000</u>
<b>Total Liabilities</b>		<b>461,000</b>
<b>Owner's Equity <sup>7</sup></b>		<b>260,000</b>
<b>Total Liabilities and Owner's Equity</b>		<b><u>\$ 721,000</u></b>
<sup>1</sup> - Balance of net income not withdrawn by owner or spent on expenses or investments <sup>2</sup> - 36 systems; 25% cost \$12,400 and 75% cost \$7,200 <sup>3</sup> - 3 vans at \$81,000; tools and equipment at \$4,200 <sup>4</sup> - Vans - \$81,000/3 yrs; tools and equipment - \$4,200/7 yrs <sup>5</sup> - Next year's payments for vans - \$27,000 and start-up loan - \$17,000 <sup>6</sup> - Remainder due for vans - \$51,000 and start-up loan - \$366,000 <sup>7</sup> - Net income for year minus owner's withdraws for year (see Statement of Owner's Equity)		

**Pro Forma Balance Sheet Year 1 (assuming 40% markup)**

<b>Balance Sheet</b>		
<b>As of the End of Year 1</b>		
<b>Assets</b>		
<b>Current Assets</b>		
Cash and short-term investments <sup>1</sup>	\$ 478,600	
Inventory <sup>2</sup>	<u>306,000</u>	
<b>Total Current Assets</b>		\$ 784,600
Fixed Assets <sup>3</sup>		85,200
Less: Accumulated depreciation <sup>4</sup>		<u>(28,000)</u>
<b>Total Assets</b>		<b><u>\$ 841,800</u></b>
<b>Liabilities and Owners Equity</b>		
<b>Current liabilities</b>		
Current portion of long-term liabilities <sup>5</sup>	<u>\$ 44,000</u>	
<b>Total Current Liabilities</b>		\$ 44,000
Notes payable <sup>6</sup>		<u>417,000</u>
<b>Total Liabilities</b>		<b>461,000</b>
<b>Owner's Equity <sup>7</sup></b>		<b>380,800</b>
<b>Total Liabilities and Owner's Equity</b>		<b><u>\$ 841,800</u></b>
<sup>1</sup> - Balance of net income not withdrawn by owner or spent on expenses or investments <sup>2</sup> - 36 systems; 25% cost \$12,400 and 75% cost \$7,200 <sup>3</sup> - 3 vans at \$81,000; tools and equipment at \$4,200 <sup>4</sup> - Vans - \$81,000/3 yrs; tools and equipment - \$4,200/7 yrs <sup>5</sup> - Next year's payments for vans - \$27,000 and start-up loan - \$17,000 <sup>6</sup> - Remainder due for vans - \$51,000 and start-up loan - \$366,000 <sup>7</sup> - Net income for year minus owner's withdraws for year (see Statement of Owner's Equity)		

**Pro Forma Balance Sheet Year 1 (assuming 50% markup)**

<b>Balance Sheet</b>		
<b>As of the End of Year 1</b>		
<b>Assets</b>		
<b>Current Assets</b>		
Cash and short-term investments <sup>1</sup>	\$ 599,400	
Inventory <sup>2</sup>	<u>306,000</u>	
<b>Total Current Assets</b>		\$ 905,400
Fixed Assets <sup>3</sup>		85,200
Less: Accumulated depreciation <sup>4</sup>		<u>(28,000)</u>
<b>Total Assets</b>		<b><u>\$ 962,600</u></b>
<b>Liabilities and Owners Equity</b>		
<b>Current liabilities</b>		
Current portion of long-term liabilities <sup>5</sup>	<u>\$ 44,000</u>	
<b>Total Current Liabilities</b>		\$ 44,000
Notes payable <sup>6</sup>		<u>417,000</u>
<b>Total Liabilities</b>		<b>461,000</b>
<b>Owner's Equity <sup>7</sup></b>		<b>501,600</b>
<b>Total Liabilities and Owner's Equity</b>		<b><u>\$ 962,600</u></b>
<sup>1</sup> - Balance of net income not withdrawn by owner or spent on expenses or investments <sup>2</sup> - 36 systems; 25% cost \$12,400 and 75% cost \$7,200 <sup>3</sup> - 3 vans at \$81,000; tools and equipment at \$4,200 <sup>4</sup> - Vans - \$81,000/3 yrs; tools and equipment - \$4,200/7 yrs <sup>5</sup> - Next year's payments for vans - \$27,000 and start-up loan - \$17,000 <sup>6</sup> - Remainder due for vans - \$51,000 and start-up loan - \$366,000 <sup>7</sup> - Net income for year minus owner's withdraws for year (see Statement of Owner's Equity)		

**Pro Forma Balance Sheet Year 2 (assuming 25% markup)**

<b>Balance Sheet</b>		
<b>As of the End of Year 2</b>		
<b>Assets</b>		
<b>Current Assets</b>		
Cash and short-term investments <sup>1</sup>	\$ 386,000	
Inventory <sup>2</sup>	<u>306,000</u>	
<b>Total Current Assets</b>		<b>\$ 692,000</b>
Fixed Assets <sup>3</sup>		85,200
Less: Accumulated depreciation <sup>4</sup>		<u>(56,000)</u>
<b>Total Assets</b>		<b><u>\$ 721,200</u></b>
<b>Liabilities and Owners Equity</b>		
<b>Current liabilities</b>		
Current portion of long-term liabilities <sup>5</sup>	<u>\$ 45,000</u>	
<b>Total Current Liabilities</b>		<b>\$ 45,000</b>
Notes payable <sup>6</sup>		<u>372,000</u>
<b>Total Liabilities</b>		<b>417,000</b>
<b>Owner's Equity <sup>7</sup></b>		<b>304,200</b>
<b>Total Liabilities and Owner's Equity</b>		<b><u>\$ 721,200</u></b>
<p><sup>1</sup> - Balance of net income not withdrawn by owner or spent on expenses or investments</p> <p><sup>2</sup> - 36 systems; 25% cost \$12,400 and 75% cost \$7,200</p> <p><sup>3</sup> - 3 vans at \$81,000; tools and equipment at \$4,200</p> <p><sup>4</sup> - Vans - \$81,000/3 yrs; tools and equipment - \$4,200/7 yrs plus amount from previous year</p> <p><sup>5</sup> - Next year's payments for vans - \$27,000 and start-up loan - \$18,000</p> <p><sup>6</sup> - Remainder due for vans - \$24,000 and start-up loan - \$348,000</p> <p><sup>7</sup> - Owner's equity from previous year minus owner's withdraws for year (see Statement of Owner's Equity)</p>		

**Pro Forma Balance Sheet Year 2 (assuming 30% markup)**

<b>Balance Sheet</b>		
<b>As of the End of Year 2</b>		
<b>Assets</b>		
<b>Current Assets</b>		
Cash and short-term investments <sup>1</sup>	\$ 596,400	
Inventory <sup>2</sup>	<u>306,000</u>	
<b>Total Current Assets</b>		<b>\$ 902,400</b>
Fixed Assets <sup>3</sup>		85,200
Less: Accumulated depreciation <sup>4</sup>		<u>(56,000)</u>
<b>Total Assets</b>		<b><u>\$ 931,600</u></b>
<b>Liabilities and Owners Equity</b>		
<b>Current liabilities</b>		
Current portion of long-term liabilities <sup>5</sup>	<u>\$ 45,000</u>	
<b>Total Current Liabilities</b>		<b>\$ 45,000</b>
Notes payable <sup>6</sup>		<u>372,000</u>
<b>Total Liabilities</b>		<b>417,000</b>
<b>Owner's Equity <sup>7</sup></b>		<b>514,600</b>
<b>Total Liabilities and Owner's Equity</b>		<b><u>\$ 931,600</u></b>
<sup>1</sup> - Balance of net income not withdrawn by owner or spent on expenses or investments <sup>2</sup> - 36 systems; 25% cost \$12,400 and 75% cost \$7,200 <sup>3</sup> - 3 vans at \$81,000; tools and equipment at \$4,200 <sup>4</sup> - Vans - \$81,000/3 yrs; tools and equipment - \$4,200/7 yrs plus amount from previous year <sup>5</sup> - Next year's payments for vans - \$27,000 and start-up loan - \$18,000 <sup>6</sup> - Remainder due for vans - \$24,000 and start-up loan - \$348,000 <sup>7</sup> - Owner's equity from previous year minus owner's withdraws for year (see Statement of Owner's Equity)		

**Pro Forma Balance Sheet Year 2 (assuming 40% markup)**

<b>Balance Sheet</b>		
<b>As of the End of Year 2</b>		
<b>Assets</b>		
<b>Current Assets</b>		
Cash and short-term investments <sup>1</sup>	\$ 838,000	
Inventory <sup>2</sup>	306,000	
<b>Total Current Assets</b>		<b>\$ 1,144,000</b>
Fixed Assets <sup>3</sup>		85,200
Less: Accumulated depreciation <sup>4</sup>		(56,000)
<b>Total Assets</b>		<b>\$ 1,173,200</b>
<b>Liabilities and Owners Equity</b>		
<b>Current liabilities</b>		
Current portion of long-term liabilities <sup>5</sup>	\$ 45,000	
<b>Total Current Liabilities</b>		<b>\$ 45,000</b>
Notes payable <sup>6</sup>		372,000
<b>Total Liabilities</b>		<b>417,000</b>
<b>Owner's Equity <sup>7</sup></b>		<b>756,200</b>
<b>Total Liabilities and Owner's Equity</b>		<b>\$ 1,173,200</b>
<sup>1</sup> - Balance of net income not withdrawn by owner or spent on expenses or investments <sup>2</sup> - 36 systems; 25% cost \$12,400 and 75% cost \$7,200 <sup>3</sup> - 3 vans at \$81,000; tools and equipment at \$4,200 <sup>4</sup> - Vans - \$81,000/3 yrs; tools and equipment - \$4,200/7 yrs plus amount from previous year <sup>5</sup> - Next year's payments for vans - \$27,000 and start-up loan - \$18,000 <sup>6</sup> - Remainder due for vans - \$24,000 and start-up loan - \$348,000 <sup>7</sup> - Owner's equity from previous year minus owner's withdraws for year (see Statement of Owner's Equity)		

**Pro Forma Balance Sheet Year 2 (assuming 50% markup)**

<b>Balance Sheet</b>		
<b>As of the End of Year 2</b>		
<b>Assets</b>		
<b>Current Assets</b>		
Cash and short-term investments <sup>1</sup>	\$ 1,079,600	
Inventory <sup>2</sup>	<u>306,000</u>	
<b>Total Current Assets</b>		\$ 1,385,600
Fixed Assets <sup>3</sup>		85,200
Less: Accumulated depreciation <sup>4</sup>		<u>(56,000)</u>
<b>Total Assets</b>		<b><u>\$ 1,414,800</u></b>
<b>Liabilities and Owners Equity</b>		
<b>Current liabilities</b>		
Current portion of long-term liabilities <sup>5</sup>	<u>\$ 45,000</u>	
<b>Total Current Liabilities</b>		\$ 45,000
Notes payable <sup>6</sup>		<u>372,000</u>
<b>Total Liabilities</b>		<b>417,000</b>
<b>Owner's Equity <sup>7</sup></b>		<b>997,800</b>
<b>Total Liabilities and Owner's Equity</b>		<b><u>\$ 1,414,800</u></b>
<sup>1</sup> - Balance of net income not withdrawn by owner or spent on expenses or investments <sup>2</sup> - 36 systems; 25% cost \$12,400 and 75% cost \$7,200 <sup>3</sup> - 3 vans at \$81,000; tools and equipment at \$4,200 <sup>4</sup> - Vans - \$81,000/3 yrs; tools and equipment - \$4,200/7 yrs plus amount from previous year <sup>5</sup> - Next year's payments for vans - \$27,000 and start-up loan - \$18,000 <sup>6</sup> - Remainder due for vans - \$24,000 and start-up loan - \$348,000 <sup>7</sup> - Owner's equity from previous year minus owner's withdraws for year (see Statement of Owner's Equity)		

APPENDIX 3F

Statement of Owner's Equity Year 1 (assuming 25% markup)

<b>Statement of Owner's Equity</b>	
<b>As of the End of Year 1</b>	
Beginning Owner's Equity	\$ -
Add: Net income	189,300
Subtract: Owner's withdraws	(35,000)
<b>Ending Owner's Equity</b>	<b>\$ 154,300</b>

Statement of Owner's Equity Year 2 (assuming 25% markup)

<b>Statement of Owner's Equity</b>	
<b>As of the End of Year 2</b>	
Beginning Owner's Equity	\$ 154,300
Add: Net income	184,900
Subtract: Owner's withdraws	(35,000)
<b>Ending Owner's Equity</b>	<b>\$ 304,200</b>

Statement of Owner's Equity Year 1 (assuming 30% markup)

<b>Statement of Owner's Equity</b>	
<b>As of the End of Year 1</b>	
Beginning Owner's Equity	\$ -
Add: Net income	295,000
Subtract: Owner's withdraws	(35,000)
<b>Ending Owner's Equity</b>	<b>\$ 260,000</b>

Statement of Owner's Equity Year 2 (assuming 30% markup)

<b>Statement of Owner's Equity</b>	
<b>As of the End of Year 2</b>	
Beginning Owner's Equity	\$ 260,000
Add: Net income	289,600
Subtract: Owner's withdraws	(35,000)
<b>Ending Owner's Equity</b>	<b>\$ 514,600</b>

**Statement of Owner's Equity Year 1 (assuming 40% markup)**

<b>Statement of Owner's Equity</b>	
<b>As of the End of Year 1</b>	
Beginning Owner's Equity	\$ -
Add: Net income	415,800
Subtract: Owner's withdraws	(35,000)
<b>Ending Owner's Equity</b>	<b>\$ 380,800</b>

**Statement of Owner's Equity Year 2 (assuming 40% markup)**

<b>Statement of Owner's Equity</b>	
<b>As of the End of Year 2</b>	
Beginning Owner's Equity	\$ 380,800
Add: Net income	410,400
Subtract: Owner's withdraws	(35,000)
<b>Ending Owner's Equity</b>	<b>\$ 756,200</b>

**Statement of Owner's Equity Year 1 (assuming 50% markup)**

<b>Statement of Owner's Equity</b>	
<b>As of the End of Year 1</b>	
Beginning Owner's Equity	\$ -
Add: Net income	536,600
Subtract: Owner's withdraws	(35,000)
<b>Ending Owner's Equity</b>	<b>\$ 501,600</b>

**Statement of Owner's Equity Year 2 (assuming 50% markup)**

<b>Statement of Owner's Equity</b>	
<b>As of the End of Year 2</b>	
Beginning Owner's Equity	\$ 501,600
Add: Net income	531,200
Subtract: Owner's withdraws	(35,000)
<b>Ending Owner's Equity</b>	<b>\$ 997,800</b>

**APPENDIX 4**

**2000 Census Data on Navajo Housing**

**Table DP-4. Profile of Selected Housing Characteristics: 2000**

Geographic area: Navajo Nation Reservation and Off-Reservation Trust Land, AZ--NM--UT (AZ part)

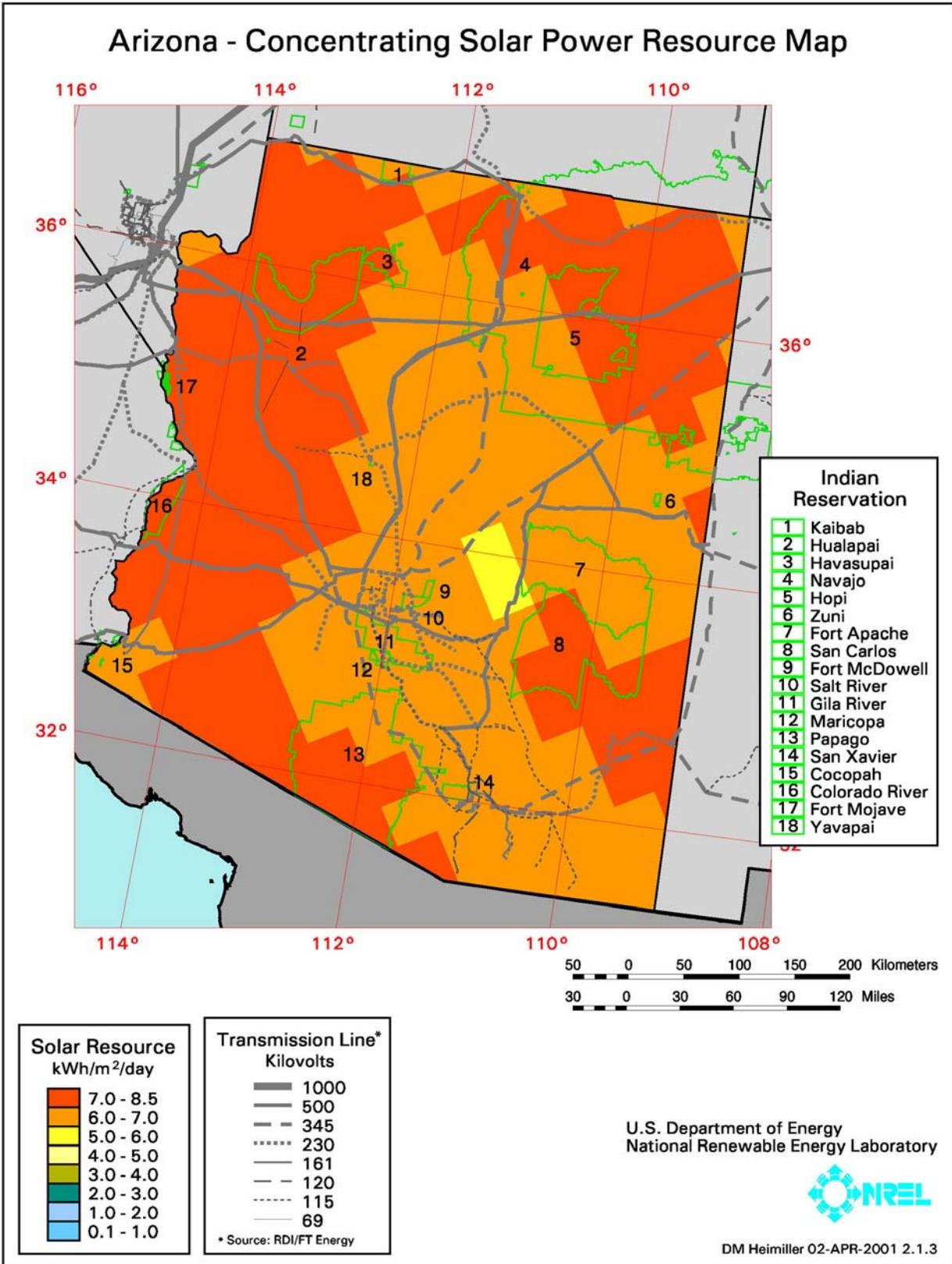
[Data based on a sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see text]

Subject	Number	Percent	Subject	Number	Percent
<b>Total housing units</b> .....	<b>41,041</b>	<b>100.0</b>	<b>OCCUPANTS PER ROOM</b>		
<b>UNITS IN STRUCTURE</b>			Occupied housing units .....	<b>27,494</b>	<b>100.0</b>
1-unit, detached .....	29,284	71.4	1.00 or less.....	16,944	61.6
1-unit, attached .....	2,305	5.6	1.01 to 1.50 .....	3,727	13.6
2 units .....	550	1.3	1.51 or more.....	6,823	24.8
3 or 4 units .....	903	2.2			
5 to 9 units .....	401	1.0	<b>Specified owner-occupied units</b> .....	<b>14,692</b>	<b>100.0</b>
10 to 19 units .....	13	-	<b>VALUE</b>		
20 or more units .....	14	-	Less than \$50,000 .....	9,512	64.7
Mobile home.....	7,198	17.5	\$50,000 to \$99,999.....	3,417	23.3
Boat, RV, van, etc.....	373	0.9	\$100,000 to \$149,999.....	788	5.4
			\$150,000 to \$199,999.....	279	1.9
			\$200,000 to \$299,999.....	337	2.3
<b>YEAR STRUCTURE BUILT</b>			\$300,000 to \$499,999.....	172	1.2
1999 to March 2000 .....	1,257	3.1	\$500,000 to \$999,999.....	30	0.2
1995 to 1998 .....	5,430	13.2	\$1,000,000 or more.....	157	1.1
1990 to 1994 .....	5,397	13.2	Median (dollars).....	25,500	(X)
1980 to 1989 .....	10,062	24.5			
1970 to 1979 .....	9,333	22.7	<b>MORTGAGE STATUS AND SELECTED</b>		
1960 to 1969 .....	6,427	15.7	<b>MONTHLY OWNER COSTS</b>		
1940 to 1959 .....	2,476	6.0	With a mortgage .....	1,255	8.5
1939 or earlier .....	659	1.6	Less than \$300 .....	303	2.1
			\$300 to \$499 .....	431	2.9
<b>ROOMS</b>			\$500 to \$699 .....	284	1.9
1 room .....	12,520	30.5	\$700 to \$999 .....	142	1.0
2 rooms .....	5,266	12.8	\$1,000 to \$1,499 .....	88	0.6
3 rooms .....	6,209	15.1	\$1,500 to \$1,999 .....	7	-
4 rooms .....	5,963	14.5	\$2,000 or more .....	-	-
5 rooms .....	6,272	15.3	Median (dollars).....	449	(X)
6 rooms .....	3,139	7.6	Not mortgaged .....	13,437	91.5
7 rooms .....	1,065	2.6	Median (dollars).....	118	(X)
8 rooms .....	321	0.8			
9 or more rooms .....	286	0.7	<b>SELECTED MONTHLY OWNER COSTS</b>		
Median (rooms) .....	2.9	(X)	<b>AS A PERCENTAGE OF HOUSEHOLD</b>		
			<b>INCOME IN 1999</b>		
Occupied housing units .....	27,494	100.0	Less than 15.0 percent .....	9,014	61.4
<b>YEAR HOUSEHOLDER MOVED INTO UNIT</b>			15.0 to 19.9 percent .....	1,303	8.9
1999 to March 2000 .....	3,337	12.1	20.0 to 24.9 percent .....	803	5.5
1995 to 1998 .....	6,897	25.1	25.0 to 29.9 percent .....	518	3.5
1990 to 1994 .....	4,913	17.9	30.0 to 34.9 percent .....	365	2.5
1980 to 1989 .....	6,096	22.2	35.0 percent or more .....	1,763	12.0
1970 to 1979 .....	3,701	13.5	Not computed.....	926	6.3
1969 or earlier .....	2,550	9.3			
			<b>Specified renter-occupied units</b> .....	<b>6,995</b>	<b>100.0</b>
<b>VEHICLES AVAILABLE</b>			<b>GROSS RENT</b>		
None .....	5,596	20.4	Less than \$200 .....	1,036	14.8
1 .....	11,526	41.9	\$200 to \$299 .....	1,225	17.5
2 .....	7,000	25.5	\$300 to \$499 .....	1,670	23.9
3 or more .....	3,372	12.3	\$500 to \$749 .....	748	10.7
			\$750 to \$999 .....	124	1.8
<b>HOUSE HEATING FUEL</b>			\$1,000 to \$1,499 .....	56	0.8
Utility gas .....	3,303	12.0	\$1,500 or more .....	21	0.3
Bottled, tank, or LP gas .....	5,447	19.8	No cash rent.....	2,115	30.2
Electricity .....	2,163	7.9	Median (dollars).....	319	(X)
Fuel oil, kerosene, etc .....	70	0.3			
Coal or coke.....	598	2.2	<b>GROSS RENT AS A PERCENTAGE OF</b>		
Wood .....	15,546	56.5	<b>HOUSEHOLD INCOME IN 1999</b>		
Solar energy.....	4	-	Less than 15.0 percent .....	2,819	40.3
Other fuel .....	255	0.9	15.0 to 19.9 percent .....	632	9.0
No fuel used.....	108	0.4	20.0 to 24.9 percent .....	366	5.2
			25.0 to 29.9 percent .....	236	3.4
<b>SELECTED CHARACTERISTICS</b>			30.0 to 34.9 percent .....	110	1.6
Lacking complete plumbing facilities .....	9,295	33.8	35.0 percent or more .....	635	9.1
Lacking complete kitchen facilities .....	8,314	30.2	Not computed.....	2,197	31.4
No telephone service .....	17,234	62.7			

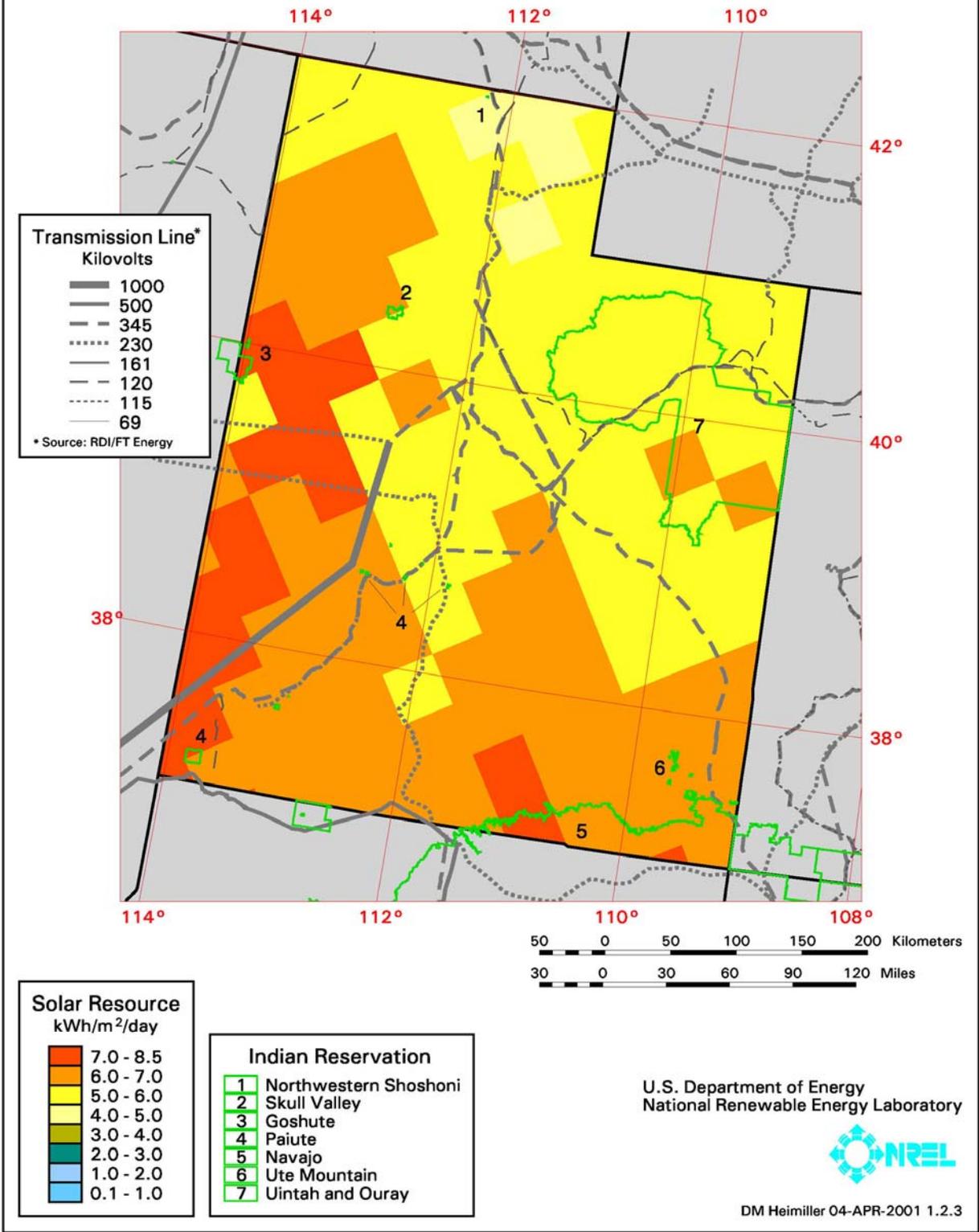
-Represents zero or rounds to zero. (X) Not applicable.

Source: U.S. Census Bureau, 2000 Census Data.

Maps



# Utah - Concentrating Solar Power Resource Map



# New Mexico - Concentrating Solar Power Resource Map

