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# Addressing Renewable Energy Development at the Local Level by Learning How to Plan Through Green Building: An Example of Community-Based Planning on the Navajo Reservation

Gepetta S. Billie

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**ADDRESSING RENEWABLE ENERGY DEVELOPMENT  
AT THE LOCAL LEVEL  
BY LEARNING HOW TO PLAN  
THROUGH GREEN BUILDING:  
AN EXAMPLE OF COMMUNITY-BASED  
PLANNING ON THE  
NAVAJO RESERVATION**

**BY**

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**THESIS**

Submitted in Partial Fulfillment of the  
Requirements for the Degree of

**Master of**

**Community and Regional Planning**

The University of New Mexico  
Albuquerque, New Mexico

**July, 2011**

*For my babies,  
Ethan Scott, Zoë Lee and my little girl who has yet to  
meet the world.*

*May your contribution to the world be even greater.*

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This work would not be possible without the assistance and guidance of some very important individuals in my personal and academic life. For their endless support, I must first give thanks.

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planning theory and concepts I learned in class in the real Native world. I have been truly honored to work with these three incredible people. Thank you!

Lastly, I acknowledge the fact that this path is not one that I have walked alone. Instead, it began with my parents planting the seed of possibility when they imparted the value of education onto my four brothers and me very early in our lives. I thank my parents, Glenio and Virginia Billie, for teaching me the lesson that work comes before play and that I can do whatever I want once I set my mind to it. These are two invaluable lessons that almost always came to bear during this process because graduate school is definitely a test of one's character, dedication, will and at times sanity. I must also thank my brothers for the hours they put in as babysitters to watch my children effectively giving me the time I needed to really focus and write.

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this process and undertake the mission for themselves once the opportunity presents itself. If mommy can do it, then you can do it.

Thank you so so much! I could not have done this without you!

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**ABSTRACT**

This thesis considers energy development, specifically how the Navajo Nation can address renewable energy development at the local chapter level by incorporating green building strategies into housing planning and development. The objective is to make sense of how individual Navajo chapters, like *Tsé Łichii'*, can learn to plan and build better housing through green building techniques with the ultimate goal of addressing energy on the Navajo reservation. Through planning theory and ideas for how to apply these concepts to individual chapter needs, this thesis will explain how the Navajo Nation as a whole can plan for sustainable renewable energy development at the local chapter level through green building by recognizing the link between renewable energy development and housing, showing there is a need for planning at the local chapter level for each Navajo chapter, breaking down the community planning process for local

Navajo communities, and breaking down planning tools through green building techniques and facilitation processes. These methods seek to break down the planning process enough to empower the local Navajo people and place planning within their reach so they can learn to make decisions that matter to them and ultimately craft plans that can be implemented.

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## **LIST OF ABBREVIATIONS**

APA – American Planning Association

CEC – Commission for Environmental Cooperation

CFL – Compact fluorescent light bulb

CRP – Community & Regional Planning

DOE – Department of Energy (US)

EERE – Energy Efficiency & Renewable Energy

EIA – Energy Information Administration

EPA – Environmental Protection Agency

HUD – US Department of Housing & Urban Development

ICA – The Institute of Cultural Affairs

IHBG – Indian Housing Block Grant

LEED – Leadership in Energy & Environmental Design

LGA – Local Governance Act (Navajo Nation)

LIHTC – Low Income Housing Tax Credit

MAHA – Mescalero Apache Housing Authority

NHA – Navajo Housing Authority

NMMFA – New Mexico Mortgage Finance Authority’s

NN – Navajo Nation

NREL – National Renewable Energy Laboratory

NTUA – Navajo Tribal Utility Authority

ONAP – Office of Native American Programs

SIPI – Southwestern Indian Polytechnic Institute

TDHE - Tribally Designated Housing Entity

UNM – University of New Mexico

USGBC – US Green Building Council

VOC – Volatile organic compound

## LIST OF NAVAJO WORDS

*Bikéyah* – Their land

*Bilagáana* – White man

*Diné* – Navajo; the people

*Diné Bi Beenahaz'áanii* – Fundamental Laws of the Diné

*Diyin Nohookáá Diné Bi Beenahaz'áanii* – Diné Common Law

*Hwééldi* – Fort Sumner, New Mexico

*Má sání* – My grandmother

*Nihimásání* – Our grandmother(s)

*Shighan* – My home

*Tsé Łichii'* – Red Rock, a chapter of the Eastern Agency of the Navajo Nation

## FOREWORD

*Yá'át'ééh shidine'é. Shí éí Gepetta S. Billie yinishyé.*

*Kinyaa'áanii nishliigo, Tsénahabíinii báshíshchíín.*

*'Ashjihí dashicheii, t'aado Tódich'íi'nii dashináí .*

*Tsé Łichii' de naashá.*

*Ákótéego éí 'asdzání nishłj.*

Hello, my name is Gepetta S. Billie.

I am of the Towering House clan, born for the Sleeping Rock clan.

My maternal grandparents are of the Salt clan and my paternal grandparents are of the Bitter Water clan.

I am from the Red Rock (*Tsé Łichii'*) Chapter of the Navajo Nation.

This is how I am Navajo.

Why am I doing this? The short answer is to get a Master's degree. The long answer is a story about how I ended up in the planning program at the University of New Mexico (UNM). This story begins with me taking a class I did not intend to take but took anyway to make full-time status as a student at the Southwestern Indian Polytechnic Institute (SIPI) in Albuquerque, New Mexico. This class was called Renewable Energy 101 and it turned out to be a class that would change my entire worldview. It was an introduction to Renewable Energy technologies with a hands-on lab that offered our class a first-hand look at the different renewable energy systems in operation on the SIPI campus at the time. It was interesting to say the least and I learned a lot, but it just sort of ended

there once the trimester came to an end. I did not get the chance to explore this interest again until we started discussing ideas of sustainability, economic development, and natural resources planning in my Analytical Methods class in my first year in the Community & Regional Planning (CRP) program at UNM. This is where I really started to think about the environmental and social injustices tribes have faced over time.

I also began to think more analytically about the places I have called home; the Navajo reservation and my chapter in particular. I thought about how these places do not make sense in that they were not built to meet the true needs of the people, the Navajo people. While, I did not know it at the time, I first became interested in planning through my experiences working for the City of Gallup in the public works division as an engineer intern in addition to my experiences living in two different parts of the Navajo reservation: *Tsé Łichii'* and Kayenta, Arizona.

Then in the summer of 2008, I applied for a student internship in the Department of Energy's Tribal Energy Program at Sandia National Laboratories in Albuquerque to gain first-hand work experience with tribal communities and to reinvestigate my interest in renewable energy. To say I have learned a lot would be a huge understatement. In my time in the program, I have learned through first-hand observation and participation in various workshops and meetings how tribal communities at all scales are working to develop renewable energy projects on their land to create more sustainable environments to meet the basic needs of their people. The conferences and meetings I have been fortunate to attend have

provided a wealth of information I would not have been able to get anywhere else, even in my studies at UNM. It is a shame that this knowledge is not common knowledge because the general public should be more aware of tribes' efforts and the momentum being gained with the implementation of every new tribal energy project.

This internship has been a unique opportunity to work with tribes who are truly dedicated to building brighter futures for their people. Quite honestly, I am tired of hearing about the dismal circumstances under which tribes live. Through this internship I see that tribes are in fact exercising their right to self-determination and turning things around for themselves through renewable energy development. I can also see how those tribes who recognize and understand their capabilities, in terms of renewable energy development, are taking the initiative to learn about the technologies and processes and applying them to their situations to develop projects they can, or one day, call their own and ultimately benefit their people. It is quite encouraging and impressive to see and hear in their own words about real case studies of tribes acting proactively to educate themselves and make better informed decisions about developing the renewable resources that exist on their lands because we are living in a world where we must learn to curb our appetites for over-consumption. We can no longer afford to be indifferent about how our current behavior affects the world our children will inherit. After all, preserving our seventh generation's future is what sustainability is all about and ultimately what *Diné Bi Beenahaz'áanii* (Fundamental Laws of the Diné) teaches us, as Diné, to live by.

While the lessons I have learned about tribal renewable energy development have been plentiful and truly eye-opening, I have also been exposed to green building in ways I never would have imagined. By attending different conferences like the U.S. Department of Housing and Urban Development's (HUD) Office of Native American Programs (ONAP) Greener Homes Summit, the U.S. Green Building Council's (SGBC) Greenbuild International Expo, and the U.S. Department of Energy Solar Decathlon to name a few, I have learned the nuts and bolts of green building. My challenge was always not only in figuring out how to apply conventional or *bilagáana* methods of green building to traditional housing situations on the reservation but how to make sense of a language that is in large part that of architects, contractors, consultants, business people, manufacturers, and planners to the everyday Navajo whose highest level of education completed might barely be high school.

Luckily, I was also fortunate to be able to see a real tribal green building project completed on tribal land. This is where I had the opportunity to meet face to face with the housing director of the Mescalero Apache Housing Authority (MAHA) in Mescalero, New Mexico and pick his brain about the significance of green building in Indian Country as well as see the housing development in its stick and frame state to the final ribbon-cutting complete with tours of the then first occupied homes. Every time I went to Mescalero or thought about their project, I thought about how their ideas for housing planning and green building with respect to energy efficiency and conservation could be applied to the Navajo reservation. This is where many of my ideas were born.

Together, my academic studies and internship experience have forced me to think of how planning can enhance life on the reservation. The more I think about my people and what it means to articulate a vision through participatory methods, the more I see the need for planning at the local level. I believe the Navajo reservation as a whole and each Navajo chapter has the potential to be a true community where Navajos are more aware of who they are as a people and work together to develop, in every sense of the word, to meet the needs of the current generation while maintaining their precious resources for future generations. I also believe each chapter has a responsibility to each Navajo family living within its boundaries to create a place, or a community, which speaks to the character and values of those Navajo families so the chapter, is not just a chapter; it is home and every Navajo can be proud to call it “*shighan*” (Navajo word, “my home”).



## CHAPTER 1 INTRODUCTION

This thesis considers how the Navajo Nation can tackle renewable energy development at the local Chapter level by planning and building better housing through low-cost green building techniques. By incorporating low-cost green building standards into housing planning from the beginning, local Navajo chapters, like *Tsé Łichii'*, can acquire tools for planning sustainable community development and do their part in addressing the Navajo Nation's energy needs.

Addressing renewable energy development at the local chapter level begins with an assessment of our current practices and future needs:

- Energy Use: How much we use and how much it costs,
- Population & Consumption: Looking at population trends and how these trends relate to present and future consumption,
- Climate Change: Relating our activities at the local level to the global level, and
- Housing: Taking a comprehensive inventory of our current and future housing needs.

Then we have to ask ourselves exactly what resources do we have that are viable for development. For Navajo, the reservation lays in an area of the southwest that has an abundant resource potential for solar and in some areas wind development. But we need to ask if developing these resources is really possible for individual chapters, chapters who cannot keep a full-time staff of chapter officials because they have very limited human and financial resources? What can they do? The bigger question is: Where do they start?

Considering the fact that the residential sector consumes 76% of the energy produced in the United States today, it makes sense to tackle energy issues at the housing level, thereby addressing renewable energy development. As any tribe with the resources that has dipped its toes in the energy development pool has come to learn, renewable energy development is a very resource-intensive and challenging endeavor. That being said, before an individual Navajo chapter considers taking on a huge project like renewable energy development, it makes sense for that chapter to first think about changing the way its community members use energy in their homes to reduce their use.

This can be accomplished with two steps: a) the chapter assesses its energy needs at the chapter scale and then b) makes information about what individual families can do to reduce their energy use in their homes available to community members. Then people can take small conservative measures in their homes like replacing inefficient incandescent light bulbs with more efficient compact fluorescent light bulbs (CFLs), or putting all non-essential appliances and/or equipment on power strips that can be switched completely on or off, or planting trees for shade in the summer and protection against the wind in the cold winter months. These are considered no-cost or low-cost measures that families, especially those on tight budgets, can take to make their homes more energy efficient. These are also low-cost measures that make green building<sup>1</sup> possible, thereby making addressing renewable energy development also completely doable.

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<sup>1</sup> Green building is the environmentally responsible practice of building structures that have the lowest impact as possible on the natural environment.

This kind of planning is reasonable and empowering in the sense that Navajo chapters can learn to act for themselves. Planning does not have to be left to the “experts” because actual community members know better about the needs and values of their community. Once the people learn to plan for themselves at the chapter level, they can then apply basic planning concepts to bigger activities such as land use planning which is a major requirement for chapter certification under the Navajo Nation Local Governance Act (LGA). Local chapter planning by local chapter members also means being able to articulate and ultimately realize a vision that speaks to the unique circumstances and character of each chapter. Consequently, addressing residential energy needs can be a useful learning step on the road to larger planning issues.

After introducing myself and why I am doing this work, the outline of this document is generally similar to the format of a grant application. I begin by providing a “Statement of Need” where I describe why this type of research is important by discussing the need for local planning, reviewing renewable energy development and energy issues in general on the Navajo reservation, and then why green building makes sense for the Navajo Nation. I examine the land and people who make up my chapter, *Tsé Łichii’*, in my Community Profile. I then go over my ideas for a Work Plan and Public Involvement for *Tsé Łichii’* by reviewing the community planning process followed by some steps for Implementation and what specific steps need to be taken to carry out the plan. This is followed by recommendations for the need for Assessment and

Evaluation. Finally, I provide a conclusion to summarize my work and make recommendations for next steps to be taken.

## CHAPTER 2 STATEMENT OF NEED

Generally speaking, the community planning process begins with a community first recognizing the need to plan (Daniels, Keller, Lapping, Daniels, & Segedy, 2007). This usually happens after the community residents become aware of problems they have had to deal with in the past or problems they may be currently facing within the community. Fortunately, recognizing the need to plan in *Tsé Łichii'* is not too challenging for the community members and the local leadership. It seems the local leadership understands the value of planning and is evident in the following statement, "local planning is important since it represents the wishes of community members" which is a direct quote from the Red Rock Chapter website and clearly speaks to the need for local planning in *Tsé Łichii'*.

### 2.1. Local Planning: The Chapter Level

In its simplest form, planning is about learning. Through planning we learn to understand where we stand as a community and see what must be done now and in the future to organize the community's time, resources, and efforts. By understanding who we are and where we come from, we can learn how to plan for and shape a better future for the people living within a community. An understanding of how past behavior shapes future behavior also forces us to learn how to care about the land and the people within the community, or in this case, *Tsé Łichii'*. In fact, *Diné Bi Beenahaz'áanii* (The Judicial Branch of the Navajo Nation) declares and teaches that "it is the duty and responsibility of the Diné to protect and preserve the beauty of the natural world for future

generations.” As Diné, it is our responsibility to learn to plan for our children’s future.

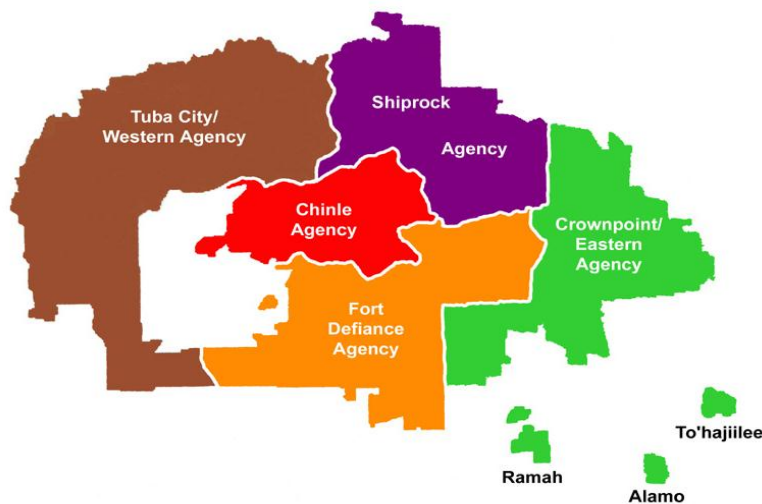
Currently, the Navajo Nation does not have a central planning office so finding current and historic information on the Nation’s planning activities is difficult. However, in January 2010, I attended the Navajo Nation Green Economy Commission Economic Community Stakeholders Meeting in Window Rock, Arizona. Interestingly enough, during a facilitated discussion of renewable energy projects on or near the Navajo Nation, a gentleman attending the meeting commented that the Navajo Nation once had a central planning office but dismantled it for some reason (Navajo Nation Green Economy Commission, 2011). This gentleman also acknowledged the fact that most planning professors at any university would shake their head in disbelief at such a move. This observation suggests that Navajo people, especially those in leadership positions, understand and appreciate the value of planning.

While appreciating the value of planning is one thing, understanding what planning means to local Navajo chapters is another. The Navajo chapter system was first organized as “Livestock Improvement Associations” in the 1920s (Wilkins, 2003). The Superintendent of the Leupp Agency, John G. Hunter, then recognized the need to reach more Navajos to better understand their common problems and called the first general meeting of Navajos in Leupp, Arizona. This meeting was the first act of local governance on the Navajo reservation by a Navajo chapter.

By 1933, over 100 chapters throughout much of the reservation were operating with an elected president, vice president, and a secretary/treasurer with meetings following parliamentary procedure. Soon after, chapter meetings were typically held once a month to discuss improvement projects relating to water, roads, buildings, livestock, etc. Chapter meetings also provided different outreach opportunities for the federal government in that they served as venues for government program/goals presentations, opportunities for information dissemination through the respective agency, precincts for council delegate elections, and forums for local tribal leaders to express their opinions (Wilkins, 2003).

**Figure 1. Map of Navajo Agencies.**

Source: [http://www.lapahie.com/Chapter\\_Email.cfm](http://www.lapahie.com/Chapter_Email.cfm)



Today, the Navajo Nation is divided into 110 chapters operating within five different agencies including the Western Agency, Shiprock Agency, Chinle Agency,

Ft Defiance Agency, and the Eastern Agency. While they operate in much the same way as before, each of these chapters is unique and is involved in planning activities at different scales, degrees of rigor, stated purposes, and with different degrees of resources. In fact, chapters often compete with each other as a result

of limited resources (T. Battiest, personal interview, April 12, 2011). Thus, it is safe to say planning on the Nation as a whole is scattered and fairly uncoordinated.

Most of these efforts are also driven by people who do not have formal training in planning. Yet by simply doing their jobs and carrying out day to day assignments, seemingly typical employees end up planning and sometimes implementing projects based on the experience they have gained working on different projects and sometimes in different tribal and non-tribal offices. The Navajo Tribal Utility Authority's planning process is an example of how planning varies by project. According to Terry Battiest (personal interview), NTUA renewable energy engineer, the planning process varies by project and by who is running the project. While NTUA has standard project management procedures, there is a lot of latitude in how projects get planned and implemented because different people have different project management styles and different clients have different needs. However, this is not to say you have to be a professional planner with a planning degree to plan for a community, but simply means planning means different things to different people and is carried out in different ways because the end goal is different for every situation; making the possibility of inconsistent planning unavoidable. Hence, the need for local community or chapter planning is still great.



## 2.2. Renewable Energy: A Means of Sustainable Development

**Figure 2. Rosebud Sioux Wind Turbine.**

Source: [www.nativewind.org/html/projects/html](http://www.nativewind.org/html/projects/html)



In general, Native American tribes like other developing nations are exploring potential renewable energy projects to develop as a vehicle for economic development and a more sustainable way of producing energy. In fact, tribes are in a very good position to develop renewable energy projects on tribal lands for three reasons. For one, tribes all across the United States have the natural resources on their land to develop renewable energy projects. According to a federal report, “Indian land comprises approximately 5 percent of the land area of the United States, but contains an estimated 10 percent of all energy reserves in the United States” (Govtrack.us, 2003). For example, the Department of Energy estimates 75% of the energy demands in the contiguous 48 states could be met with the development of the Great Plain’s wind resources (Govtrack.us, 2003).

Second, Congress finds these energy resources to be among the most valuable natural resources of tribes. For tribes, developing these resources means securing a vast amount of revenue. In 2000, tribes generated \$700,000,000 in revenues from oil, natural gas, and coal sales (Govtrack.us,

2003). Given this scale of income, what tribe would not also be interested in developing their energy resources?

Finally, tribes are sovereign nations which have the right to self-governance. This means they have the authority to develop their lands as they see fit to address the needs of their people (Ambler, 1990). Furthermore, the federal government supports this idea because the purpose of the Native American Energy Development and Self-Determination Act of 2003 was to “assist Indian tribes and individual Indians in the development of Indian energy resources and to further the goal of Indian self-determination, particularly through the development of stronger tribal governments and greater degrees of tribal self-sufficiency” (Govtrack.us, 2003, p. 7).

However, federal support does not mean renewable energy development is an easy venture. While tribal renewable energy development can serve many goals such as economic development, rural electrification, greater self-sufficiency, renewable energy development at any scale is very expensive and resource and time intensive. Any tribe that is contemplating developing renewable energy projects on their land must consider how much money and time they are willing to invest in a project because they would need to consider the types of resources that are feasible for undertaking development costs (upfront costs as well as operating and maintenance costs, etc.), resolving right of way and transmission-line issues, generating and distributing energy, as well as addressing risk factors, environmental impacts and benefits, legal issues,

cultural issues, available and new technologies, business opportunities, ownership issues, and human resources issues (“Guide to Tribal Energy,” n.d.).

As for the Navajo Nation, much of the Nation’s renewable energy development efforts are led by the Navajo Tribal Utility Authority. The Navajo Tribal Utility Authority (NTUA) is an enterprise of the Navajo Nation charged with supplying the reservation with basic utilities such as electricity, water and wastewater disposal. Along with their basic utility-serving mission, the NTUA has begun developing a renewable energy program to meet the electricity needs of the people living in the most remote and inaccessible reaches of the reservation by harnessing solar and wind energies as an alternative source of power.

**Figure 3. NTUA 880 watt hybrid system in use at Narrow Canyon, Navajo reservation.**

Source: Personal photo.



The program began in 1993 as a

pilot project NTUA developed in partnership with Sandia National Laboratories to distribute fairly low-wattage 240/260 watt photovoltaic systems to families who previously had no access to electricity. The program has since grown in the number of systems used by families and in the size and power generation capacity of the photovoltaic system itself. NTUA is now supplying 880

watt hybrid photovoltaic and wind systems (Navajo Tribal Utility Authority). In

2010, NTUA introduced a new generation of hybrid systems including a 1,080 watt photovoltaic array and 400 watt wind turbine (1,480 watt system) with an Energy Star refrigeration solution (Battiest, 2010). The refrigeration solution is a major step toward energy independence for families living in remote areas because the refrigerator is the biggest energy-hogging appliance in use in homes today. For some Navajo families living in remote areas, the refrigerator is a major necessity for food storage and health and safety reasons. For example, some medications, like grandma's insulin or the baby's antibiotics, require refrigeration.

**Figure 4. Hybrid system powering rural Navajo home.**

Source: [http://buffalopost.net/?category\\_name=american-recovery-and-reinvestment-plan](http://buffalopost.net/?category_name=american-recovery-and-reinvestment-plan)



While the Department of Energy has provided \$2 million to date to assist the program, it is not enough to provide electricity to all those who need it because the units the NTUA is providing cost \$18,000 each and the latest

survey shows there are still 16,000 families living on the reservation who do not have access to electricity. \$18,000 for one hybrid system might sound like a lot of money, especially to those families who really have tight budgets, but the number is actually fairly reasonable considering the cost of extending a power line. According to the NTUA, running power lines to individual homes is estimated to cost \$30,000 per mile (Battiest, 2008). Furthermore, the success

and feasibility of the renewable energy program depends largely on a family's ability to manage their energy loads efficiently as the NTUA units produce about 2kW a day. In comparison, the average American household uses roughly 31 kWh per day (US Energy Information Administration (EIA), n.d.a ). This means a family on a 2kW system cannot afford to do things like leave the television running all day and run the microwave and/or other appliances at the same time. It is definitely a different way of life, but it is a life many Navajo families are learning to enjoy the same activities other families who have access to electricity do.

The Solar Program is part of NTUA's off-grid residential initiatives designed to provide alternative energy solutions to individual Navajo families living far from the existing electricity infrastructure. NTUA is also in the process of developing utility-scale renewable energy projects. This means NTUA is looking beyond providing power for individual families and is trying to develop energy solutions to create its own power to supply the entire reservation and possibly sell to other power companies in New Mexico, Utah, Nevada, Arizona, and California. Right now, NTUA does not produce its own power. Instead, NTUA purchases electrical power from off the reservation from power companies like PNM (Public Service Company of New Mexico), Arizona Public Service and Tucson Electric Power and then sells this power to the Navajo people (Battiest, 2008).

Not only does this process seem illogical given the fact that most of the power used by *bilagáana* society is actually produced on Navajo land, but it is

also unsustainable. Right now, the Navajo reservation is home to two coal-fired power plants: the Navajo Generating Station near Page, Arizona, and the Four Corners Power Plant near Farmington, New Mexico, and a third proposed plant at Desert Rock, New Mexico. Together, the two existing power plants produce enough energy to power over 600,000 homes in New Mexico, Utah, Nevada, Arizona, and California (Friends of Lake Powell, n.d.). Surprisingly, none of this power goes directly to the Navajo reservation even though these power plants buy and burn coal mined directly from the Navajo reservation to produce power. Instead, this power is sold to and transmitted right over Navajo homes via transmission lines that also stretch across the Navajo reservation to power companies like PNM, Arizona Public Service, and Tucson Electric Power. Then power is sold back to NTUA from these companies and finally sold to the Navajo people (Battiest, Navajo Tribal Utility Authority Lecture, 2008).

Therefore, it makes sense for the Navajo Nation and NTUA to explore their options for power generation. The Navajo reservation lies in an area of the United States that has very promising potential for wind and solar resources (Map 1 and Map 2). As such, NTUA is in the process of developing a number of utility-scale renewable energy projects on the Navajo Nation with prospective wind project sites in Arizona at Boquillas Ranch near Seligman, Arizona, Gray Mountain near Cameron, Arizona, and Black Mesa near Kayenta, Arizona. NTUA also has prospective solar project sites at Reclamation Mine Sites, different chapters through different Chapter initiatives, and Non-trust lands like Boquillas Ranch (Battiest, Navajo Nation Renewable Energy Initiatives, 2010).

However, considering how renewable energy development is a huge endeavor for any tribe or entity to undertake, the question becomes “Where do we start?”

### **2.3. Green Building**

This section considers how the Navajo Nation and its 110 chapters can design and build high quality housing that is sustainable, healthy, and affordable. This section begins with a case for why chapters should do more green building to not only build quality homes within their respective chapter boundaries but at the same time broadly address the housing shortage that has plagued the rest of Indian country for years. The case for why Navajo chapters should do more green building starts with a look at current practices in terms of the relationship between energy use and buildings in general followed by an examination of how these current practices impact the environment, economy and social aspects of everyday life.

This is followed by an investigation of current tribal housing conditions in the United States in addition to an inventory of Navajo housing conditions on the reservation. This investigation will determine what kind of need exists on the Navajo reservation today. A look at tribal housing conditions in general reveal there is indeed a great demand for more and better housing on tribal land all across the country and in the spirit of basic economics, a look at demand also requires a look at supply. Thus, an examination of current housing stock on the reservation is also necessary. An examination of housing stock then reveals an

opportunity for future building practices for not only the Navajo Nation but for tribes in general.

Furthermore, an understanding of the opportunity for future building practices on the Navajo reservation requires an exploration of sustainability. What does it mean and most importantly, what does sustainability mean for the Navajo Nation? The answer to these questions can be addressed by an analysis of the Fundamental Laws of the Diné and green building practices. This means relating Diné Fundamental Laws to green building by first defining green building in simple terms and then seeking a basic understanding of green building through an inquiry of green building elements and benefits.

Finally, nothing makes for more compelling evidence than to see actual green building projects realized on tribal land. Therefore, this section includes an example of a large-scale green housing project recently completed on the Mescalero Apache reservation in South Central New Mexico. The I-Sah'-Din'-Dii Housing Development on the Mescalero Apache reservation is proof to other tribes that green building on tribal land can be accomplished with creative funding mechanisms and a strong desire to build sustainable, healthy, and safe housing that meets the needs of tribal community members. This section also includes a summary of tribal green building projects completed on the Hualapai reservation. The Hualapai projects are an example of what good leadership and planning can accomplish given an understanding of green building technologies and the willingness of decision-makers to take the time to do the research and push for green standards. Finally, I highlight a project completed at the smallest



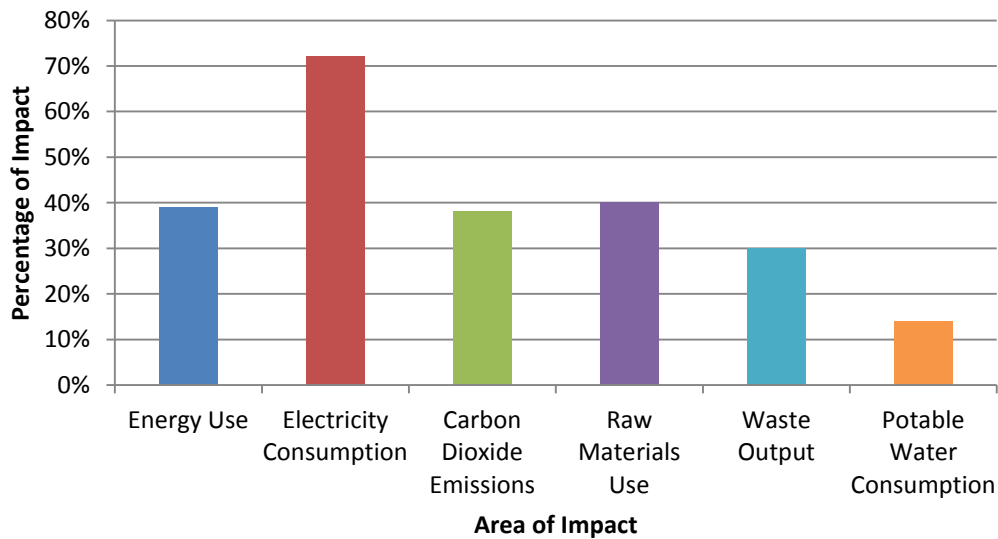
scale with a story of how an individual Hopi tribal member has turned his family's homestead into a self-sustaining working model of successfully living off grid on tribal land.

**a. Current Practices: Energy and Buildings**

The built environment has an undeniably significant impact on our natural environment, economy, and health. The buildings we use and inhabit are the heaviest consumers of electricity produced in the United States today. Buildings are also responsible for about a third of all emissions and wastes. According to the U.S. Green Building Council (USGBC), buildings account for:

- 39% of energy use,
- 72% of electricity consumption,
- 38% of all carbon dioxide emissions,
- 40% of raw materials use,
- 30% of waste output, the equivalent of 136 million tons annually, and
- 14% of potable water consumption (USGBC, n.d.b).

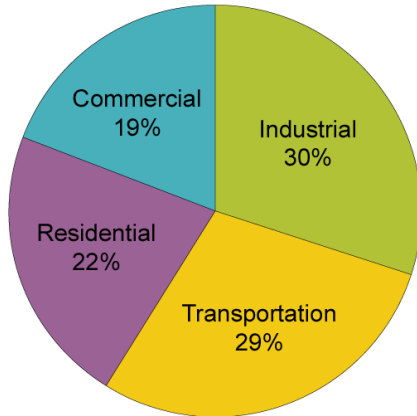
**Figure 5. Impact of buildings.**  
Source: USGBC, n.d.b



### a.1. Energy Use.

**Figure 6. Share of Energy Consumed by Major Sectors of the Economy, 2009**

Source: US EIA, 2010e

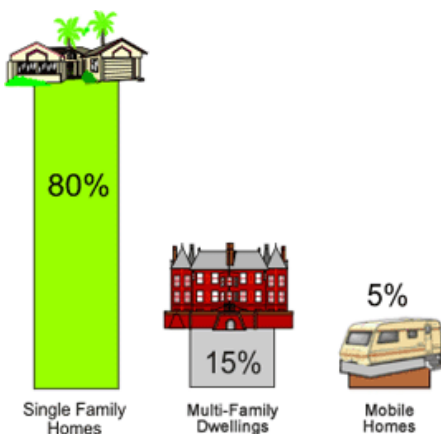


The Energy Information Administration (EIA) reports how much energy is consumed in each major sector of the U.S. economy, i.e. commercial, residential, industrial, and transportation. According to the EIA, the buildings used in the commercial and residential

sectors consume a combined 41% of the energy produced in the United States, while the industrial and transportation sectors consume 30% and 29% respectively (US EIA, 2010e). Compared to the other major sectors of the economy, buildings use more energy than industrial and manufacturing activities and transportation.

**Figure 7. Energy use within the residential sector.**

Source: US EIA, 2010c



The EIA breaks energy use down even further within the residential sector by showing it accounts for 22% of the energy use in the United States. According to the EIA, 80% of the energy consumed in the residential sector is consumed by single-family homes, 15% is consumed by multi-family structures, and 5% is consumed by mobile homes (US EIA, 2010c).

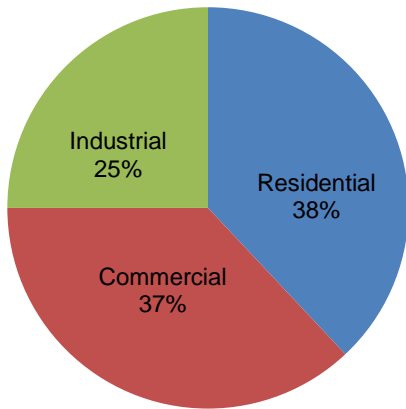
Compared to the different types of homes examined by the EIA, single-family homes use a significant proportion of energy within the residential sector. This

means there are either significantly more single-family homes in the United States compared to multi-family structures and mobile homes and as a result, people living in single-family homes use much more energy than those living in multi-family structures and mobile homes.

### a.2. Electricity Use

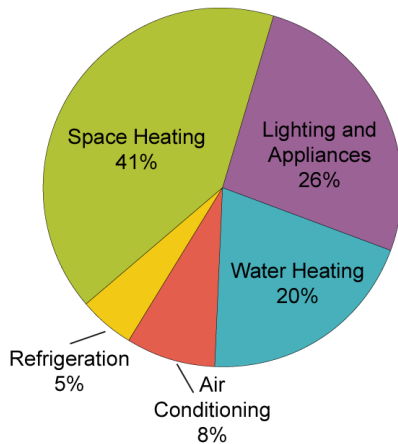
**Figure 9. Electricity use by sector, 2008.**

Source: US EIA, 2010d



**Figure 8. How energy is used in homes, 2005**

Source: US EIA, 2010d



In addition to energy use, the EIA also reports how much electricity is used by each major sector of the economy. According to the EIA, the residential sector is the biggest consumer of electricity. The residential sector uses 38% of the electricity produced in the United States, while the commercial sector uses 37%, the industrial sector uses 25%, and the electricity used by the transportation sector is fairly negligible

compared to the other sectors (US EIA, 2010d).

This means the buildings used in both the residential and commercial sectors use a combined total of 75% of the electricity produced in the United States today. This number, while very high, compares very well with the USGBC's estimate of 72%.

Electricity is an essential element of modern day life. It is one of the most commonly used forms of energy and the most taken for granted aspect of daily life. In this day and age, modern technology and practice make it is very easy to flip a switch or plug a power cord into an outlet with no thought for where the power comes from. We just expect the power to be there when we need it because within the residential sector, energy is needed to power appliances and electronics that make daily activities possible. For the most part, energy is used for air conditioning, refrigeration, space and water heating, lighting, and powering common household appliances and equipment (US EIA, 2010d). Because electricity is used to power virtually all aspects of modern day life, it is increasingly more important to consider the impact of electricity production.

### **a.3. Our Impact: Buildings, the Environment and Climate Change**

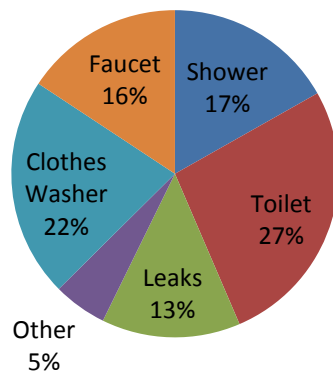
The buildings we use and inhabit impact the environment throughout their life stages. According to the Worldwatch Institute (Roodman & Lenssen, 1995), “the modern buildings we live and work in rival such well-known polluters as cars and manufacturing as sources of harm to the environment, adding greatly to deforestation, the risk of global warming, overuse of water, and acid rain.” Unfortunately, modern buildings are more often than not designed and built without consideration for energy efficiency or the overarching economic, environmental, and social impacts of the built environment. Today’s construction seems to be driven by cost and low cost is the bottom line instead of energy efficiency, affordability, sustainability and other important factors.

Needless to say, the built environment has the greatest impact on the natural environment. The natural environment is directly impacted through energy use related emissions, water use and discharge, storm water runoff, the manufacturing and use of building materials, solid wastes, siting and landscaping issues, and poor indoor air quality associated with the construction and operation of buildings. This list of how the built environment impacts the natural environment varies by region and the availability of natural resources within each region.

**Figure 10. Indoor Water Use.**

Source: US EPA, 2008.

### How Much Water Do We Use?



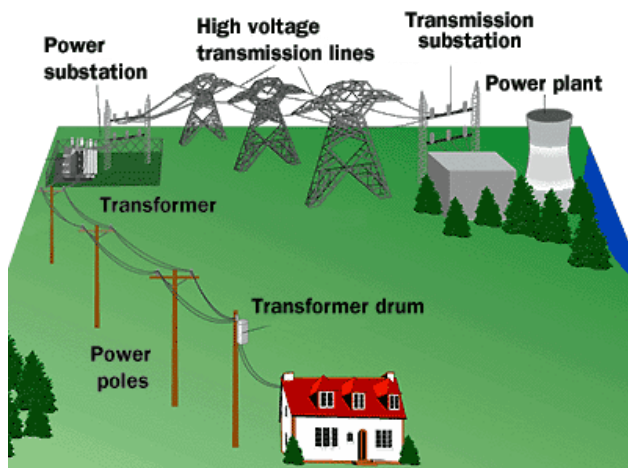
In the southwest, water is considered a scarce resource. Thus, one of the most distressing examples of how the built environment impacts the natural environment includes an example of how water is used within a residential building (US Environmental Protection Agency (EPA), 2008). As

stated before, buildings use 13.6% of all potable water, or the equivalent of 15 trillion gallons of water per year, for various domestic uses. In most cases, this potable water is not used for drinking, but for bathing, indoor cleaning, waste transportation, and other outdoor uses such as lawn watering (US EPA, 2008).

Additionally, buildings consume 40% of all raw materials in the United States. The Worldwatch Institute found that 55% of the wood cut for non-fuel

uses was for building construction (Roodman & Lenssen, 1995). According to the U.S. Environmental Protection Agency (EPA), 170 million tons of building-related construction and demolition debris was generated in the United States in 2003 (US EPA, 2009a). The EPA also estimated that roughly 210 million tons of municipal solid waste was generated in the United States in a single year (Franklin Associates, Ltd., 1998). Half of the wood cut for non-fuel use in the US is used for building construction and of that half millions of tons of wood are being thrown away as waste. This waste then contributes to the millions of tons of municipal solid waste that is generated by people doing everyday activities including garbage.

**Figure 11. Tracing power from plant to home.**  
Source: energyeducation.tx.gov



The Commission for Environmental Cooperation (CEC) was established by the North American Agreement on Environmental Cooperation (NAAEC) which is a collaborative environmental protection effort

between Canada, Mexico, and the United States. The Secretariat of the CEC found in its Article 13 report that “the impact is especially profound in terms of greenhouse gas emissions” (23). Buildings are indirectly responsible for the emissions released into the atmosphere because of the energy used to power buildings and the activities that take place inside those buildings. As mentioned

previously, buildings account for 38% of all carbon dioxide emissions released into the atmosphere. Other greenhouse gases emitted into the atmosphere everyday include: carbon monoxide, sulfur dioxide, nitrogen oxides, particulate matter, and heavy metals such as mercury. Carbon dioxide is a greenhouse gas that has been found through various private and public studies to be a source of global warming (US EIA, 2010b). Thus, buildings ultimately contribute to global warming because of the energy used to heat, light, cool and power the electronics that inherently come with each building.

The energy used to operate buildings comes from electric power plants. In 2007, 72% of the energy produced in the United States came from fossil fuel burning power plants (US EIA, 2010b). Power plants that burn fossil fuels, such as coal, are the sources of approximately 40% of all U.S. carbon dioxide emissions (US EIA, 2010b). Furthermore, coal-fired power plants are a key source of greenhouse gas emissions (Commission for Environmental Cooperation, 2008). In turn, increased greenhouse gas emissions contribute to global warming or climate change (US EIA, 2010b). Clearly, immediate action in the building sector is necessary to mitigate climate change.

#### a.4. Tribal Housing

**Figure 12. Cardboard house on the Reservation.**

Source: <http://4allourrelations.org/>



Native Americans live in some of the worst housing conditions in the United States today. The basic standard of living of Native Americans remains well below that of the rest of the nation. A 2003 study on unmet

needs in Indian Country reported approximately 90,000 Native American families are homeless or under-housed, 14 percent of all reservation homes have no electricity, 1 in 5 Indian homes lacks complete plumbing facilities (Housing Assistance Council, 2004), and the rate of overcrowding and substandard housing conditions exceeds 60 percent on some reservations (US Commission on Civil Rights, 2003).

Furthermore, in its report, *A Quiet Crisis*, the US Commission on Civil Rights found these conditions to be “unacceptable in 21<sup>st</sup> century America.” That being said, the federal government, through its trust responsibility to the tribes, has made many attempts over the last 50 years to improve life on the reservation. Unfortunately, these attempts failed and life on the reservation has not improved much since the first report done by the US Commission on Civil Rights in 1961. Hence, to this day, the need for not only housing, but better housing, on tribal land is great.



Figure 13. A home in need of repair in the *Tsé Łichii'* chapter.

Source: Personal photo.



In addition to meeting the housing need in Indian country, it is also important to understand the unique challenges Native Americans face. According to the Coalition for Indian Housing and Development, “unique financial barriers, remoteness, limited human resources, and land-use restrictions are factors not normally faced by public housing programs, but are among the most serious challenges for Indian communities” (Millennial Housing Commission). Even though the federal government has struggled to improve living conditions on reservations across the country for decades, not all attempts were total disasters. The federal government took a step in attempting to improve living conditions in Indian country by recognizing the fact that Native Americans possess needs unlike other populations in the United States. In 1996, the government finally addressed the unique needs of Native Americans with the passage of the Native American Housing Assistance and Self-Determination Act (NAHASDA).

The goals of the act were simple: “to put Indian tribes in the driver’s seat when it (came) to decisions on designing and building Indian homes and related infrastructure; and to encourage the use of creative and private sector financing in Indian housing” (Housing Assistance Council, 2004). Under NAHASDA, tribes are now allowed more authority and flexibility in running their own self-defined

programs tailored to their specific needs, which is congruent with tribes' rights to

**Figure 14. Navajo hogan, Manuelito Chapter.**

Source: Personal photo.



self-determination and sovereignty. In

fact, one of the basic tenets of

Indigenous planning contends, "People

have the basic right to determine their

own future" (Jojola, 2001). This idea also

falls in line with *Diyin Nohookáá Diné Bi*

*Beenahaz'áanii* or Diné Common Law

which declares that "the values and principles of Diné Common Law must be recognized, respected, honored and trusted as the motivational guidance for the people and their leaders in order to cope with the complexities of the changing world, the need to compete in business to make a living and the establishment and maintenance of decent standards of living."

NAHASDA essentially makes tribes responsible for owning and practicing their right to determine the future of housing for their people. NAHASDA also encourages tribes to take more risks and get creative in leveraging funds so they are not only able to offer a variety of housing services and fund more units, but also to finance community development as defined by each tribe (Housing Assistance Council, 2004). However, even though NAHASDA has opened the door of opportunity for improvements in Indian housing, compared to housing in non-tribal communities, miserable conditions on many reservations across the country continue to this day.

## a.5. Housing in the United States

**Figure 15. A typical US subdivision.**

Source: amenfoto.com



The United States currently has about 275 billion square feet of building stock (Architecture 2030, 2011). In 2008, the average square footage of a single-family home was 2,519 square feet (US Census Bureau, 2009). Thus, 300 billion square feet of building stock is equivalent to about 120 million single-family homes (300 billion square feet/2,519 square feet). Every year, roughly 1.75 billion square feet of building is torn down, approximately 5 billion square feet is renovated, and about 5 billion square feet is built (Architecture 2030, 2011). Using the same calculation, this is the equivalent of about 695,000 single-family homes being torn down, almost 2 million homes being renovated, and about 2 million single-family homes being built. This means the number of houses being built and renovated far exceeds the number of houses being torn down. Herein lays the opportunity to build toward sustainability.

**Figure 16. House under construction.**

Source: www.floridanewhomeexperts.com



According to the Architecture 2030 Challenge, by the year 2035, 52 billion square feet of building stock will be demolished, 150 billion square feet will be remodeled, and another 150 billion square feet will be newly constructed (Architecture 2030, 2011). This means over the next 25 years, about 75% of the built

environment will either be new or renovated. This premise presents a great opportunity to change the way we build and shape our environment, environmentally, socially, and economically to create more sustainable housing.

The challenge for Navajo and *Tsé Łichii'* would be to find out exactly what the housing stock looks like on the reservation and within the *Tsé Łichii'* chapter, respectively. For *Tsé Łichii'*, this means determining how much square footage is available within the chapter in terms of livable space and non-livable space. Livable space would include the amount of square footage that can be used for everyday household activities or lived in within a home in addition to how much square footage can be built for living space. Livable space would include spaces such as the living room, bed rooms, the kitchen, etc. Non-livable space includes the amount of square footage that will or needs to be torn down. These spaces cannot be lived in or should not be used for living purposes. With these numbers, the *Tsé Łichii'* chapter can figure out what their opportunity for green building is in terms of how much new livable space can be built for different Navajo families living within the community.

#### **a.6. Sustainability**

What exactly do we mean by “sustainability?” The American Planning Association (APA) broadly defines sustainability as, “whether the Earth’s resources will be able to meet the demands of a growing human population that has rising aspirations for consumption and quality of life, while maintaining the rich diversity of the natural environment or biosphere” (American Planning Association, 2003). While this definition, like most other definitions, addresses

resources and issues of consumption, it suggests the earth is responsible for supporting a growing human population's demands and preserving the natural environment's rich diversity. In reality, sustainability is an umbrella concept for exploring the relationship between human activity and the natural environment while encompassing a whole host of diverse issues surrounding human development including environmental, economic, social, and cultural issues. To a great extent, sustainability is an indefinable concept that means different things to different people and ultimately depends on context.

In this case, the context is the built environment's impact, as a result of human activity, on the natural environment. Thus, it makes sense to consider sustainability as defined by the Environmental Protection Agency. According to the EPA, sustainability is the "social and environmental practices that protect and enhance the human and natural resources needed by future generations to enjoy a quality of life equal to or greater than our own" (US EPA, 2011a). In contrast to the first definition, this definition places the burden of responsibility on human populations. This means we have to consider not only what resources we have to work with today when it comes to building, but also what our children and our children's children will be left with. Will they have enough resources to build with to meet their needs? What about the generation after that?

#### **a.7. Sustainability and Tribes**

Sustainability is not just a fancy planning word used only when academics gather in a classroom or some other mainstream setting. Sustainability also applies to and is a concern of Native Americans. As one Wisconsin Utility

Authority stated when addressing the Rosebud Tribal Utility Commission, “You are either at the table, or you are on the menu” (LaDuke, 2003). Consequently, more and more tribes are beginning to not only make reservations for a seat at the table, but they are also beginning to take a more proactive stance in deciding what gets put on that menu.

What does sustainability mean to tribes? Again, the APA defines sustainability as “whether the Earth’s resources will be able to meet the demands of a growing human population that has rising aspirations for consumption and quality of life, while maintaining the rich diversity of the natural environment or biosphere” (American Planning Association, 2003). This definition, like many other definitions includes all the right words: resources, growing human population, consumption, quality of life, maintaining diversity, etc., but does not describe what we as a people should do to achieve sustainability. As mentioned before, this definition places the burden of meeting human needs and maintaining the natural environment on the earth, not the people who use the earth’s resources to live their lives the way they want. Unfortunately, this definition severely conflicts with traditional tribal beliefs and practice in general.

**Figure 17. Honoring nature’s bounty.**

Source: myspace.com



According to the Center for Indian Community Development in California, “Traditionally, all tribes lived within the rhythms and cycles of the natural world, ingeniously discovering how to prosper using

what nature provided. As contemporary Tribes work to achieve healthy and prosperous communities, they are presented with the challenge of reconciling their current needs with more traditional practices, particularly those that show respect for nature” (State of California , 2004). This statement suggests tribes figured out how to live within nature’s bounty and took what they could to thrive as a people, but as they have grown in population and with the times, they have had to get creative about how they use their resources so as not to deplete what they have. Nature took care of them, so it is now their duty to take care of nature. This is how they show reverence to nature.

Native elders often tell stories of how tribes traditionally lived in sync with the natural rhythms and cycles of the world. Tribal people had no choice. There were no modern amenities. *Má sání* (Navajo word for “grandmother”) could not just hop in the car and drive to the grocery store to buy food and other supplies so it was necessary to learn and live off the land for survival. The difference was that tribes took only what they needed out of respect for nature’s bounty. That is how tribes traditionally prospered.

With almost daily advances in technology, this practice is no longer practical or necessary. Thus, tribes must find ways of marrying traditional knowledge and practice with technological advancements. It is necessary to do so, but in keeping with traditional practice, it is also important to always show respect for Mother Earth. With respect to housing, one way tribes can marry traditional knowledge and practice with modern technologies while still showing reverence for nature is through green building.

## CHAPTER 3 COMMUNITY PROFILE:

Putting together a community profile means taking a look at the land and the people. Together, the land and the people define the “local level.” Many plans often begin with a brief description or profile of the community. This profile is basically a snapshot of the community at a given time. This snapshot usually summarizes the physical, economic and social changes that have taken place within the community (Daniels et al., 2007). Consequently, this section begins with background on the Navajo Nation to put *Tsé Łichii’* in context.

### 3.1. Background: The Navajo Nation

Historically, the *Diné* have been known to be resilient people constantly adapting to the ever changing world (Underhill, 1956). The hands of time have undeniably transformed the Southwest from a place that was once affluent with diversity to an arid dust bowl (Chiras, 2001). Inconceivable as it is, the Southwest was once a thick forest that was home to wildlife such as deer, antelope, wild turkey, mountain lion, and jackrabbit as well as plant life such as wild berries and herbs (Underhill, 1956). The migratory Navajo people of this time very much depended on the hunting and gathering made possible by the biodiversity of their local landscape (Marshall, Jr., 1981). They also lived a nomadic lifestyle since the Navajo existed in small bands with no central governance.

However, as time went on, and as the Navajo came into contact with more and more people, native and non-native alike, they learned to adapt to and adopt the different practices of the people they came into contact with. Thus, the



Navajo's economic development was promoted by the knowledge and skills learned either by observation or by raiding camps and villages to obtain "teachers" and tools (Marshall, Jr., 1981). Around 1700, the Navajo's way of life was profoundly changed with the Spaniard's introduction of the sheep and horse (Underhill, 1956). The Navajo were quickly converted from a hunting-gathering people to a pastoral people thereby shifting the Navajo economy yet again.

**Figure 18. The Long Walk.**

Source: [www.irwinator.com](http://www.irwinator.com)



Following the onset of raiding, thanks to the horse, the Navajo's economic evolution came to a screeching halt when the United States government began a policy of Indian Removal in the mid-1800s as more and more Natives were identified as problematic (Marshall, Jr., 1981). In 1862, exercising a scorched-earth policy, Kit Carson and his men stormed the southwest in hunt of any and all Navajo, killing livestock and people and destroying homes along the way.

By 1864, the defeated Navajo, or those who were not able to escape to the safety of the mountains, numbering approximately 8,000, were rounded up and forced to march almost 300 miles to Fort Sumner, or *Hwééldi* as the Navajo call it, in the dead of winter. *Hwééldi* was basically a concentration camp in eastern New Mexico. Captives died of starvation, disease, abuse, and lack of supplies. *Hwééldi* proved to be an appropriate place to exile or punish the Navajo effectively as the land was not suitable to sustain any kind of living.

Forced to provide for themselves, the Navajo's attempts to grow crops failed miserably due to the poor soil quality and the salty Pecos River that mockingly flowed past them. They did not have any sheep or horses and were incapable of hunting or gathering effectively as the land they were strictly prohibited from leaving was not as rich in biodiversity as the land from which they were ejected (Marshall, Jr., 1981).

**Figure 19. Rations distribution at Fort Defiance post Long Walk.**

Source: [bloodhound.tripod.com/longwalk.htm](http://bloodhound.tripod.com/longwalk.htm)

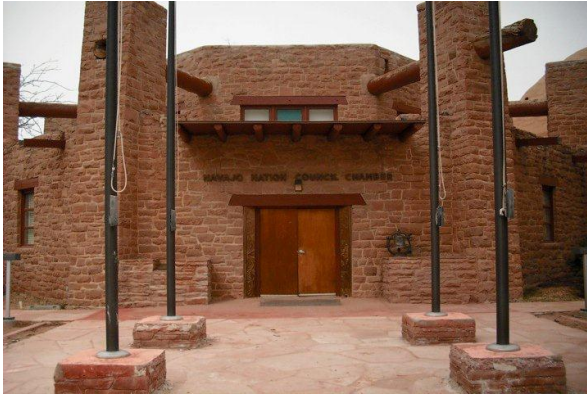


By 1864, it became too expensive for the government to detain the now decimated Navajo at Fort Sumner and a treaty was made between the Navajo and the United States that released the Navajo and allowed them to return to a

portion of their homeland along with a limited supply of sheep and other provisions (Marshall, Jr., 1981). It should have been a good thing that the Navajo were able to go home. However, the stipulations of the treaty essentially placed the Navajo under house arrest as they were treated as wards of the government. For the next 60 to 70 years, the United States government kept a very close eye on the Navajo and made sure the Navajo adhered to all imposed restrictions. As a result, the broken Navajo were not able to recover or institute any kind of economic, political, or social stability and ultimately led to an

unfortunate situation of permanent dependence between the Navajo and the U.S. government (Marshall, Jr., 1981).

**Figure 20. Navajo Nation Council Chambers.**  
Source: Personal photo.



Then in the early 1920's, oil was discovered on Navajo land. This prompted the need for a more systematic form of Navajo government for American oil companies to deal with. Thus, the federal government was pressured by

said oil companies into creating a central Navajo Nation government to help deal with providing leases for oil companies to exploit and develop the oil and gas resources found on Navajo land (Wilkins, 2003). In 1923, a Navajo tribal council consisting of 24 members (12 voting delegates and 12 non-voting alternates) was established to supposedly provide the Navajo people with more representation in government affairs. However, the infant tribal council acted as little more than an “advisor” to the Interior Department’s Commissioner Hagerman (Wilkins, 2003). After almost 90 years of evolution in Navajo tribal government, including the formation of a three-branch system (executive, legislative, and judicial) that upholds the Navajo constitution, the Navajo Nation government exists today as one of the largest and most sophisticated forms of tribal government in the United States today. Up until a few months ago, the tribal council consisted of 88 voting members representing the Nation’s 110 chapters across the reservation. However, with recent legislation, the council

has been reduced to 24 members again making the Nation's future government uncertain.

**Figure 21. Map of the Navajo Nation.**

Source: <http://haskaanhadzohihealth.wordpress.com/>



It is true that the Navajo have come a long way since the Treaty of 1868. Today, the Navajo Nation is the largest Native American tribe in the United States, both in population

and reservation size. The people of the Navajo Nation live on 27,000 square miles of remote reservation land in the Four Corners region of the southwestern United States. The reservation, which is the equivalent of the state of West Virginia area-wise, spans across northeast Arizona, northwest New Mexico, and southeast Utah (Navajo Nation). The reservation boasts beautiful landscapes and a culturally rich heritage.

However, it appears the Navajo still have a long way to go. Marshall's (1981) review of the Navajo tribe post-Fort Sumner reveals:

“A long history of economic exploitation, first by traders, then by corporations engaged in extraction of the Tribe's natural resources. Because of this exploitation, the Navajo economy remains underdeveloped, and the Navajo people are subject to a high degree of deprivation even in comparison to other minority groups within the United States.”

Furthermore, the Navajos, like most American Indians, are poor (Gilbreath, 1973). The following is a table of basic economic figures for the Navajo Nation in comparison to the rest of the country (US Census Bureau, 2000b).

**Table 1. 2000 Census data of the Navajo Nation with respect to the US.**  
(US Census Bureau, 2000b)

	Navajo Nation	United States
Total Population	180,462	281,421,906
% Male	49	49
% Female	51	51
Median Household Income	\$20,005	\$41,994
Per Capita Income	\$7,269	\$21,587
% Population in Labor Force	28	64
Unemployment %	42	3.7
% Persons Below Poverty	42.9	12.4

**Figure 22. Kerosene lamps light the darkness for those without electricity.**

Source:  
[http://photos-e.ak.fbcdn.net/hphotos-ak-snc3/hs094.snc3/16135\\_200712742415\\_807242415\\_2963178\\_2691876\\_n.jpg](http://photos-e.ak.fbcdn.net/hphotos-ak-snc3/hs094.snc3/16135_200712742415_807242415_2963178_2691876_n.jpg)



These numbers, while they may be old, are still a reflection of a low quality of life for the Navajo people. The 2010 Census data will probably show a similar trend. Additionally, these dismal socio-economic conditions are

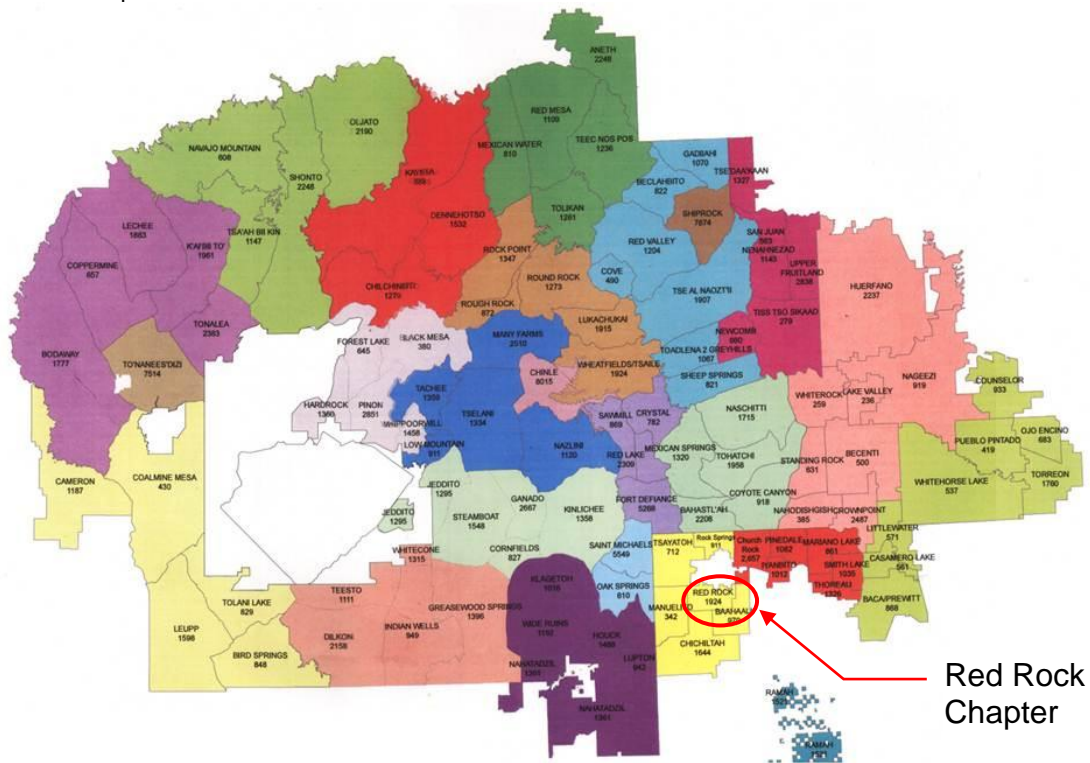
also a reflection of physical conditions. The area suffers from a lack of basic infrastructure and utilities. An estimated 16,000 families, or about one-third of the population, currently live without access to electricity (Navajo Tribal Utility

Authority, 2010). Life without electricity has posed many hardships for the Navajo people including health and safety problems especially for those living in the most remote reaches of the reservation.

### 3.2. Tsé Łichii'

*Tsé Łichii'* (also known as Red Rock Chapter) is one of the Navajo Nation's 110 chapters and belongs to the Crownpoint/Eastern Agency of the five Navajo agencies. The following information was collected from the Red Rock Chapter's official website.

**Figure 23. Map of Navajo Nation Chapter boundaries.**  
Source: <http://leonardtsosie.us>



#### a. Government

In terms of government structure within the *Tsé Łichii'* chapter, *Tsé Łichii'* has one chapter Navajo Nation Council delegate, Charles Damon, II. The



**Figure 24. Chapter meeting at *Tsé Łichii'*.**  
Source: Personal photo.



chapter also has a staff of elected officials consisting of a chapter president, a chapter vice-president, a secretary, and a treasurer. In addition to these elected officials, the chapter also

has a Land Board officer, a Community Service Coordinator, and an Office Specialist. The Navajo police district overseeing *Tsé Łichii'* is the Crownpoint District. There are five tribal offices providing different services within the chapter including: Navajo Nation Department of Head Start (Red Rock Headstart I and II), a Community Health Representative, an Adult In-Home Care Program, a Community Services Program, and a Senior Citizen Program.

## **b. Community Resources and Public Facilities**

**Figure 25. Red Rock Community Chapter House.**  
Source: Personal photo.



For medical services, chapter members go to either Gallup Indian Medical Center in Gallup, NM or Zuni Indian Medical Center in Zuni, NM. As for education, children from the *Tsé Łichii'* chapter have the

option of attending one of the three pre-school/head start schools, three kindergarten-8<sup>th</sup> grade schools, and three high schools located in the Gallup, Wingate, and Bread Springs areas.

There are no recreational facilities available in the *Tsé Łichii'* chapter. There are however, four public facilities available for use by chapter members including, office space at the chapter house itself, a warehouse, a head start facility, and a Quonset hut building. The chapter also maintains equipment including a grader for grading roads and such and a pickup truck for official chapter business use.

In terms of civic organizations, there are three churches available within the chapter boundaries for chapter members to attend. These three churches are: Red Rock Church of God, Dineh Methodist Mission, and St. Jerome Catholic Church. Those who do not attend an organized church might practice traditional Navajo religion through the Native American Church. There are no active community organizations reported in the *Tsé Łichii'* area.

### **c. Current Land Use**

To date, there is no commercial or industrial activity taking place within the chapter boundaries. Such activity takes place in neighboring municipalities like Gallup, NM, Window Rock, AZ, and Crownpoint, NM. Most people from *Tsé Łichii'* who do work, commute to work in these areas with major employers being the Indian Health Service and the Bureau of Indian Affairs. Those who have found employment within the chapter work at one of the following places: Red



Rock Head Start, the chapter house itself, the Senior Citizen's Center, or some other Navajo tribal office.

There is some agricultural production taking place within the chapter boundaries, but is relatively small-scale and limited to individual families planting their own fields for their personal use. Agriculture in this sense is mostly dry-land farming consisting of corn fields with a little bit of squash, pumpkins, and beans planted here and there. The end product is usually not sold for profit but used as an extra food source for those families who have the land to plant and harvest a field. Sometimes planting a field is a communal effort where everyone who participates in the planting, maintenance, and harvesting of a field has fairly equal access to the yield.

#### **d. Geography**

In terms of geography, *Tsé Łichii'* is located roughly five miles south of Gallup, NM along NM State Highway 602. *Tsé Łichii'* encompasses roughly 42,000 acres of the Navajo reservation and hugs the southern and western boundaries of Gallup. The topography varies with mountainous areas with fairly steep slopes to valley floors scarred with a widespread system of severely incised arroyos. Finally, *Tsé Łichii'* has two local natural resources: coal and a good water table.

#### **e. Population Characteristics**

According to the 2000 Census, *Tsé Łichii'* has about 2,000 Navajo tribal members living within the chapter's boundaries. The following is a table of population counts for the years 1980, 1990, and 2000:

**Table 2. Census data showing Indian population in *Tsé Łichii'*.**  
(Red Rock, n.d.)

Census Year	Indian Population
1980	1,573
1990	1,022
2000	1,974

From 1980 to 1990, the *Tsé Łichii'* population decreased by almost 35%; losing 551 members. Then from 1990 to 2000, the population almost doubled in size; by 952 members to be exact. *Tsé Łichii'* demographics are summarized in the following table derived from the 2000 Census:

**Table 3. 2000 Census data comparing *Tsé Łichii'* with the Navajo Nation.**  
(US Census, 2000b & 2000c).

	<i>Tsé Łichii'</i>	Navajo Nation
Total Population	2,030	180,462
% Male	48.5	49
% Female	51.5	51
Median Age	23.6	23.8
Total Households	533	27,442
Average Household Size	3.81	3.78

The total population in *Tsé Łichii'* makes up about 1 percent of the total Navajo Nation's population. Then the number of households present in *Tsé Łichii'* make up almost 2 percent of the total number of households on the Navajo reservation. The rest of the numbers for *Tsé Łichii'* seem to match with the overall population map of the rest of the Navajo Nation.

## f. Economic Data

**Table 4. Economic data for *Tsé Łichii'* and the Navajo Nation**  
(US Census, 2000b & 2000c)

	Tsé Łichii'	Navajo Nation
Median Household Income	\$18,059	\$20,005
Per Capita Income	\$5,983	\$7,269
% Population in Labor Force	42.8	28
Unemployment %	15.7	42
% Persons Below Poverty	55.5	42.9

Most of the numbers from *Tsé Łichii'* match the numbers for the rest of the Navajo Nation. The biggest difference would be in the percentage of population in the labor force. For *Tsé Łichii'*, the percentage of people living within the chapter who are in the labor force is 42.8% compared to the Navajo Nation's 28%. This means more people are employed who live in *Tsé Łichii'* compared to those living in other parts of the Navajo reservation. So, it makes sense that the unemployment rate for *Tsé Łichii'* is also less than the total percentage for the entire Navajo Nation at 15.7% and 42% respectively. This means *Tsé Łichii'* has a greater proportion of its people working than the rest of the Navajo Nation so the unemployment rate in *Tsé Łichii'* is lower than the rest of the Navajo Nation. However, even though the unemployment rate in *Tsé Łichii'* is lower than the rest of the Navajo Nation, those who are employed in *Tsé Łichii'* make slightly less money than those who are employed in the greater Navajo Nation.

At 64.2% of the labor force, a majority of those employed work as private wage/salary workers. Another 33.5% work as government workers and 2.2% of the remaining work force are self-employed workers. With a better picture of

what *Tsé Lichii'* looks like in terms of the land and people, a better work plan can be developed.

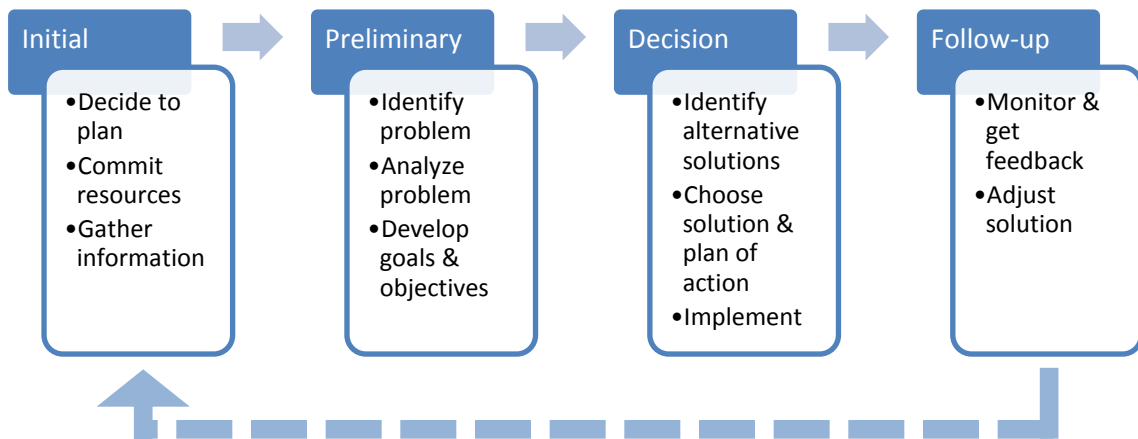
## CHAPTER 4 WORK PLAN & PUBLIC INVOLVEMENT:

Putting together a work plan and outlining public involvement begins with asking what specific activities need to be done to implement a plan. In this case, defining the community planning process is the first and most important step for compiling and implementing a work plan.

### 4.1. The Community Planning Process

The community planning process is governed by four phases with steps to be followed at each phase and a possible feedback loop at the end (Daniels et al., 2007).

Figure 26. The Community Planning Process.



In the explanation that follows, the words “community” and “chapter” will be used interchangeably. The word “community” is another one of those words that can mean different things to different people and its definition depends on context. In this case, the Navajo people living within the *Tsé Łichii’* chapter boundaries make up the community.

The community planning process begins with an initial phase of making the sometimes difficult decision to plan and committing the necessary resources to plan and gather information. For *Tsé Łichii'*, this phase usually begins when either a community member brings an issue to the chapter's attention or the chapter officials recognize a need within the community. Whatever the case, the issue is addressed at a planning meeting and then placed on the agenda for community input at the next chapter meeting. At this chapter meeting, the community members vote on whether or not the issue is worth addressing or if they have the resources to address the issue and do the necessary research.

The preliminary phase consists of problem identification and analysis followed by the development of goals and objectives. For *Tsé Łichii'*, the planning committee or group of concerned community members will identify the source of the issue. This is done by taking an inventory of everything that could be contributing to the issue including but not limited to land uses, infrastructure, housing and other buildings, the community's economic base, the natural environment, the chapter's organizational structure, etc. (Daniels et al., 2007). This is also where the planning committee determines what would happen if certain changes took place to address the issue, if no changes took place, and finally how changes should take place within the community. At this point, community input is necessary for a couple of reasons. For one, community input secures valuable knowledge about the community from community members. This is important because community members have significant and very useful information about the community that nobody else knows. In this sense, the

community members become the experts. Second, community input also insures the plan ultimately follows the community's vision. With active community participation, the community members can see for themselves where the plan is headed and can stop the bus, so to speak, if they sense they are headed in the wrong direction.

The decision phase is where alternative solutions are identified and a solution and plan of action is selected for implementation (Daniels et al., 2007). At this point, the *Tsé Lichii'* planning committee will have enough information to have done a comprehensive analysis of the issue. This analysis will be the backbone of any solutions that are identified. Right away, at least three solutions should be identified. One solution should reflect actions or changes that should take place within the community, another should include no action or change; and a third should offer a perspective on how these actions or changes should occur. With community input, a solution should be chosen that reflects the needs, values, and vision of the community. The chosen solution should also outline goals and objectives for achieving the community's vision. These outlined goals and objectives will serve as the foundation for an action plan as defined by the community. Finally, this chosen plan is acted on by the planning committee and community members.

The follow-up phase is where the plan chosen and implemented is monitored for feedback purposes from the community and where changes can be made to the plan accordingly. This is where community members can offer their ideas on how well they think the plan is working and offer suggestions for

adjustments. One way the *Tsé Łichii'* community members can tell if the plan is working or not is by using benchmarking (Daniels et al., 2007), or creating measureable targets that are tied to the plan's goals and objectives and reveal tangible results. For example, the *Tsé Łichii'* chapter sets a goal of incorporating green building standards into future housing. The chapter then decides to build three new homes that each have a passive solar design with all new Energy Star appliances and low-flow plumbing fixtures by 2015. If the chapter is able to build said houses by 2015, then they know they have hit their target. If however, the chapter is not able to build anything by 2015 because the planning committee and/or community members would find a serious problem with the plan and agree the plan is not working; they can return to the initial phase and start over as they see fit.

#### **4.2. Indigenous Planning**

Some might argue that the community planning process previously outlined does not mesh well with traditional tribal practice or that the community planning process is too Western and belongs to the *bilagáana* way of doing things. This is why we also have to consider Indigenous planning (Jojola, n.d.) which basically means we, as tribal people, share the same worldview that we, as tribal nations, have been planning right from the beginning. While we might not have called ourselves planners or what we were doing planning per se, in the broadest sense of the word, planning, is exactly what we did as tribal people when we learned to live within our means and only take from the land what we needed out of respect for the land and so we could survive.



One way Indigenous planning differs from the more westernized way of planning or the traditional comprehensive planning model is that Indigenous planning moves beyond the usual inventory approach (Jojola, Indigenous Planning and Community Development). Western planning and the comprehensive planning model is usually characterized by action planning where a community first makes an inventory of their resources and then acts based on the resources they have available. This approach does not work well for tribes because tribal communities usually have little to no resources to begin with. Planning with this model limits what tribes can do like the way a child's creativity is stifled by the number and variety of crayons offered at restaurants. Restaurants offering kid's menus that double as coloring sheets usually offer three different colored pre-packaged crayons. Even the most imaginative child will find they cannot make the colors they need to color their page given their limited coloring options but will do what they can with the crayons they have.

**Figure 27. An example of strategic planning: Navajo Nation Energy Policy Development Working Group Meeting.**

Source: Personal photo.



Indigenous planning on the other hand has evolved into a practice that focuses more on strategic planning (Jojola, n.d.). Whereas action planning tends to focus on the present and what can be done now given available resources, strategic planning anticipates change and considers

how that change should be managed (Daniel et al., 2007). Thus, the question shifts from “what can we do with what we have?” to “what do we do to get where we want to be?” This planning approach no longer limits what tribes can do because they can look beyond their scarce resources and design a vision statement that speaks to the needs and values of the community. Since strategic planning is designed to maximize the results of a community’s efforts (Daniels, Keller, Lapping, Daniels, & Segedy, 2007), Indigenous planning has become a planning model that uses strategic planning to construct the overall structure of a plan and exercises action planning as the mechanism for achieving the plan’s goals and objectives.

#### **4.3. Planning and Green Building**

Some of the planning tools we can make use of are rooted in an understanding of green building, what it means by definition and what some of the benefits and elements of green building are that make sense of current situations. Green building research and literature today is almost limitless and continues to grow with almost daily advances in new construction and building materials technologies. However, the supply of green building research and literature shrinks dramatically when explored through the lens of tribal housing and is almost non-existent when one tribe becomes the focus. As such, this paper concentrates on green building practices and ideas that are most relevant to the Navajo Nation and draws on my own observations and thoughts about green building from various conferences I have attended and publications I have collected about green building practices and ideas created by and for tribal

communities in general. My intention is not to declare a universal definition of green building for all tribal communities. Rather, my intention is to provide context for green building as I have come to understand the concept and how it applies to tribal communities so these communities have a working framework to define green building in their own terms.

**a. Definition**

In December 2007, the U.S. Department of Housing and Urban Development (HUD) Office of Native American Programs (ONAP) hosted a 2-day training called “Greener Homes: Creating Energy Efficient, Comfortable and Healthy Tribal Homes” in Santa Fe, NM. The training provided informational workshops on home energy efficiency and comfort, energy basics, indoor air quality, mold and moisture prevention, renewable energy resources, resident strategies, and information on Energy Star (Greener Homes Course Introduction, 2007).

The training began with a brief introduction to green building starting with why tribes should consider incorporating green building practices into their housing projects. According to an early presentation, there are two main reasons for why tribes should consider green building on tribal land. For one, sustainable practices such as green building facilitate tribal people’s ability to work toward achieving healthy, livable communities.

With this in mind, green building is defined as creating healthier and more resource-efficient buildings through:

- Construction and renovation methods,

- Operation and maintenance, and
- Designs that focus on entire building lifecycle (Greener Homes Course Introduction, 2007).

Second, green building allows tribal people to reconnect with the natural world. By going back to designs and building practices that are environmentally sensitive, tribal people can also (re)learn to be conscientious of their impact on the natural environment. Green building integrates buildings and the people who use them back into the natural environment through the use of:

- Natural and local materials,
- Natural and passive ventilation,
- Temperature control and lighting,
- Resource conservation and protection, and
- Environmentally sensitive site design (Greener Homes Course Introduction, 2007).

#### **b. Elements**

According to HUD ONAP, green building is composed of eight elements.

These green building elements include:

- Energy efficiency,
- Sustainable development,
- Environmentally preferable building materials,
- Renewable energy,
- Indoor environment,
- Water stewardship,

- Waste reduction, and
- Toxic reduction.

At first glance, addressing these eight elements may appear daunting. However, these eight different elements can be addressed by a sustainable design strategy that addresses six elements of building design and construction.

These strategies include a consideration for the following elements:

- Site,
- Water,
- Energy,
- Materials,
- Indoor environment, and
- Education.

#### **b.1. Site**

Because buildings have a huge impact on the local environment, it is important to consider how the building is sited. This means paying attention to where the building is located, how it fits into the local landscape and existing community and what infrastructure may or may not be needed. Careful site selection upfront can save a lot of time and money related to construction costs and man power. Some sustainable siting criteria for considering site selection include:

- Using appropriate building sites,
- Preserving open space,
- Reducing sprawl,

- Developing brownfields,
- Safeguarding endangered species,
- Restoring damaged environments, and
- Designing to optimize sun, wind, and light (State of California , 2004).

**Table 5. Sustainable siting criteria and questions to ask.**

Siting Criteria	Questions To Ask
Using Appropriate Building Sites	<ul style="list-style-type: none"> <li>• Does the site have existing infrastructure (i.e. roads, utility lines, parking, community buildings, etc.)?</li> <li>• Is this land on prime farmland?</li> <li>• Is the elevation of the land within or near a 100-yr flood plain?               <ul style="list-style-type: none"> <li>○ Is the land adjacent to a waterway that has at least a 1% chance of flooding in any given year (Daniels, Keller, Lapping, Daniels, &amp; Segedy, 2007)?</li> <li>○ Can check FEMA maps to make sure</li> </ul> </li> <li>• Was this land previously used for public parks (Tribal, Federal or State)?</li> </ul>
Preserving Open Space	<ul style="list-style-type: none"> <li>• Will this housing project include open space?</li> <li>• If undeveloped, is any portion suitable for:               <ul style="list-style-type: none"> <li>○ Wildlife and plant habitat</li> <li>○ Natural areas</li> <li>○ Important wetlands or watershed lands</li> <li>○ Trails for non-motorized activities</li> <li>○ Low-impact activities</li> <li>○ Little or no land disturbance? (Definition of Open Space and Evaluation Criteria)</li> </ul> </li> </ul>
Reducing Sprawl	<ul style="list-style-type: none"> <li>• Is the site near existing infrastructure?</li> <li>• Will new housing be scattered?</li> <li>• Could new housing be clustered?</li> </ul>
Developing brownfields	<ul style="list-style-type: none"> <li>• Was this site formerly used for industrial or commercial activity?</li> <li>• Could this site be potentially contaminated with hazardous substances, pollutants or other contaminants because of this industrial or commercial activity? (Brownfields Definition: Brownfields and Land Revitalization)</li> </ul>

Table 5 (cont.)

Safeguarding Endangered Species	<ul style="list-style-type: none"><li>• Is the site home to endangered or threatened species?</li><li>• Is this site a designated wetland (i.e. swamps, marshes, bogs)?</li></ul>
Restoring Damaged Environments	<ul style="list-style-type: none"><li>• Is there any opportunity to restore damaged lands to its natural state on this site?</li></ul>
Designing to optimize sun, wind, and light	<ul style="list-style-type: none"><li>• Does the site have exposure to the sun?</li><li>• Is the site exposed to views of the surrounding landscape?</li><li>• Is the site located outside typical wind patterns?</li></ul>

While location is an important component of appropriate siting, it is also important to consider how well a new development or building will blend into the surrounding landscape or existing community. Some sustainable criteria for site integration include:

- Enhancing naturally occurring biodiversity,
- Minimizing site disturbances,
- Managing stormwater,
- Optimizing transportation options,
- Reducing heat island, and
- Reducing light pollution (State of California , 2004).



**Table 6. Sustainable siting criteria and design strategies to consider.**

Sustainable Siting Criteria	Design Strategies to Consider
Enhancing Naturally Occurring Biodiversity	<ul style="list-style-type: none"> <li>• Avoid/limit significant alteration of sensitive topography</li> <li>• Avoid removing or relocating natural vegetation and/or wildlife habitat</li> <li>• Create car-free areas for pedestrians like parks</li> </ul>
Minimizing Site Disturbances	<ul style="list-style-type: none"> <li>• Adopt a site management plan</li> <li>• Mitigate degradation of water and soil quality by:               <ul style="list-style-type: none"> <li>○ Establish clear directions for construction operations of equipment &amp; vehicles</li> <li>○ Avoid hazardous material spills</li> </ul> </li> </ul>
Managing Stormwater	<ul style="list-style-type: none"> <li>• Minimize the amount of impervious surfaces like paving</li> <li>• Capture runoff where possible</li> <li>• Increase the amount of porous surfaces on the site               <ul style="list-style-type: none"> <li>○ Use mulching</li> <li>○ Include areas for vegetation like gardens</li> <li>○ Consider green roofs</li> </ul> </li> </ul>
Optimizing Transportation Options	<ul style="list-style-type: none"> <li>• Site buildings near existing public transportation</li> <li>• Include amenities for bicyclists               <ul style="list-style-type: none"> <li>○ Bike lanes</li> <li>○ Parking for bicycles</li> <li>○ Places to lock bicycles</li> </ul> </li> <li>• Provide incentives like better parking for carpools</li> </ul>
Reducing Heat Islands	<ul style="list-style-type: none"> <li>• Plant more trees/vegetation or take advantage of existing trees/vegetation for shading and cooling</li> <li>• Use reflective or light colored roofing material</li> <li>• Limit the amount of dark paved surfaces</li> </ul>
Reducing Light Pollution	<ul style="list-style-type: none"> <li>• Dim outdoor lighting</li> <li>• Block bright lights with trees or other building features</li> </ul>

The fore mentioned siting selection and integration criteria can save a project money, time and resources and should be considered especially when building on a site that has not already been built on. This will most likely be the case throughout much of the Navajo reservation because most of the reservation has not been developed or does not have adequate access to infrastructure. Regardless, the above criteria should be considered to facilitate a new building's seamless integration into the natural environment and local community.

## **b.2. Water**

The second design strategy for sustainable development focuses on water. Water is arguably the most vital resource required for survival by all living things and is a precious resource in the arid southwest. The Center for Indian Community Development finds, "sustainable water strategies involve every aspect of water use, from stewardship of local sources to reducing use indoors and out and managing wastewater" (83). These techniques are designed to maximize water conservation efforts and sustainable water and landscaping strategies include:

- Developing a water use management plan
- Indoor water conservation,
  - Using low-flow plumbing fixtures
  - Using high-performance appliances
- Outdoor water conservation, and
  - Using rainwater collection systems
  - Using sustainable landscaping techniques

- Using high-efficiency irrigation systems
- Innovative waste water management
  - Using gray water recovery systems
  - Using waterless urinals
  - Using biological treatment of other “off grid” systems.

**Table 7. Sustainable water and landscaping strategies.**

Sustainable Water and Landscaping Strategies	Design Strategies to Consider
Using Low-flow Plumbing Fixtures	<ul style="list-style-type: none"> <li>● Install low-flow showerheads and other plumbing fixtures in the kitchen and bathroom(s)</li> <li>● Install low-flow toilets</li> </ul>
Using High-performance Appliances	<ul style="list-style-type: none"> <li>● Consider installing residential front-loading tumbling washing machines</li> <li>● Install water-efficient dish washers</li> <li>● Install Energy Star rated appliances</li> </ul>
Using Rainwater Collection Systems	<ul style="list-style-type: none"> <li>● Capture rainwater for reuse in and outdoors</li> <li>● Design rooftops to catch rain with pitched roofs and gutters with downspouts</li> <li>● Install rainwater barrels</li> </ul>
Using Sustainable Landscaping Techniques	<ul style="list-style-type: none"> <li>● Retain as much native vegetation as possible</li> <li>● Reuse vegetation removed from construction sites</li> <li>● Xeriscaping</li> <li>● Minimize/avoid planting non-native vegetation or exotic plants</li> <li>● Minimize use of chemical fertilizers/pesticides</li> <li>● Plant edible plants where possible</li> <li>● Take advantage of natural contours of the land</li> <li>● Preserve topsoil during construction</li> </ul>

Table 7 (cont.)

Using Innovative Waste Water Management Strategies	<ul style="list-style-type: none"><li>• Using gray water recovery systems to cut the amount of potable water used where non-potable water is adequate</li><li>• Using biological waste treatment or other “off grid” systems including composting toilets</li></ul>
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### **b.3. Energy**

Energy should be addressed in the same fashion as water where conservation is the name of the game. Green building attempts to break the modern building practices that ignore energy efficiency and resource conservation. Since buildings are one of the biggest culprits for greenhouse gas emissions, it is crucial to address the way in which energy is used in buildings. One way to do so is to design with energy efficiency in mind. What's more, an energy efficient home is a home that saves money. For example, one of the easiest and most cost effective steps a homeowner can take is replace incandescent light bulbs with compact fluorescent light bulbs. If every household in the United States replaced just one incandescent bulb with an Energy Star rated model, then more than 8 billion kWh (the equivalent of removing 1 million cars from the road per year) of energy could be saved (as quoted in “Greener Homes”). Some energy efficiency strategies include having a:

- Passive solar design
  - Optimizing site, design and orientation
  - Landscaping to provide natural shade
  - Using natural day lighting

- Using natural heating and ventilation
- Energy management plan
  - Evaluating tradeoffs and minimizing projected energy costs
  - Training building occupants
  - Tracking and optimizing performance over time
  - Employing an energy management system and commissioning
- Energy efficiency products, or using high performance:
  - thermal insulation,
  - roofing and glazing
  - lighting
  - Heating, ventilation, and air conditioning systems
  - Appliances (State of California , 2004).

**Table 8. Energy efficiency strategies.**

Energy Efficiency Strategies		Design Strategies to Consider
Passive Solar Design	Optimizing Site, Design and Orientation	<ul style="list-style-type: none"> <li>• Site buildings so southern exposure is clear of large obstacles that block sunlight</li> <li>• Site buildings on an east-west axis to maximize solar gain through south-facing windows during winter months</li> <li>• Design overhangs to shade windows during summer months</li> <li>• Build an earth wall on the north side of building to minimize heat loss</li> </ul>
	Strategically Design Landscaping	<ul style="list-style-type: none"> <li>• Plant deciduous trees on south side of building to provide shade in the summer but still allow solar gain in the winter</li> <li>• Plant evergreens on the north side of the building to block cold winter winds</li> </ul>
	Using Natural Day Lighting	<ul style="list-style-type: none"> <li>• Use glazing to funnel light where it is needed</li> <li>• Consider small skylights</li> <li>• Consider more efficient solar light tubes</li> <li>• Install windows in every room</li> </ul>
	Using Natural Heating and Ventilation	<ul style="list-style-type: none"> <li>• Incorporate elements that allow thermal massing like heavy masonry in the walls (tromb� walls) or concrete slabs in the flooring</li> <li>• Install ceiling fans and high windows to encourage air flow and cooling</li> <li>• Install a window in every room</li> </ul>
Preparing an Energy Management Plan		<ul style="list-style-type: none"> <li>• Evaluate tradeoffs and minimize projected energy costs with a cost-benefit analysis</li> <li>• Train building occupants on operation and maintenance of appliances and energy saving design</li> <li>• Employ an energy management system to reduce overall energy use</li> </ul>

Table 8 (cont.)

Using Energy Efficient Products	Use High-Performance Thermal Insulation To Reduce Energy Use	<ul style="list-style-type: none"> <li>• Consider R-values of at least R13 to R-15 for walls, R38 to R60 for attics/ceilings and R25 to R-30 for floors (Energy Savers Booklet: Tips on Saving Energy &amp; Money at Home, 2009)</li> <li>• Design tight building envelopes to reduce leakage but not to constrain ventilation</li> </ul>
	Using High-Performance Roofing And Glazing	<ul style="list-style-type: none"> <li>• Use reflective or light colored roofing material</li> <li>• Use double pane windows, tinted windows, or Low-E windows treated with an energy-efficient glaze</li> </ul>
	Using High-Performance Lighting Systems	<ul style="list-style-type: none"> <li>• Focus and aim lighting to provide the right amount of light for specific tasks</li> <li>• Use day light first and for as long as possible</li> <li>• Use high-efficient alternatives to incandescent bulbs such as compact florescent light bulbs or LEDs</li> <li>• Use dimmers where possible</li> </ul>
	Using High-Performance Heating, Ventilation & Air Conditioning Systems	<ul style="list-style-type: none"> <li>• Use Energy Star air conditioning system</li> <li>• Consider installing a heat pump</li> <li>• Consider using radiant cooling systems or evaporative cooling over refrigerated air</li> <li>• Install programmable thermostats</li> <li>• Install wood pellet stoves certified by the EPA</li> </ul>
	Using High-Performance Appliances	<ul style="list-style-type: none"> <li>• Choose Energy Star rated appliances</li> <li>• Choose energy efficient water heaters</li> <li>• Consider installing a solar water heating system</li> </ul>

**b.4. Materials**

Green building addresses materials by using building materials that have the least environmental impacts throughout their life cycles. This means reusing

and recycling materials. Other green building products are designed and required to have the highest safety and performance ratings. As mentioned before, half of the wood cut in the US is used for building construction and a significant proportion of this virgin wood is discarded as waste during and after construction. Using these materials translates into one of the biggest material conservation strategies for building and reducing waste. Strategies for using green building materials include:

- Preparing a green building product selection plan,
- Using salvaged building products,
- Using recycled-content building products,
- Using locally available materials,
- Using rapidly renewable or naturally occurring resources,
- Using certified wood or structural insulated panels (State of California , 2004).

**Table 9. Green building materials strategies.**

<b>Green Building Materials Strategies</b>	<b>Design Strategies to Consider</b>
Preparing a Green Building Product Selection Plan	<ul style="list-style-type: none"> <li>• Research green building materials and find out what is available in your area</li> <li>• Research how green building materials compare to conventional building materials</li> <li>• Discuss your green building priorities with your contractor so everybody understands the goal of the project</li> </ul>



Table 9 (cont.)

<p>Using Salvaged Building Products</p>	<ul style="list-style-type: none"> <li>• Locate a local salvage business</li> <li>• Use salvaged items including doors, framing, windows and plumbing fixtures</li> <li>• Use reclaimed lumber</li> </ul>
<p>Using Recycled-content Building Products</p>	<ul style="list-style-type: none"> <li>• Research specifications and suppliers of high quality building materials with recycled content</li> <li>• Use recycled-content materials such as             <ul style="list-style-type: none"> <li>○ Lumber</li> <li>○ Carpet</li> <li>○ Insulation</li> </ul> </li> </ul>
<p>Using Locally Available or Naturally Occurring Building Products</p>	<ul style="list-style-type: none"> <li>• Research and locate locally available products to save on transportation costs/impacts and help boost local economy</li> <li>• Use locally available/produced construction products like Navajo FlexCrete or similar aerated concrete products</li> <li>• Use materials made from rapidly renewable resources</li> </ul>
<p>Using Smart Wood or Alternative Lumber Products</p>	<ul style="list-style-type: none"> <li>• Use wood certified by the Forest Stewardship Council (stamped FSC)</li> <li>• Use structural insulated panels (SIPs) for floors, walls and roofs</li> </ul>

**b.5. Indoor Environment**

The indoor environment should not be ignored. While it should be considered best practice to consider how a building impacts the natural environment, it is also important to consider how buildings affect the occupant especially since buildings are built for occupant use in the first place. In general, Americans spend more than 80 to 90% of their time indoors (State of California ,

2004). Therefore, steps should be taken to address the health and safety of building occupants. Some strategies for insuring indoor air quality include:

- Ensuring adequate ventilation,
- Designating indoor spaces as smoke-free and implementing tobacco smoke controls,
- Using low-emitting building products,
- Installing controllable systems, and
- Preparing an indoor air quality management plan for construction and early occupancy (State of California , 2004).

**Table 10. Enhanced indoor air quality strategies.**

<b>Enhanced Indoor Air Quality Strategies</b>	<b>Design Strategies to Consider</b>
Ensuring Adequate Ventilation	<ul style="list-style-type: none"> <li>• Design an effective ventilation system with floor vents for input air and ceiling vents for outtake</li> <li>• Evaluate outdoor air quality for intake</li> <li>• Locate intake ducts properly</li> <li>• Use efficient air filtration</li> <li>• Make sure room registers and return ducts are configured correctly and not blocked</li> <li>• Take measures to eliminate moisture and retard mold growth within HVAC systems</li> <li>• Evaluate tradeoffs between effective ventilation and energy efficiency</li> </ul>
Using Low-emitting Building Products	<ul style="list-style-type: none"> <li>• Research volatile organic compounds (VOCs)</li> <li>• Use building products that do not emit VOCs including paint, carpet and adhesives</li> <li>• Use formaldehyde-free products</li> </ul>

Table 10 (cont.)

Installing Controllable Systems	<ul style="list-style-type: none"> <li>• Give occupant control over some devices</li> <li>• Install windows that can be opened/closed</li> <li>• Install programmable thermostats</li> </ul>
Preparing an Indoor Air Quality Management Plan for Construction and Early Occupancy	<ul style="list-style-type: none"> <li>• Direct contractors to take measures to protect HVAC systems from contamination</li> <li>• Address sequence of events so carpet is not laid before painting so carpet does not absorb VOCs offgassing</li> <li>• Do not allow occupancy for two weeks after construction is complete</li> <li>• HVAC system should run during this two week period to air out building</li> <li>• Educate occupants of operation &amp; maintenance of systems and materials</li> </ul>

**b.6. Education**

Education is vital for successful implementation of sustainable design strategies. Since the homeowner knows how to best run their households, it is also important for them to understand how to run the house itself. The benefits and cost savings of a green building can only be achieved and maximized when the occupant understands how each feature works and what their responsibilities as homeowners are to make sure the features work to their potential. Just like how new automobiles or other new equipment come with an owner’s manual, a new home with green building technologies should also come with an owner’s manual. However, this manual should be written in simple terms and include examples where possible so as not to confuse and potentially frustrate homeowners. This is especially important for Navajo families who are not used to dealing with such new features in a home. The following table outlines

sustainable education criteria and low-cost design strategies that could be included in such a manual for homeowners.

**Table 11. Sustainable education criteria.**

Sustainable Education Criteria	Low-Cost Design Strategies to Consider
Preparing a Handbook for Homeowner	<ul style="list-style-type: none"> <li>• Explain the benefits of living in a green building</li> <li>• Explain the tradeoffs between upfront costs and the long term savings associated with green building</li> <li>• Explain the features of the building (passive solar design, energy efficiency, etc.)</li> <li>• Explain how the homeowner can best take advantage of green building features</li> <li>• Explain how to operate and maintain equipment and appliances</li> <li>• Explain the responsibility of living in a green building</li> </ul>
Preparing a Water Use Management Plan for Building Occupants	<ul style="list-style-type: none"> <li>• Explain how water conservation is critical</li> <li>• Include projections of potential cost savings</li> <li>• Provide a summary of local water quality testing results if available</li> <li>• Offer suggestions for reducing water use</li> </ul>
Understanding & Using Low-cost Water Conservation Techniques	<ul style="list-style-type: none"> <li>• Repair leaky faucets</li> <li>• Take shorter showers</li> <li>• Do not run water while brushing teeth and/or shaving</li> <li>• Insulate exposed hot water pipes</li> <li>• Only run full loads in washer &amp; dishwasher</li> </ul>

Table 11 (cont.)

Understanding & Using Energy Efficiency Techniques	<ul style="list-style-type: none"><li>• Turn off lights when not in use</li><li>• Group and plug appliances into power strips to ensure appliances are completely shut off when not in use</li><li>• Use CFLs in place of incandescent bulbs</li><li>• Use natural day lighting for long as possible</li><li>• Lower the thermostat on your water heater to 120°F</li><li>• Consider air drying clothes on a clothes line</li></ul>
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Most of these strategies come from an energy savers manual that was developed for the US Department of Energy, Office of Energy Efficiency & Renewable Energy by the National Renewable Energy Laboratory (National Renewable Energy Laboratory, 2009).

### c. Benefits

HUD ONAP also identifies three benefits of green building. In addition to understanding what makes a building a green building, it is also important to understand the benefits of green building as an approach to conservation and ecologically friendly design. The three benefits are: environmental, economic and social. Each of these benefits can be broken down even more to include the following:

- Environmental benefits of green building include:
  - Enhancement and protection of biodiversity and ecosystems
  - Improved air and water quality
  - Conservation and restoration of natural resources
  - Reduced energy consumption and climate impacts

- Reduced waste streams
- Economic benefits include:
  - Reduced operation and maintenance costs
  - Creation and/or expansion of local markets for green products and services
- Social benefits include:
  - Enhanced community values
  - Heightened aesthetic qualities
  - Enhanced occupant comfort and health
  - Minimized strain on local infrastructure
  - Improved quality of life for occupants and community.

Quite arguably, a fourth benefit might be cultural because the goal of green building is to build with as minimal impact on the earth as possible. This goal falls in line with traditional Native American ceremonies and practices that pay respect to Mother Earth. So green building would be a way of also paying respect to Mother Earth. Additionally, tribal communities benefit from green building when cultural values and practices are respected and observed in the design. For example, Navajos traditionally place the front entrance of their homes facing east. This is done to pay reverence to and welcome all the blessings of the morning sun. So, a housing project on the Navajo reservation could honor and respect this practice by designing houses with east-facing front entrances. If a house is designed with appropriate cultural references, then the community might be more inclined to honor and respect the green building

elements of a home by taking better care of the building itself because they feel the design of the house respects their cultural values.

## CHAPTER 5 IMPLEMENTATION:

Sometimes even the best plans end up collecting dust on a shelf in a forgotten closet in some office somewhere (Daniels et al., 2007; Wheeler, 2004). For this reason, plans should be written with the ultimate goal of being implemented.

### 5.1. Sustainability Planning

**Figure 28. Navajo Energy Policy Strategic Planning Meeting.**  
Source: Personal photo.



Planning for the implementation of green building technologies on Navajo land must take a different approach than the “business as usual” approach. This means incorporating the basic tenets of sustainability

planning into already established ideals of indigenous planning. According to Wheeler (2004), “Plans are only effective if they are implemented, inspire action, or otherwise help bring about changes in the world.” In this case, the most effective and constructive planning approach is sustainable planning where all parties involved can first conceptualize problems differently and then address the true challenges of housing planning for the Navajo people.

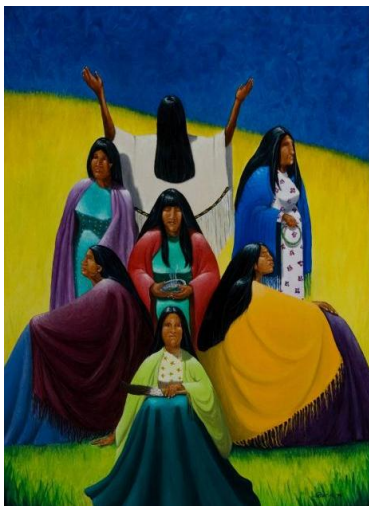
Furthermore, a housing plan for *Tsé Łichii’* must not only make people want to build better homes but must also change the way these people use



energy in their homes. This means crafting a plan that speaks to the needs and values of the people living in *Tsé Łichii'* rather than trying to implement another cookie cutter plan that ignores the character of the people and *Tsé Łichii'*'s sense of place. As such, Wheeler (2004) identifies five elements to differentiate sustainability planning from “business as usual” planning:

- A long-term perspective,
- A holistic outlook,
- Acceptance of limits,
- A focus on place, and
- Active involvement in problem-solving.

**Figure 29. Seven generations.**  
Source: <http://fineartamerica.com>



A long-term perspective considers an expanded time horizon where the goal is to make sure planning efforts by the *Tsé Łichii'* chapter at the chapter level enable the Navajo Nation as a whole to thrive well into the future. Given the changing times, it is simply not enough for the Navajo Nation just to get by as it has. Considering an expanded time horizon is not only implicit to the concept of sustainability, but also corresponds with the Seven Generations philosophy of Native American idealism. The lesson behind the Seven Generations philosophy “is to care for the earth and the people on it, care about future generations, and live as sovereign people for seven generations to come” (Begay-Campbell, n.d.).

By looking to the seventh generation, an assessment of how short or near-term and specific actions can guide long-term goals can be made.

**Figure 30. Deciduous trees shade south side of home.**

Source: (US Department of Energy, 2010)



One way of making such an assessment would be to define sustainability indicators. An example of a sustainability indicator would be how planting deciduous trees along or near

south-facing walls affects a homeowner's electricity bill over a period of one year.

Cost savings in the bill should prove that planting deciduous trees along south-facing walls is in fact sustainable practice. However, a long-term perspective is not just about looking to the future; this perspective also means reflecting on the past to understand the history and evolution of the Navajo people to gain a more comprehensive understanding of current problems. In this case, understanding past housing practices can paint a better picture of why unsatisfactory housing conditions currently persist and what can be done to address these conditions in future housing. For example, a basic comprehension of the fact that the *Tsé Łichii'* chapter has never had a building code would help current housing planners understand why existing houses have so many problems with inadequate insulation and would lead them to consider adopting a building code now to avoid insulation problems later.

A holistic outlook embodies an ecological understanding of the world by seeing the relationships between everything (Wheeler, 2004) that exists in the world at any given time. One way to recognize these relationships is to integrate different scales of planning. In this case, a holistic outlook on the planning process, with respect to housing, integrates community-based planning at the chapter level, with planning at the agency level, and planning at the reservation level.

**Figure 31. The different levels of planning on the Navajo Nation.**

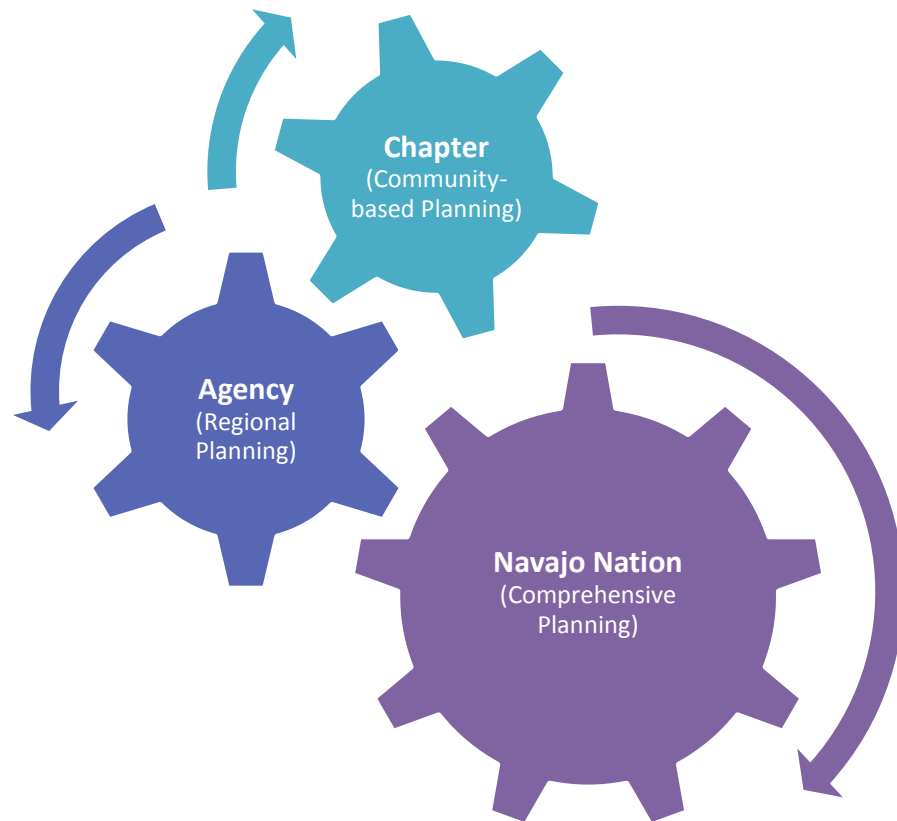
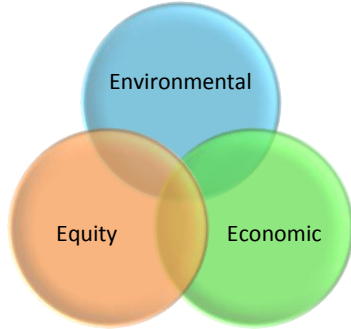


Figure 32. The three E's of planning.



This essentially means connecting planning activities from the 110 existing chapters to develop a regional plan that would then inform a comprehensive plan, which the Navajo Nation currently does not have. To link the different scales of planning, the three goals

of planning, or the “Three E’s,” would need to be merged to be sustainable (Wheeler, 2004). This means weaving environmental, economic and equity issues together so global issues such as climate change and energy consumption in more affluent societies are connected with local environmental justice issues on the reservation. In fact, Curley (2008) asserts that “working in partnership with the world community on climate change would strengthen Navajo sovereignty and preserve culture far more than saying ‘yes’ to a coal-fired power plant ever could.” For Curley, building another coal-fired power plant is a Band-Aid solution for addressing the Navajo Nation’s problems with economic development because such a plant only creates a limited number of jobs for people living in the immediate vicinity and ignores the rest of the Navajo population.

Acceptance of limits recognizes one of the newest forms of thinking in planning theory and practice, which is limiting growth. In a world where progress is equated to quantitative growth in production and consumption, there are several ways of applying “limits to growth” to planning (Wheeler, 2004). For *Tsé Lichii*, this means instead of building more houses for the mere sake of growing

the housing stock, tackle land use planning to shape and organize how the community grows in the future. Land use planning is an effective tool for defining how and where a community should grow (Daniels et al., 2007). One way of doing this would be an adoption of building codes to regulate the placement, shape, and style of buildings being built or altered. For *Tsé Łichii'*, there are no building codes so families who have the funds can build a house however they want. Since this is the case, many homes are built haphazardly with almost no consideration whatsoever for energy efficiency and sometimes are not built to be readily plugged into existing infrastructure. Houses are built and mobile homes are placed on a site first, then the homeowner goes to the chapter or local utility company to see about getting “hooked up.”

Acceptance of limits also means recognizing the fact that resources are limited (Wheeler, 2004). Planning for renewable energy development provides an opportunity for the Navajo people and surrounding communities to conserve and manage existing natural resources such as water and coal more sustainably. Coal and water, especially water, are not as abundant as they once were so it is very important now more than ever to learn to use and manage both responsibly and sustainably.

A focus on place means fostering the health and uniqueness of specific, geographical locations (Wheeler, 2004). For urban, or even suburban, environments, this means planning to avoid building another “Anywhere, USA.” For *Tsé Łichii'*, “focusing on place” means creating and maintaining a sense of place for the community so the community members can recognize *bikéyah*

(Navajo, “their land”) for what it is and what it should be. The goal is to make

**Figure 33. Karigan Estates, Window Rock, AZ.**

Source: Personal photo.



sure the community protects and maintains its scenic beauty and distinct cultural atmosphere so nobody feels even the slightest sense of displacement. Karigan Estates, a subdivision located on the Navajo reservation just west of Window Rock,

AZ is an example of an “Anywhere, USA.” Looking at a photo of Karigan Estates, one would not know it was a subdivision on the Navajo reservation. In fact, the picture above could be a picture of any subdivision in the United States.

Furthermore, sense of place is an important component of traditional Navajo ideology. For example, the traditional practice of burying a newborn’s umbilical cord in a meaningful place ties that baby to the meaning of that specific place. It is said that doing so gives a child a sense of place in the world so they ultimately have a sense of being and grow up with meaning and guidance in their life. With meaning, they do not wander aimlessly through life trying to find their place. They will have a distinct sense of who they are and where they come from, and thus know who they want to be and where they are going.

Active involvement in problem-solving is important because sustainable development will only occur through the hard work of many dedicated people who, by having a stake in the success of a given project, actively and constructively participate in the problem-solving process (Wheeler, 2004). In

rural settings, such as *Tsé Łichii'*, there are many advantages to seeking the involvement of many different people from all different walks of life. Chambers (1985) offers the following five basic principles and practices of taking such a multidisciplinary approach:

1. Optimizing tradeoffs in the information that is collected and learned and most importantly recognizing when enough information is known and needed;
2. Offsetting biases to reverse any biases, acting unhurriedly and deliberately for a balanced representative view;
3. Triangulating different research methods to get the same result;
4. Learning directly from and with rural people to obtain valuable face-to-face information from local “experts;” and
5. Learning rapidly and progressively to allow for conscious exploration, judgment and decision-making, and adaptive learning.

Active involvement also paves the way for the definition and articulation of a vision for the plan for and by the Navajo people living in *Tsé Łichii'*. Having a vision makes sure the plan addresses the needs and concerns of the past and present as well as a vision for the future as voiced by the Navajo people. A vision also takes measures to ensure a plan represents the people for which the plan is developed. These measures can best be recognized through community participation in facilitated activities including:

- Train the trainer sessions where people learn with and from each other and gain from this type of experiential learning

- Visioning sessions where people can articulate for themselves what they want their community to look like
- Strategic and action planning sessions to work together
- Focus groups
- Public meetings
- Advisory groups for outsiders should we need outside “expertise” even though I believe tribal people, local people, are experts in their own right.

These methods will foster community learning and facilitate true public participation (Arnstein, 1969) at the local level so that planning becomes culturally and socially (Kabotie, 2011) relevant to the Navajo people. As Daniels et al. (2007) describes, “Good public involvement depends on opportunities and encouragement.” As such, implementation depends on active public involvement.

## **5.2. Facilitation**

To a great extent, public involvement particularly during the planning process requires the ability to conduct effective meetings that are well-organized and managed. This holds especially true for those involved in tribal planning processes because decision making within tribal organizations is more often than not a very intricate, long, and delicate process (Hausam, 2006). These difficulties are due in large part to the lack of a unified sense of communication among the stakeholders participating in the planning process itself. This disruption in the line of communication can impede the decision-making process but can be avoided with consensus-building techniques like facilitation (Hausam,



2006; Kabotie Consulting, 2011). Master facilitator and trainer, Lesley Kabotie (personal communication, April 21, 2011), asserts, “Facilitation provides a focused process to help groups of people come together, share their best, most innovative thinking and make thoughtful decisions” on topics they are passionate about.

Bear in mind that Navajo chapter houses were established to involve the local people and create venues for information sharing and gathering. Likewise, planning in the 1950’s also shifted toward a more collaborative process that sought to involve stakeholders in a way that stimulated information sharing and gathering (Hausam, 2006). For planning in Indian Country, consensus-based, participatory processes work best because they include people and their experience in the decision making process. Consensus-based or participatory facilitation is a process that requires people to engage with each other so they can listen and effectively see and hear each other (L. Kabotie, personal communication, April 21, 2011). This allows the participants to be acknowledged and affirmed as important contributors to the planning process and speaks to the way in which Native people have historically engaged in and committed to action (L. Kabotie, personal communication, April 21, 2011).

For tribal planning processes, facilitation is a powerfully useful tool for establishing a group’s collective will that truly represents the thinking and insight of all its members in their common language and context in order to see a project through from conception to completion (L. Kabotie, personal communication,

April 21, 2011). As such, facilitated consensus-based processes do the following:

- Build the political and collective will to complete the project at hand,
- Provide the opportunity for participants to have a detailed picture of the options and how to best proceed,
- Reinforce the group's determination to do or implement something,
- Strengthen the relationships among participants or stakeholders,
- Provide a forum for focused, serious and deliberate discussion among participants, and
- Provide local experts with a forum for educating their fellow community members and outsiders (The Alire Group, 2011).

There are many different methods for conducting facilitated meetings. However, in the summer of 2010, under the Tribal Energy Program Internship Program, I had the opportunity to participate in a Train the Trainer session led by Kim Alire Epley, founder and owner, and Lesley Kabotie, (Crow) Master Facilitator and trainer with The Alire Group Facilitation Services Company. This was a valuable learning experience not only because it was an opportunity to learn about and practice facilitation outside the classroom, but also because it was an opportunity to work with two professional strategic planning facilitators who specialize in Native American community, leadership and organizational planning and decision-making.

Their method of choice is called the Technology of Participation (ToP) which was developed by The Institute of Cultural Affairs (ICA). The ICA

developed the techniques associated with ToP through community empowerment and development work carried out with marginalized communities around the world (L. Kabotie, personal communication, April 21, 2011). With ToP, the Alire Group bridges technical expertise with local knowledge in the field with tribes and promotes an important lesson: Community participation determines the success of planning; the more engaged the better.

While successful community planning depends on the participation of local people, good local leadership also plays a defining role (Daniels et al., 2007). In their 20 years of working with tribal organizations, The Alire Group found that “tribal leaders demonstrate a desire to explore, evaluate and mobilize resources, opportunities and innovations available to them at all levels” (p. 1). The Alire Group also makes an important distinction between hierarchical leadership and what they term “facilitational leadership” in the following way:

**Table 12. Emergence of different leadership styles.**

	Hierarchical Leadership	Facilitational Leadership
ASSUMES:	Top-Down Approach	Many Diverse Perspectives
KNOWS:	What To Do	“How To Do” Methods
SEEKS:	Right Answer	Ownership of Decision
RELIES ON:	Individual Ability	Group Ability

After setting the background for facilitation and the need for such a process in Indian Country, The Alire Group continued our training with the process, or steps to follow, when facilitating a meeting. The first step is introducing the foundational values of facilitation to the group of participants so

they understand the goal of the workshop in addition to their responsibilities as participants.

Table 13. The foundational values of facilitation.

FOUNDATIONAL VALUE	DEFINITION (Execution)
<b>PARTICIPATION</b>	<ul style="list-style-type: none"> <li>• Create an environment that encourages participation from all</li> <li>• Honor and respect each other</li> </ul>
<b>TEAMWORK</b>	<ul style="list-style-type: none"> <li>• Create small teams to break down vulnerability</li> <li>• This is important for those who are not comfortable with public speaking</li> </ul>
<b>CREATIVITY</b>	<ul style="list-style-type: none"> <li>• Use/encourage instinct/intuition/gut as source of knowledge</li> <li>• Accept the fact that knowledge does not always equate to “technical expertise”</li> <li>• Think outside the box</li> </ul>
<b>CONSENSUS</b>	<ul style="list-style-type: none"> <li>• Think about consensus as the point where one thread of an idea intersects the thread of another idea.</li> <li>• The tighter the weave the better</li> </ul>
<b>ACTION</b>	<ul style="list-style-type: none"> <li>• Make the decision to move ahead or ACT</li> <li>• Based on consensus decisions</li> </ul>

The next step is to lay the foundation for the meeting by introducing the three elements of facilitation which are outlined in the following table:

Table 14. The elements of facilitation.

ELEMENT	PURPOSE	STEPS
<b>CONVERSATION</b>	Engages the group early in the process and helps group see there are many diverse perspectives	Ask a series of questions: <ol style="list-style-type: none"> <li>1. Ice breaker</li> <li>2. Objective question to gather information nothing more.               <ul style="list-style-type: none"> <li>○ Participant offers pure data</li> <li>○ Just data</li> <li>○ No thoughts or emotions attached</li> </ul> </li> <li>3. Reflective question to get an emotional response               <ul style="list-style-type: none"> <li>○ Participant thinks about how they feel about the data</li> </ul> </li> <li>4. Interpretive question to inspire thought               <ul style="list-style-type: none"> <li>○ Participant thinks about what the data means</li> </ul> </li> <li>5. Decisional question to inspire action               <ul style="list-style-type: none"> <li>○ Participant thinks about what to do</li> </ul> </li> </ol>
<b>WORKSHOP</b>	Helps group establish a Vision through focused discussion	<ol style="list-style-type: none"> <li>1. Break large group into small manageable groups</li> <li>2. Highlight a focus question</li> <li>3. Outline the process</li> <li>4. Set the stage</li> <li>5. Give groups time to brainstorm and talk about pressing issues</li> <li>6. Groups focus on common ideas</li> <li>7. Groups present findings to larger group for large group discussion</li> <li>8. Large group develops a clear and practical vision</li> </ol>
<b>ACTION PLANNING</b>	Helps group focus on strategies for implementing the vision with goals and objectives	<ol style="list-style-type: none"> <li>1. Start with a discussion of the vision as motivating picture for the future</li> <li>2. Analyze issues and obstacles</li> <li>3. Develop strategic actions for addressing issues and obstacles</li> <li>4. Develop goals and objectives for implementing action strategies</li> </ol>

The steps outlined in the table above are designed to encourage participation and the sharing of experiential knowledge. This kind of participatory process engages the people who came to work in the work in a way that does not rely on the individual participant's confidence level, aptitude for public speaking or assertiveness (Kabotie, 2011). Furthermore, tribes who engage in these types of processes stand to gain the ability to reclaim and own 'the power to be the architects and stewards of the resources and opportunities of their nations and to exercise accountability to their own futures by prudently responding to and addressing the issues that undermine the stability, wellbeing and viability of their nations' (Kabotie, 2011) because a successful collaborative process yields the following results:

- Enduring ownership of the decision,
- Quality decision-making,
- Collective buy-in,
- Empowerment.

### **5.3 Examples of Tribal Green Building**

Finally, what better way to move forward than to see examples of real live projects realized on tribal land? The next few sections will highlight different tribal green building projects or case studies realized on tribal land.

#### **a. Case Study: I-Sah'-Din'-Dii Housing Development, Mescalero, NM**

The Mescalero Apache Tribe and the Mescalero Apache Housing Authority (MAHA) broke ground on Friday, July 18, 2008 for the I-Sah'-Din'-Dii Housing project in an effort to address and help alleviate a substantial housing

shortage on the Mescalero Apache reservation. The I-Sah'-Din'-Dii Housing Development is the first new single family housing development to be built on the Mescalero Apache Reservation in twelve years. This new 30-unit housing development is built on 34 acres of land adjacent to the existing White Mountain Subdivision. It is a Low Income Housing Tax Credit (LIHTC) Project consisting of 30 single family rental homes and a community center with a playground and a half-court basketball court. Additionally, the I-Sah'-Din'-Dii Housing Development is a designated "green" housing development designed to have as minimal an impact as possible on the environment. This means minimizing alteration of the natural landscape by building in response to the natural landscape, utilizing passive solar and energy efficiency techniques on housing design and using non-toxic and healthy materials for good indoor air quality (Blosser, 2009).

### **a.1. Background on Mescalero**

**Figure 34. Mescalero Apache tribal member performing at the I-Sah'-Din'-Dii Ribbon Cutting.**  
Source: Personal photo.



The people of the Mescalero Apache tribe occupy approximately 463,000 acres of reservation land in south-central New Mexico, just southwest of the city of Ruidoso. The reservation is characterized by high mountains with elevations ranging from 5,400 feet to over 12,000 feet. These mountains are part of the

Sacramento Mountain region with vegetation consisting mostly of timber pine, fir, spruce, aspen, white oak, piñon and juniper (Inn of the Mountain Gods, 2010).

Presently, there are more than 4,000 enrolled tribal members in the Mescalero tribe. About half of the population is under the age of eighteen and most tribal members live on the reservation (Inn of the Mountain Gods, 2010). The median age on the Mescalero reservation is 22.6, compared to the US median age of 35.3 (US Census Bureau, 2000a). The median age on the Mescalero reservation is 22.6, compared to the US median age of 35.3 (US Census Bureau, 2000a).

Compared to rampant unemployment rates across most Native American reservations, where some reach as high as 80% (Obama, 2008), the Mescalero unemployment rate on the reservation is relatively low at 8.6% (US Census Bureau, 2000a). A majority of those employed work in service occupations with educational, health and social services; agriculture, forestry, fishing and hunting, and mining; and arts, entertainment, recreation, accommodation and food services are the top three industries at Mescalero. Additionally, 63% of those employed are government workers and 33.8% are private wage and salary workers.

While the unemployment rate is fairly low, the median household income is also relatively low \$23,902. In comparison, the US median household income is \$41,994 (US Census Bureau, 2000a) 4. Roughly 35% of individuals surveyed at Mescalero are below the poverty level where 12.4% are below poverty in the total United States (US Census Bureau, 2000a). Even though people have jobs



on the reservation, these jobs are not high-paying jobs. Altogether, larger household sizes and the fact that the Mescalero work relatively low paying jobs contribute to the high poverty rate on the reservation.

#### **a.2. I-Sah'-Din'-Dii Housing Development Features**

The I-Sah'-Din'-Dii Housing Development features a community-oriented design consisting of 30 single family rental homes and a community center complete with a social room, kitchenette, an office with computer stations, a playground and a half-court basketball court. Other features include: childcare, employment and health services, bicycle and walking trails, sidewalks, transportation, and access to a neighborhood school. Lot sizes range up to 80 feet by 200 feet in area to accommodate community requests to keep livestock on their property (Blosser, 2009).

These green healthy homes are oriented so the living, dining and kitchens are facing the southern exposure with large windows and appropriate overhangs to maximize solar heating and natural daylighting in the cold winter months while protecting against overheating during the warm summer months. Natural ventilation is encouraged through the placement of high windows that can be opened during the warmer months, allowing cross-ventilation as well as exhaust of the warmer air. Floors are concrete to absorb and radiate the sun's heat in the winter and non-toxic formaldehyde-free materials such as insulation, paints, adhesives, and wheat fiber cabinets are used. Each home has high performance insulated doors and windows, Energy Star appliances, and energy efficient light fixtures and furnaces, and low-flow plumbing fixtures. Finally, each home has a

metal roof connected to a water-catchment system including two 55-gallon drums for livestock and garden watering uses (Blosser, 2009).

### **a.3. Financing I-Sah'-Din'-Dii**

The I-Sah'-Din'-Dii Housing Development was financed with Low Income Housing Tax Credit (LIHTC) Equity, State Housing Trust Funds, State HOME funds, and NAHASDA Indian Housing Block Grant (IHBG) monies. Other financing was used to develop the infrastructure, including the first time use of New Mexico Mortgage Finance Authority's (NMMFA) Loan Funds to a Tribally Designated Housing Entity (TDHE) which was enacted under the Tax Reform Act of 1986. LIHTC finances over 90% of the affordable rental housing in the country, building 120,000 annually (Webster, 2009).

State agencies administer the LIHTC program in accordance with Section 42 of the Internal Revenue Code. Tax credits are allocated to qualified projects. Investors, or equity partners, provide the financing in exchange for the project's tax credits (Webster, 2009).

Since its inception, the LIHTC has gained in popularity for construction of new low income housing projects. To date, there are about 100 such projects in existence throughout Indian country (Mescalero Apache Housing Authority, 2008). 12 LIHTC projects exist in various parts of New Mexico and the I-Sah'-Din'-Dii Housing Development is the first to be built on the Mescalero Apache reservation.

#### **a.4. Addressing the Housing Need**

The I-Sah'-Din'-Dii Housing Development is the first new single family housing development to be built on the Mescalero Apache Reservation in twelve years. This new development is built adjacent to the existing White Mountain Subdivision, which was the last subdivision to be built on Mescalero Apache land, and the nearby school (Mescalero Apache Housing Authority, 2008).

There were more than 350 families on the MAHA waiting list for housing at Mescalero at the time of the groundbreaking. While there is still a great need for housing, the 30 new rental home housing development provides much needed shelter for low-income families at Mescalero. Rent for each of the single-family unit ranges from \$250 to \$450 per month based on each family's income (Jacobs, 2008). It was important for the new housing to be affordable for the Mescalero Apache people. According to Tim Horan, MAHA Executive Director, "A lot of our people really struggle with the costs of food and housing. So what we intend to do is build green, healthy homes that are very energy efficient in order to reduce the cost of energy use" (Jacobs, 2008).

#### **a.5. Green Building**

In MAHA's application for LIHTC funding in 2007, the I-Sah'-Din'-Dii Housing project scored the highest number of points possible on their NMMFA application for a "green" environmentally-friendly design (Mescalero Apache Housing Authority, 2008). The I-Sah'-Din'-Dii Housing Development is a designated "green" housing development designed to have as minimal an impact as possible on the environment, and utilizing the New Mexico Mortgage Finance

Authority's Green Guidelines. The following are the NMMFA guidelines MAHA adhered to for green designation:

- Reduced impact on the natural landscape,
- Responsive to the natural landscape,
- Passive solar and energy efficient techniques, and
- Non-toxic materials for good indoor air quality (Mescalero Apache Housing Authority, 2008).

**a.6. Is I-Sah'-Din'-Dii Sustainable?**

The answer is yes. According to the five sustainable design strategies outlined above. The I-Sah'-Din'-Dii Housing Development did address site, water, energy, materials and indoor environment. With respect to site, this housing development made sure to reduce its impact on the natural landscape by including an erosion and stormwater plan that called for no clear cutting, the use of permeable pavement where appropriate, and no building on slopes greater than 10%. The I-Sah'-Din'-Dii Housing Development also included a construction waste management plan where construction waste was recycled on site.

**Figure 35. Rain barrels incorporated into new housing at I-Sah'-Din'-Dii.**

Source: Personal photo.



With respect to water, the I-Sah'-Din'-Dii Housing Development designed roads along ridge lines to promote natural drainage. Additionally, the I-Sah'-Din'-Dii Housing Development included a catch and reuse system for rainwater. Their houses have metal pitched roofs to catch rainwater and store in a water catchment system that included two 55-gallon drums. The water caught in these drums were used for livestock and gardening. Finally, the landscaping that was not natural was xeriscaping. All these steps were taken because "respecting the environment is key to the values of the Mescalero people" (Spotlight on I-Sah'-Din'-Dii Housing Development, 2008).

The I-Sah'-Din'-Dii Housing Development addressed energy through the use of energy efficient appliances, low flow plumbing fixtures, and high-performance windows and doors. Additionally, the I-Sah'-Din'-Dii Housing Development addressed materials by using local materials and workers where possible. In fact, 30% of the workers involved in all phases of the construction process were local Mescalero Apaches. According to Tim Horan, they "carefully sited the structures for minimal disturbance of the natural vegetation" (Stallings, 2009).

Finally, the I-Sah'-Din'-Dii Housing Development paid attention to the indoor environment by including high windows that allowed for natural and cross ventilation and warm air exhaust in the housing design. The design also called for low VOC (volatile organic compound), non-toxic, and formaldehyde-free materials. There are also no carpets installed in the houses. Instead, the houses have stained concrete floors throughout to inhibit allergens.

**b. Case Study: Hualapai, A Tribe Building toward Sustainability**

Through my internship with the Tribal Energy Program at Sandia National Laboratories, I have had the opportunity to travel and visit with different people involved in energy development projects on tribal lands. The first time I visited the Hualapai Nation was in the summer of 2008 under the Tribal Energy Program Internship Program. The other interns and I visited with different Tribal offices and toured renewable energy projects currently planned and/or implemented on the Navajo, Hopi, and Hualapai reservations. Our last stop on the tour was the Hualapai Nation in Peach Springs, AZ. Upon our arrival at the Hualapai Tribal Office, we were greeted by Jack Ehrhardt, Director of Planning and Economic Development for the Hualapai Tribe, and general contractor. After introductions, we took a drive up the hill to look at one of Jack's projects.

**Figure 36. Earthship at Hualapai.**

Source: Personal photo.



One of the first projects Mr. Ehrhardt helped see through to completion for the tribe is an Earthship. Earthships are buildings made from recycled and recovered materials that are so well incorporated into the land they stay naturally warm in the winter and cool in the summer (US Environmental Protection Agency, 2011b). The Hualapai Earthship provides the tribe's environmental department

with 1,000 square feet of office space and uses more than 500 tires and 500 pounds of aluminum in its walls that would otherwise have been dumped in the local landfill. The Earthship also features:

- Other recycled building materials including windows salvaged from an old building and environmentally-friendly paint,
- Natural materials including clay used for the walls and stone for the floors,
- Photovoltaic panels mounted on the roof,
- A passive solar design with large south-facing windows,
- Reduced long term energy costs,
- Roof designed to catch rainwater, and

- A gray water system designed to catch and reuse gray water from the kitchen sink to irrigate the surrounding landscape (US Environmental Protection Agency, 2011b).

At the time the Earthship was completed, more than 100 Hualapai tribal members signed a petition requesting Earthships be built as housing for them. While the results of this petition are unknown because we were not given any details, the Hualapai Earthship still serves as an alternative and working example of creative and earth-friendly building techniques for other tribes.

**Figure 37. New construction at Hualapai.**

Source: Personal photo.



On this same visit, we followed Jack to a relatively new construction site where the crew was

busy assembling the outside walls of a building. As we stood on the dusty white foundation under the hot sun, Jack first explained that the floor we stood on was to be a tribal building offering social services like shelter for women in the community. Then, as he started describing the building materials that were being used, he walked over to one of the walls and easily picked up a cinder block with one hand. Our jaws dropped long enough for him to explain that what we thought were cinder blocks were actually a type of green building material called FlexCrete, which is a style of building block made of aerated concrete that looks like typical cinder blocks.



**Figure 38. Hualapai Nation Social Services Building.**  
Source: Personal photo.



**Figure 39. Hualapai Social Services Building features.**  
Left: Solar light tubes provide lighting. Right: High efficiency water heater and fixtures.  
Source: Personal photo.



The following summer, I went back to Hualapai with a different group of TEP interns. After introductions, we drove back to the site and toured the newly completed Hualapai Social

Services Building. We learned that the completed building featured other green building elements including solar light tubes for lighting in addition to other day lighting options, wood floors to reduce allergens usually found in carpet flooring, Energy Star rated

and high-efficiency appliances, low-flow fixtures, and a rainwater catchment system complete with rainwater barrels.

**Figure 40. Hualapai Cultural Center: Early construction.**  
Source: Personal photo.



On this same trip, Jack led us to another construction site that was in the same condition as the social services building when we first saw it the summer before. This building was to be a cultural center for the

Hualapai tribe and was in the early phases of construction with a foundation laid and walls erected. The walls for this building were constructed of the same aerated concrete blocks as the social services building. Without much more than that, it was difficult to imagine what the completed building would look like, but touring the construction site and hearing Jack's stories was enough to appreciate what the cultural center would mean to the Hualapai Nation.

The following summer, I returned with a third cohort of interns for the Tribal Energy Program. First, we visited the Earthship and the others got to ask their questions and explore the building. Then we went back to the Hualapai Cultural Center site. The building was recently completed and shined like a new penny in the hot Arizona sun. Jack explained how the cultural center was designed and built with a consideration for both the environment and Hualapai cultural values. The Cultural Center features green building elements including green building materials such as aerated concrete blocks and low-VOC paints,

wood pillars made from locally available materials, high windows that can be opened to allow natural cross ventilation and cooling, energy efficient appliances, low-flow fixtures, non-allergen producing stained concrete floors, and natural daylighting. The Cultural Center also features displays of tribal artifacts and paintings throughout. This building exemplifies how modern construction techniques like green building can pay tribute to cultural values.

Altogether, the Earthship, Hualapai Social Services Building, and Hualapai Cultural Center on the Hualapai reservation serve as examples of what other tribes can do given the patience and commitment to build environmentally-responsible structures. The Hualapai projects are also a clear indication of what research and open-mindedness can accomplish.

### **c. Case Study: Wilfred Moore, A Look at One Man's Efforts**

Mr. Wilfred Moore is an Army Corps of Engineers veteran who has been involved in the construction business since his honorable discharge in 1960. In 1977, Mr. Moore returned to the Hopi reservation to start his own concrete business, W. Moore Concrete Construction, and to give back to the Hopi Tribe (Hopi Telecommunications, Inc.). He and his wife now live on a homestead on the northwestern corner of the Hopi reservation along US Highway 160 between Tuba City and Kayenta, Arizona. His home is an example of how a tribal member can implement green building practices as an individual.

In my first summer in the Tribal Energy Program, the other interns and I went on a week-long tour solar energy installations/projects on tribal lands in Arizona. Our tour started with a look at the NTUA headquarters in Fort Defiance,

AZ followed by a tour of the NTUA office in Kayenta, AZ that also included a first-hand look at a working NTUA solar/wind hybrid installation at a remote NTUA customer's home in Narrow Canyon, Arizona, just west of Monument Valley. From here, our next stop was at a Hopi tribal member's home which was located on a dirt road not more than a mile south of US 160 about halfway between Kayenta and Tuba City, AZ.

**Figure 41. Solar light post lighting antique wagon outside W. Moore's house.**

Source: Personal photo.



Willie Moore, as he was introduced to us, lives in a double-wide manufactured home. While this might seem typical for the reservation, what is unique about his home is the fact that it operates just like any other home with running water and electricity but is completely off the grid with no connections to any local utilities. From the beginning, Mr. Moore understood the implications of his site selection, in that there were no water or electricity lines nearby to easily tap into, but decided to place his home there knowing he would be consenting to a different kind of life. This meant modifying their home to be self-sustaining and green.

For starters, he and his wife modified their home's building specifications. Since the Moore's did not have access to a power line, they had to make their home energy efficient. They considered energy efficiency in the following ways:

- ✓ They requested more insulation in the walls and the roof from the manufacturer before it was delivered to their property,
- ✓ In place of the traditional skirt that lines the bottom of a manufactured home, they installed concrete slabs to increase the insulation (R- value) of the floor,
- ✓ They built a concrete wall around the outside of the home to block cold winter winds,
- ✓ They placed all of their appliances and equipment inside the home on power strips to avoid phantom loading and make sure these devices do not draw power when not in use,
- ✓ They do not use lamps or electricity for light during the day but use day light inside their home for as long as possible,
- ✓ They recently installed an energy-efficient solar refrigerator in their kitchen to replace their conventional energy-hogging one, and
- ✓ They make every effort to avoid using task-specific appliances/equipment that use heating elements such as a clothes dryer and hair dryers are completely off limits because such devices use a lot of power.

**Figure 42. Electrical equipment.**

Above: Battery bank. Below: Inverter.  
Source: Personal photo.



Since the Moore's home is not tied into the electrical grid or local water line, Mr. Moore and his wife considered their options for having access to said utilities. With respect to electricity, their solution was renewable energy. As such, their home is powered by a photovoltaic array and small wind turbine. Together, these two power generators charge a battery bank that supplies the power needed when the sun is not shining and/or the wind is not blowing. The Moore's went a step further and took the initiative to learn about the operation and maintenance of these systems and are currently responsible

for how they run. This is a huge responsibility because PV and wind systems operate in conjunction with other electrical equipment such as inverters, monitoring devices with digital readouts, and wiring schemes. The batteries also require care and maintenance.

With respect to water, the Moore house is set up with a water storage tank. Mr. Moore hauls water from the local well to replenish their tank as needed. Because they have a limited supply of water, the Moore's are also conservative with their water usage. Their water conservation efforts include:



- Limiting shower time,
- Washing only full loads of laundry in their clothes washer,
- A gray water system that catches water from the sinks and shower for reuse as outside plant watering,
- Xeriscaping, and
- A rainwater catchment system will be installed to water livestock and outside plants.

**Figure 43. Newly built outdoor area furnished & equipped with salvaged materials.**

Source: Personal photo.



With respect to building materials, the Moore's are fortunate to have access to concrete materials by way of Mr. Moore's concrete company. Mr. Moore also has an advantage in building expertise as he was in the construction business for so many years working on large construction jobs and sometimes in areas with extreme weather conditions. However, the Moore's also understand the basic green building concept of reuse. This understanding and practice

is evident in the different projects and additions they have completed on their home. For example, in 2010, our internship program took another tour of the area and we found the Moore's had recently built an outdoor living area that included seating and a kitchen. The kitchen equipment and furniture was salvaged from a local business and repurposed for the Moore's use and enjoyment.

**Figure 44. Mrs. Sylvia Moore explaining energy efficiency in their home.**

Source: Personal photo.



Finally, it took a lot of work and time to educate themselves about the benefits and drawbacks of living off grid. Therefore, the Moore's take care to educate their guests about the features of their home. This is not a typical reservation home and the

Moore couple understands the idea that they can maximize the results of their efforts when there is a basic understanding of and appreciation for the way their home operates. The Moore's also understand the value of sharing experiential knowledge. This is evident in the fact that they open their home to curious visitors such as our group and are eager to interpret the features of their home. Their home is indeed one to be shown off as it teaches an important lesson that living off grid does not mean sacrificing comfort but understanding your limits.



## CHAPTER 6 RECOMMENDATIONS & CONCLUSION:

Countless studies unanimously attribute climate change to consumption. Energy consumption should be of particular concern to us because in order for us to enjoy all the benefits and conveniences of modern life, we need energy to support our economies and lifestyles, especially for those living in developed nations. That being said, the built environment also has a profound impact on our natural environment, economy and health. Unfortunately, the buildings we live in, work out of, and receive basic services in have more often than not been designed and built without consideration for energy efficiency or the overarching economic, environmental, and social impacts of the built environment. Nowhere else could this be any truer than on Native American reservations in the United States today.

This thesis explains how Navajo chapters, like *Tsé Łichii'*, can learn to plan for themselves. By learning the basics of the community planning process and incorporating ideas of Indigenous and sustainability planning, *Tsé Łichii'* can plan and build better housing for community members that not only speaks to their social, cultural, economic, and environmental values but also allows them to manage their resources more responsibly

Local Navajo chapters, like *Tsé Łichii'*, can learn to plan and build better housing with a construction technique called green building. Green building is a way of building healthier, safer and more resource-efficient buildings. By starting with housing at the chapter level, chapters can do their part to help the Navajo Nation as a whole tackle renewable energy development especially since energy

projects in general cost an incredible amount of money and require a tremendous amount of time, commitment, and patience. By starting with housing and building better resource-efficient homes that do not use a lot of energy, the people of the Navajo Nation as a whole can change the way they use energy and reduce their use and impact on the natural environment. Planning and building better houses is definitely something the Navajo people can do.

### **6.1 Community Planning Process**

Planning is something that is too big for one person, or one family, and difficult for or even one chapter to handle. The following methods are intended to break down the planning process to empower Navajo people to make decisions that matter to them and which produce plans that can be executed.

Undoubtedly, there are many challenges associated with planning within tribal structures including dealing with tribal and federal bureaucracies, but these challenges should not stop a community from even considering planning their own projects. In fact, tribes can overcome these barriers by planning their own projects because they can then learn to command effective change for their communities. Table 15 summarizes the recommended steps necessary to conduct a community planning process.

**Table 15. Community Planning Process.**



### **Step 1 — Determine if Planning is Appropriate**

Learning to command effective change through planning begins with a community learning to recognize whether or not planning is even appropriate. For *Tsé Lichii’*, this means asking the community members if they want and can start planning a housing project. A greater sense of ownership over the process for the community is established by obtaining the community’s blessing. Without the community’s blessing, resentment could arise toward the project itself and/or the project’s participants and may lead to less willingness to participate.

### **Step 2 — Define How to Involve the Community**

While establishing a rapport with the community members means inviting them to participate, it also means defining *how to* involve the community members especially those who almost always find themselves reluctant to participate in public processes. This form of bottom-up planning approach

includes the “have-not citizens” (Arnstein, 1969) at the project’s inception in a way that enables them to not only participate, but share in the benefits of the greater Navajo society. Inclusion at this level prevents the participatory process from becoming empty ritual and keeps it as productive as it is empowering for all those involved.

### **Step 3 — Use Facilitation to Engage**

Facilitation can be a valuable tool for engaging a group of people who share a common concern in dialogue, critical thinking and decision making. Good facilitation provides a pathway for people to talk about topics, sensitive or not, in a highly organized manner without stifling creativity or open, safe communication. Thus, finding a good facilitator to include early in the planning process is important. In this case, a good facilitator is capable of applying typical facilitation methods in the context of a given tribe’s history, land and people. When a tribal group participates in a consensus-based participatory process that affirms and builds upon the cultural and historical context of the group, the response is very encouraging and transformational in the sense that the group walks away with a unique and greater level of cooperation and mutual respect (Kabotie, 2011).

There are a couple reasons why this is important. For one thing, a fresh pair of eyes and ears can be the best solution for receiving and interpreting new perspectives just like when writing a term paper. Sometimes it takes someone who has never read your paper to look at it and point out the most obvious grammar mistakes that you would never have known existed if you had not

asked this person to read your paper. Similarly, a good facilitator holds up a mirror to the group and helps the members see the pimples on the face of their process. This means a facilitator can help a group self-identify the imperfections in their plan so they maintain ownership over the content and ideas of a discussion.

Second, enthusiasm can get in the way of progress. While passion about a topic should be encouraged and welcomed, it can also hinder the evaluation process. Being overly passionate can paralyze a project's progress because it can translate into non-conducive behaviors such as stubbornness and the inability to see and accept other viewpoints. A good facilitator is competent enough to recognize such potential stalemates and lead the group back to a process that engages the participants to produce enduring results, and decisions and commitment that each participant owns and acts on long after a meeting has taken place (Kabotie, 2011)

#### **Step 4 — Educate the Public**

The problem here is not that tribes or individual tribal members lack the motivation to do the work but that the ability to do the work can be paralyzed by a lack of information. Education is vital for recruiting participants and conducting a transparent, comprehensive, and inviting process. In this case, educating the community about renewable energy basics, green building and the planning process is the cornerstone for achieving a transparent and comprehensive plan that everybody can contribute to and agree upon. Understanding the basics of these three concepts empowers people with a voice and the opportunity for these

people to express themselves in ways they never thought possible. Sometimes people are reluctant to speak up in public because they fear looking bad for speaking out of turn or asking “dumb questions.” A common understanding of the issues can alleviate this problem.

### **Step 5 — Identify a Community Champion**

While a knowledgeable group who is comfortable with voicing their ideas is preferable, sometimes doing so is not always possible. For example, it would be almost pointless for a large group as well-informed and articulate as they may be, to meet with an important figure in a decision-making position like a Navajo Tribal Council Delegate. In this case, the community needs a champion (US Department of Energy, 2007) or a community member who is well-versed in the community’s needs, values, and vision to advocate for the entire community. Unlike typical tribal leaders, this person is not appointed, but emerges from the community as a result of their dedication to the community, land and beliefs. The job as an advocate for the entire community includes learning about resources and opportunities that exist outside the community’s boundaries, representing the community at tribal and inter-tribal events and conferences, and promoting the community’s efforts at public venues so other communities and tribes can learn from this particular community’s efforts. An effective champion also provides the longevity and continuity that is required of a long-term, multi-year planning process.

## **Step 6 — Establish a Planning Office**

Because the planning process can be long-term, multi-year, and resource-intensive, dependence on one person to champion the community's efforts might be too much for one person to handle. As such, establishing a planning office within the community is the biggest step any tribal community or Navajo chapter can take for itself. A planning office would serve as the hub of the community's planning efforts and provide the organization and structure planning requires. It can maintain the chapter's attention to its land use planning process under the Local Governance Act. The planning office can also house the Chapter Planning Committee and advisory board for non-Navajo partners/participants. The planning office should also be open to the community at large so community members have a physical place to go to get questions answered, comments submitted, and/or documentation of planning activities and progress. An official planning office also validates the community's commitment to planning.

## **Step 7 — Evaluate and Assess**

The power of assessment and evaluation lies within the concept of "deconstructionism" where the whole is taken apart and pieced back together again, similar to the way a child will take apart a toy to see how it works (Jojola, n.d.). By doing so, we can turn our attention away from the "WHY", why are things the way they are? To the "HOW", how can we address these issues with what we know?

One way to start asking "how" is to conduct a SWOT analysis. A SWOT analysis allows us to better understand our situation so we can focus on how we

will move into the future. We can do this by exploring the strengths and weaknesses of our current activities/projects to better understand the opportunities and threats of future projects. This technique allows us to evaluate:

- Strengths – to determine successes of the project that should be reinforced;
- Weaknesses – to determine areas that need improvement or definition;
- Opportunities – to determine other areas of interest to the Navajo people and avenues of sustainability and/or empowerment; and
- Threats – to determine issues that might halt a project during implementation or even before it begins (Daniels et al., 2007).

We can also create benchmarks, or goals that can be accomplished within a certain time frame, so we can see tangible results and see exactly what we have done and what we need to do to keep moving forward. Evaluating success through benchmarking and/or establishing measurable targets also allows for accountability. By reaching certain benchmarks and targets, we see which goals are met, and see whether funds were spent appropriately.

Empowerment evaluation is another effective tool for assessing the success of a plan. Empowerment evaluation allows people to drive the evaluation process and become the experts (Butterfoss et al., 1996). By training people to evaluate a plan for themselves, they can learn about the planning process and the technologies in addition to taking more responsibility for the project; thereby managing a project that not only speaks to their needs, but is also sustainable in every sense of the word.



Evaluation can be a difficult process in itself whose value is sometimes unrecognized. However, evaluation is necessary for growth and community development in the same way people often assess their own behavior to recognize the mistakes they have made in their lives and learn from them so that they can improve their future. In this sense, self-evaluation by a community means learning what planning activities work and do not work. If a community finds an activity or practice that works to their benefit, then they can build off of them to reinforce other practices that might not be as strong. Inversely, they can save resources, time and effort by not engaging in activities and practices that they have learned do not work.

## **6.2 Implementing a Green Housing Project in *Tsé Łichii*'**

So, what are all the steps necessary for implementing a green building housing project in *Tsé Łichii*'? The following chart outlines recommendations for implementing a green building housing project in *Tsé Łichii*'.

Figure 45. Steps *Tsé Łichii'* should take to implement a green building housing project.



### Step 1 — Pre-Planning

This involves making the decision to plan and commit resources. For *Tsé Łichii'*, this means getting a resolution to plan for green building approved by the community at a chapter meeting. Chapter approval indicates the community understands the issue and wants to move forward with the planning process, thereby giving their “blessing” to proceed. The planning committee should then

meet at another time, preferably in the next week, to identify resources that they have and/or need to gather. Their inventory should include the following tasks:

- Task 1 - Identify human resources:
  - a. Assemble a green building planning committee whose job is to first understand green building and convey the green building information that makes the most sense for the community to the rest of the *Tsé Łichii'* in planning meetings to come; the green building planning committee will be subsequently referred to as the planning committee or simply the committee,
  - b. Recruit a recorder to take notes at and write summaries of each planning meeting,
  - c. Identify and hire a good facilitator (one who has experience working with Native communities, preferably one who has previously worked with the Navajo Nation and understands the history, land, and people),
  - d. Consider recruiting a Navajo Housing Authority employee as a resource for housing planning to advise the planning committee,
- Task 2 - Identify financial resources:
  - a. Assess chapter funds
    - Chapter's current balance
    - Anticipated funding allocations
  - b. Research and apply for grants
  - c. Allocate acquired funds to the following:

- The facilitator’s services
- Materials for meetings:
  - Markers
  - Large easel pads
  - Easel
  - Large post-it pads or white ream of paper to be cut and half and taped on the wall
  - Tape
  - Blank white copy paper
  - Food and drinks (if not donated)
- Construction
- Task 3 - Create a timeline for planning projects
  - a. 2 weeks to do resources inventory
  - b. Construct a Gantt chart, or timetable to schedule planning activities

in the following way:

Table 16. Example Gantt chart for *Tsé Łichii’*.

Task	January				February				March				May			
Week	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Resources inventory																
1 <sup>st</sup> planning meeting																
2 <sup>nd</sup> planning meeting																
3 <sup>rd</sup> planning meeting																
Construction																
Monitoring & feedback																

## Step 2 — First Planning Meeting

Conduct the first planning meeting to understand the housing situation in *Tsé Łichii’*. This meeting should be facilitated by the facilitator hired in the first step and held in a space that has plenty of room for participants to move around (including tables and chairs that can be easily moved) and has lots of wall space

to hang note cards and large pieces of paper. At this meeting, the facilitator should facilitate a group discussion about:

- Their thoughts on the problem with housing within the chapter
- Everything they think could be contributing to the problem with housing
- The chapter's housing needs
- Green building
- Energy use
- What would happen if the chapter did nothing to address the problem
- What would happen if the community acted now to address the problem.

The planning committee should then take the information collected at this meeting to outline tasks to be completed before the next planning meeting. The first task is to do an inventory of housing. This means accounting for the following:

- Housing supply: count the total number of houses in the chapter
- Housing condition: rate and record the condition of each house on a scale

from very poor to excellent using these definitions:

- a. Very poor: structure is not worth saving and should be torn down
- b. Poor: house is standing and lived in but needs a lot of repair
- c. Average: house is lived in and needs minor structural repairs
- d. Good: house is occupied and does not need any structural repairs
- e. Excellent: house is occupied, very well-maintained and does not need any repairs

### **Step 3 — Training**

After the housing inventory, the planning committee should hold a special training session to educate the rest of the community on green building (i.e. definition, elements and benefits) and provide an overview of the inventory results to prepare for the second planning meeting. This can be done with PowerPoint or even flip-chart presentations given by planning committee members. The presenter should use simple terms and give plenty of examples

with narrative and pictures. They should also be ready to answer questions from the public. Preparedness should allow the group to get right to the point in the second planning meeting and not waste time, especially the facilitator's time since they are paying for the facilitator's services.

#### **Step 4 — Second Planning Meeting**

Conduct a second facilitated planning meeting to articulate a vision. Now that the community and planning committee understands green building, the goal of this workshop should be to first develop a definition of green building for *Tsé Łichii'* and then apply this definition to a vision for future housing in the community. The facilitator should lead the group in a discussion about green building in the context of the housing inventory results. This discussion should then inform the articulation of a vision for the community that the participants can contribute to and agree upon. With a clear idea of what the participants want their community to look like, they can identify goals and objectives to achieve their vision. This can be a one or two day meeting depending on how much detail the community wants to include and how much money they have to pay for the facilitator's services.

#### **Step 5 — Third Planning Meeting**

Conduct a third planning meeting to outline the steps necessary for moving forward with the plan. This meeting should also be facilitated to avoid chapter officials or other "leaders" influencing the community members' ideas of what they think should happen next. The participants should break into smaller groups that focus on specific tasks based on their interests and strengths. This

way, people are working on projects they will enjoy and know how to do so they have more motivation to see this process through to completion. Each of these groups should focus on tasks including:

1. Writing the plan: compiling summaries of each planning meeting to write a detailed plan
2. Sharing the information collected up to this point with the rest of the community with different types of media including:
  - a. Pamphlets
  - b. Posters
  - c. Flyers
  - d. Public presentations
3. Developing a formal bid for contractors
4. Researching local contractors and architects
5. Working with chosen contractor to specify details (i.e. green building needs and wants) and the community's vision to the contractor.

### **Step 6 — Draft, Review and Adopt Plan**

The plan writing committee writes the plan. The plan should be written in clear simple terms and based on the outcomes of each planning meeting. The plan should contain the following:

- I. Introduction:
  - a. State the purpose of the plan (i.e. planning green building)
  - b. Outline the *Tsé Łichii*'s planning process by summarizing how previous planning activities (i.e. Planning meetings 1, 2, 3, and the training session) and each activity's outcome informs the plan
  - c. Provide historical information on the *Tsé Łichii*' chapter for context.

- II. Community Profile
  - a. Government structure
  - b. Community resources & public facilities
  - c. Current land use
  - d. Geography
  - e. Economic data
  - f. Population characteristics
  - g. Housing characteristics
- III. Work Plan & Public Involvement
  - a. Introduce green building planning committee and stakeholders
  - b. Summarize each planning meeting and training session
    - Who participated
    - What was discussed
    - What were the results of each meeting
- IV. Vision
  - a. State the community's vision (i.e. What the community members want *Tsé Łichii'* to look like in 10-15 years)
  - b. Identify Goals & Objectives as a list of statements
- V. Implementation
  - a. Detail the specific actions that need to be taken:
    - State the goal
    - List the objectives: the tasks to be completed to achieve the goal



- Name who is responsible for each task
- Give timeframes for each task

b. This can be outlined as bullet points or in a matrix

After the plan has been written, the whole planning committee reviews it and makes any necessary changes. Then the plan is formally presented to the rest of the community at a chapter meeting. Finally, the plan is adopted through an approved chapter resolution.

### **Step 7 — Take Action**

Implement the plan by using all the information collected through the three planning meetings. Implementation starts with making the following decisions:

- Selecting a proper site to build the houses on
- Hiring a contractor who will follow the community's vision.

Then implementation is finalized with the construction of new homes. The planning committee should keep in continuous contact with the contractor throughout the construction phase. The planning committee should also document progress throughout this phase and relay this information to the rest of the community so the community knows exactly what is happening. This documentation should be in the form of written update reports include plenty of pictures. This documentation will also later serve as a resource for other interested communities and/or tribes.

### **Step 8 — Monitoring & Feedback Session**

The last step is to hold another facilitated discussion with the planning committee and interested stakeholders about the completed housing project.

The participants should discuss whether or not the goals of the plan were met using the outlined objectives. This can be accomplished by first administering a customer satisfaction survey to the families who occupy the new houses and then discussing the results of these surveys in a neutral, public, and facilitated meeting. They can also do a SWOT analysis of the entire project to define the strengths and weaknesses of the planning process itself as it relates to the community's housing needs in order to identify the opportunities and threats of future projects. This SWOT analysis should also be led by the facilitator so those who were directly involved in the planning process have the opportunity to speak and not worry about hosting the meeting themselves. Finally, this last step should be an opportunity to discuss lessons learned throughout the planning and implementation process so the community ultimately gains a foundation in planning from which to build off of in later planning projects.

### **6.3 Conclusion**

Under the Navajo Nation's Local Governance Act, planning is a responsibility left to the chapters. Meeting the requirements for chapter certification verifies the chapter's aptitude for responsible and knowledgeable planning for and by the local people. Planning should be an activity left to the local chapters because the people within a chapter know the local conditions better than anybody else. Drawing on this kind of local knowledge is empowering in the sense that the local people become the experts and no longer depend on outsiders to tell them what they probably already know. This kind of

empowerment then manifests itself as a deepened sense of ownership and commitment to a project.

Navajo chapters like other tribes in the United States have very limited resources and a lingering sense of dependency on other institutions and governments, namely the federal government; hence a strong and clear understanding of effective resource management can pave the way for other planning activities such as land use planning. Land Use planning is a major requirement for chapter certification under the Local Governance Act and a status sought by every chapter because certification allows chapters more autonomy and resources to act more effectively on their own thereby reducing their reliance on the central Navajo Nation Government.

In conclusion, the basic tenets of Indigenous planning are:

- ❖ “People thrive in community;
- ❖ Ordinary people have all the answers;
- ❖ People have a basic right to determine their own future;
- ❖ Oppression continues to be a force that devastates people; and
- ❖ The people are beautiful, already” (Jojola, n.d.).

In its most basic form, each of these five fundamental principles serves to empower Native people. Together, they serve as the hallmarks of planning for tribal communities that is environmentally, socially, and culturally sound.

Planning is not a foreign activity practiced only by the *bilagáana* or something that should be left to the “experts.” Rather, planning is an invaluable tool for helping tribal communities to understand themselves for what they are and what they can be. Therefore, empowering the Navajo people with planning tools means empowering them to proactively and effectively address the issues that mean most to them now and in the future.

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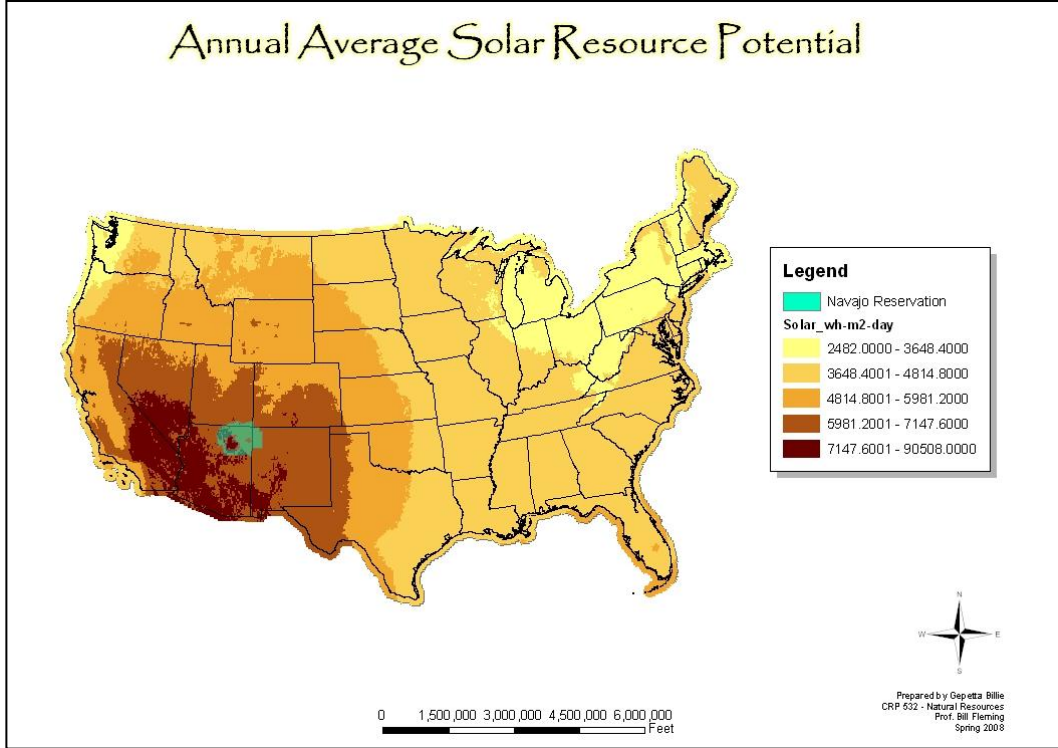
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# APPENDIX

## MAPS

Map 1



Map 2

