

**Fort Nelson First Nation-Owned Tu Deh-Kah Geothermal Project:  
A Socio-economic Study**

by  
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## **Abstract**

As global greenhouse gas emissions continue to increase, there is a growing focus on low-carbon initiatives, specifically renewable alternatives to conventional fossil fuels for energy production. Transitions to renewable energy sources may occur across scales, including community-scale energy production. As technologies develop, there is a gap in academic literature on the local-scale impacts and factors involved in community-level renewable energy projects.

Northern British Columbia is one of the last remaining regions of the province that is reliant on fossil fuels for electricity production. The Clarke Lake gas field, a depleted gas field in the territory of the Fort Nelson First Nation (FNFN), has been identified as having potential for viable geothermal energy production. The Fort Nelson First Nation initiated the Tu Deh-Kah (TDK) geothermal project in 2019 in the Clarke Lake field – one of the first commercial scale geothermal energy projects to be developed in Canada. As a fully First Nation-owned project, TDK is a unique example of Indigenous community energy in the context of Canada as a settler-colonial state.

This research aims to provide baseline data for the TDK project through original survey and interview data, and census data analysis. This thesis outlines a range of perspectives and expected outcomes of the TDK project as identified by FNFN community members, as well as social and economic indicators for the regional context of the project. Results demonstrate how the social and economic effects of boom-and-bust cycles or loss of industry in resource-dependent communities may be visible in some quantitative indicators, in this case in labour force participation rates. The high value of potential career and skill development opportunities

for local community members through the TDK project is a key finding of this thesis. Results of this research may be used for future assessment of TDK's outcomes and impacts in its local context.

## **Preface**

This thesis is an original work by Sara Chitsaz. The research project, of which this thesis is a part, received research ethics approval from the University of Alberta Research Ethics Board, Project Name “Fort Nelson First Nation-Owned Tu Deh-Kah Geothermal Project Socio-Economic Study”, Pro00112659, November 29<sup>th</sup>, 2021.

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## Chapter 1 : Introduction

### Introduction

In the context of increasing global emissions, there is a push for further development and adoption of renewable energy sources as alternatives to fossil fuels. Within this context, there are a growing number of community-led renewable energy projects in Canada. Northern British Columbian communities, including Fort Nelson, commonly rely on fossil fuels for electricity production; although there are increasing opportunities for these communities to develop their own renewable energy sources (Mahbaz et al. 2020). One such community initiative is the Fort Nelson First Nation-owned Tu Deh-Kah (TDK) geothermal project, which will provide electricity Fort Nelson region. Fort Nelson First Nation (hereby FNFN) has acquired permits and funding for the development of the TDK geothermal site, which will provide energy for the community and has potential to be used for other projects such as greenhouses which may increase access to nutritious food, thereby improving food security in Fort Nelson (Odgen 2020).

Academic literature demonstrates a tendency for communities with high resource development to have proportionally low economic growth, as has been seen in Indigenous communities in the Albertan oil sands and other communities near resource extraction projects (Parlee, 2015). In order to mitigate this tendency, it is necessary to identify the benefits and risks that are associated with resource development and extraction, and to identify how communities can optimize benefits from locally owned energy projects.

Hoicka et al. (2021, p.1) defines community energy as having a “deep engagement in process, as well as local and collective benefits”. Indigenous ownership of renewable energy projects, specifically community energy projects, provides one area of hope as a potential tool for furthering Indigenous self-determination and reconciliation (Stefanelli et al., 2019). While academic discourse on Indigenous equity ownership of renewable energy projects is relatively new, the potential for First Nations or other Indigenous communities in Canada to control

resource development projects has the potential to substantially support reconciliation in Canada (Hoicka et al., 2021). Ownership structures of community energy projects are diverse, and terms like “community energy” are not always clearly or consistently defined in academic literature (Hoicka et al., 2021). As more Indigenous communities engage in community-level energy projects, there may be opportunities for academic research to examine the extent to which reconciliation associated with Indigenous energy projects is tied to the ownership structure of the project (Hoicka et al., 2021). TDK provides an example of a community energy project that is 100% First Nation-owned. The distribution of benefits and risks generated by Indigenous-owned energy projects is one piece of the discourse on reconciliation in these projects. By developing an understanding of local community members’ perspectives on and experiences with resource extraction and development, policy makers and project managers may be better equipped to ensure that their concerns are being addressed and that they are receiving appropriate benefits. As Indigenous-owned resource development opportunities become more available, there is a gap in scholarly literature on the distribution of benefits and risks associated with resource extraction in the Indigenous communities that own these projects. This research seeks to fill this gap by identifying qualitative and quantitative baseline data regarding the social and economic context of the TDK project using two approaches. The first approach, in Chapter 2, employs a settler-colonialism theory lens in identifying a spread of perspectives and knowledge held by FNFN community members regarding TDK as a community energy project. The second approach, in Chapter 3, applies a community capacity framework to identify baseline indicators for the socio-economic context of the TDK project rooted in social indicators literature. Although these approaches to baseline data are theoretically distinct, the combination of theory and methods used to identify the social and economic context of the TDK projects provides a more rich and community-specific understanding than would be possible with either approach alone.

## **Chapter Overview**

The present chapter sets out to introduce the study setting, relevant areas of academic literature, and the methodology used in this research. Chapters 2 and 3 are distinct articles. Chapter 2 focuses primarily on the perspectives and experiences of FNFN members regarding the TDK

project, rooted in primary interview and survey data. Chapter 3 focuses on identifying social and economic baseline indicators for the FNFN community based in secondary census data and supplemented with primary interview data. Chapter 4 provides a conclusion, drawing together the findings of this research, its limitations, and areas for future research.

## **Study Setting**

### ***Fort Nelson First Nation***

This study is focused on the case of the Fort Nelson First Nation-owned TDK geothermal project and its local regional context. The following section on the study setting includes reflections on what I have learned about the region through interactions with community members.

Approximately 10% of the upper northeastern corner of the province of British Columbia is governed by the Northern Rockies Regional Municipality (NRRM). This region of the province is rich in boreal forests and has had a long history of oil and gas extraction.

Fort Nelson is the largest community within the NRRM, and it is where the administration of the NRRM is centred. In Fort Nelson, one can find a small variety of restaurants and hotels, two primary grocery stores, gas stations, an airport, a school, and a recreation centre. A substantial portion of the public infrastructure, including the airport and recreation centre, was developed or renovated during an economic boom from oil and gas development in the region, during which time the population of Fort Nelson was estimated to have been around 10,000 people.

Unfortunately, as is often seen in resource-dependent communities, the region faced an economic downturn in around 2007, when the forestry industry left. At this time, the local economy funneled largely into oil and gas development. Since 2016, when the oil and gas industry left the region, the region has again faced severe economic downturn.

Treaty 8 was originally signed between First Nations of Northern Alberta, Northern Saskatchewan and Southwest of the Northwest Territories and the Crown in 1899. Later, adhesions in Northeastern BC were added, including the FNFN which entered the treaty in 1910 (Fort Nelson First Nation Info, n.d.). The FNFN is one of six First Nations in the Treaty 8 Tribal

Association, which provides advisory services to BC's Treaty 8 members to "achieve sustainable shared economic prosperity and create strong proud communities" while preserving their cultural heritage and protecting their historic Treaty 8 Rights and the environment (Treaty 8, n.d.).

The FNFN's primary reserve, officially called Reserve 2, is located just 7 kilometers south, and across the Muskwa River, of Fort Nelson along the Alaskan Highway. The FNFN has members from Cree and Dene (primarily Dene Tha) linguistic groups. The Indian and Northern Affairs Election Code is followed in the FNFN, meaning that elections for the Nation's seven councillors are held every two years. Currently, Sharleen Gale is the Chief Councillor of the FNFN (Fort Nelson First Nation Info, n.d.).

The Fort Nelson population is around 2,611 people (Statistics Canada, 2021). The FNFN has approximately 800 registered band members, with about half of their members living on the main reserve, called Reserve 2. On the reserve, you can find amenities including the Nation-run Chalo school, a health building, a gas station, community space, a daycare, a Nation-owned construction company and band administration offices. The FNFN administration has departments for Capital Works & Housing; Health, Community and Family Centre; Justice Department; Economic Development (called the Deh Tai LP); and Lands and Resources.

There are ongoing efforts to maintain the culture and traditional knowledge of the FNFN. Through Chalo School, there are language classes, and the Trades Centre is currently being renovated to provide space for community teachings on practices such as processing moose that have been hunted by community members. The FNFN's Land Department ensures that the Nation's interests related to land and natural resources are represented and engages in projects to steward the land. The Land Department has environmental monitoring projects including water and climate monitoring throughout the FNFN's territory, the Liard Basin Monitoring Initiative focused on monitoring the Liard River watershed between 2016 and 2019, and the re-establishment of a fish camp and water and climate change monitoring at Tlu Tué (Maxhamish or Fish Lake) (Fort Nelson First Nation, Environmental Monitoring, n.d.). Additionally, the FNFN is working to revitalize Indigenous law through the Revitalizing Indigenous Law for Land, Air & Water (RELAW) project, initiated in 2016. The Land Department also has

ecological restoration projects, including the caribou habitat restoration, Dene fire project, and the Oilfield Restoration Pilot project (Fort Nelson First Nation, Ecological Restoration n.d.). The economic development branch of the FNFN, Deh Tai, has been engaged in a variety of economic initiatives including the Liard Hot Springs Lodge, Eh-Cho-Dene (a construction company), owning property in Qualicum, and, of particular relevance to this research, the TDK geothermal energy project.

Many members of the FNFN also live in Fort Nelson. In looking at the case of TDK, it is important to consider the proximity of the FNFN Reserve 2 to Fort Nelson. The reserve system in Canada is a colonial system that has involved drawing sometimes arbitrary boundaries to distinguish Indigenous territories from non-Indigenous territories as is recognized by the Canadian government. Although the NRRM and the FNFN are governed separately, economic development, and the associated boom and busts in the regional economy effects both communities. With approximately half of FNFN members living on reserve and half living off, there are many members who live in the town of Fort Nelson, elsewhere in the NRRM, in Fort St. John, and elsewhere around the country and the world. In this way, FNFN members' experiences do not exist within a vacuum on the FNFN Reserve 2. In about the 1950s, the FNFN reached a settlement with oil companies that had been given license to extract oil on FNFN reserve land by the province of BC. This brought an influx of money into the Nation, enabling families to start their own businesses and build livelihoods out of the oil and gas industry. When the oil and gas industry retreated from northeastern BC, members of the FNFN and NRRM community members alike faced the associated community impacts of the sudden loss of industry.

Since the loss of the forestry and oil and gas industries in the region, there have been efforts to diversify the economy of the northeastern BC region. Included in these efforts and endeavors are the proposed Peak Renewables wood pellet processing plant, the proposed Peak LNG plant, and the FNFN-Owned TDK geothermal energy project.

### ***Tu Deh-Kah Geothermal Project***

The TDK project, formerly called the Clarke Lake Geothermal Project, is 100% Indigenous-owned, and the FNFN had secured \$40.5 million in Federal Funds for the project as of 2020 (CLGP Press Release, March 2020). Additional funding for project development is being gathered on an ongoing basis as the project progresses. Deh Tai LP, the economic development branch of the FNFN, is collaborating with the Barkley Project Group, a project management group with experience with renewable energy projects, to develop TDK. Along with producing electricity, the FNFN has plans for TDK to provide heat for buildings, forestry, and agriculture (CLGP Press Release, March 2021). The use of heat for agriculture specifically has been flagged as a way to support the food security in the Fort Nelson area. As Kinney et al. (2019) argue, geothermal energy in Canada's remote Northern communities has the potential to provide both a reliable source of energy and a cost-effective food supply to communities.

The TDK project site is located on the Clarke Lake gas field, approximately 17 kilometers from the Fort Nelson Reserve 2. Part of what makes this project unique among commercial scale geothermal energy developments in Canada is that it may reclaim existing gas wells. With the initial estimate of potentially producing 7-15 MW, TDK is anticipated to generate enough energy to power the Fort Nelson Reserve 2 and the Fort Nelson community. Potential offshoots of the TDK project come up often in conversations about the potential significance of the project. Should the geothermal brine being pumped through the system contain lucrative organic materials like certain minerals, there is potential that these may be harvested and sold. Other proposed offshoots of the geothermal project include harnessing the excess heat from the geothermal plant to heat greenhouses for agricultural endeavors, providing direct-use-heat (such as heated roads, heating for residences or commercial buildings), heating an Onsen-inspired spa facility, powering local industrial activities (such as the Peak Renewables pellet plant), and providing power for cryptocurrency mining. While these endeavors could provide a range of benefits to locals, it is important to note that the heat generated from geothermal wells has a limited radius in which the heat can travel, potentially limiting the spread of these additional benefits to the TDK development. Further pump tests of the test wells, with an anticipated completion of fall 2022, will provide a more concrete assessment of the amounts of energy to be produced by the project as well as what offshoot projects are feasible.



TDK is a binary cycle geothermal plant. This means that two holes will be drilled into the earth to release heat, which will heat a secondary organic liquid (Dhar et al. 2020). This secondary liquid will in turn boil and power the turbine. The water in binary cycle plants is returned to the ground to be reheated and begin the process again. By using a secondary liquid with a lower boiling point than water, binary cycle plants do not require the hot water in a reservoir to be as hot as in other forms of geothermal plants. As of August, 2022, the TDK project is in a 30-day testing phase. Results of this testing period will inform more specific estimates for the amount of energy expected to be produced by TDK, as well as plans for the projects' development moving forward.

Initially, the FNFN partnered with the Saluteaux Nation for TDK in around 2019. The Sauteaux Nation has a pre-existing Power Purchase Agreement (PPA) with the British Columbia Hydro and Power Authority (BC Hydro) – the primary electric utility provider in the province. A PPA with BC Hydro is necessary for energy projects in British Columbia in order to sell the power they produce to the electricity grids owned by BC Hydro. PPAs can be difficult to attain for new energy projects in BC because BC Hydro has a monopoly on the provincial energy grid. Sauteaux Nation left the partnership with FNFN soon after, leaving the FNFN, or more specifically Deh Tai LP as the sole owner of the TDK geothermal project.

Barkley Project Group LTD, a project management consultant firm based in Nanaimo in Southern BC was hired to manage the TDK project. In the fall of 2021, two members of the FNFN were hired as the first full time staff of TDK. There is a Geothermal Training and Employment Steering Committee (GTESC), comprised of a combination of FNFN community representatives, TDK project proponents, staff for the regional college, and a variety of other organizations. The GTESC meets every three weeks to plan future employment and training opportunities for members of the FNFN.

## Academic Context

As emissions from energy use continue to contribute heavily to climate change, there is an ongoing push for the transition to renewable energy sources, specifically through the development of community energy projects (MacArthur 2017). Northern communities in Canada, which currently rely heavily on fossil fuels for energy, have the opportunity to develop successful geothermal energy infrastructure to transition to renewable energy sources (Mahbaz et al. 2020). Local initiatives to transition to renewable energy have the potential to support local economic and community development (Mahbaz et al. 2020). As community-led renewable energy projects continue to be proposed and developed, there is a growing body of research on the social impacts and implications of energy transitions on the community level.

This research is situated within a body of academic discourse on renewable energy transitions that include concepts such as energy justice, energy security, and energy democracy. Inequal access to energy nationally and internationally has given way to a body of discourse on justice in energy. Energy security is concerned with stable and secure access to energy. Academic literature on energy justice is widespread, focusing on a variety of scopes from local energy poverty to larger conversations about energy security, with emphases ranging from different aspects of energy production or access to whole energy systems (Bickerstaff et al., 2013). Energy democracy is concerned with empowering communities economically, politically, and with energy through “bringing energy resources under public or community ownership and/or control” (Fairchild et al., 2017). Energy democracy may support efforts of increasing energy security and energy justice by increasing communities’ ownership or control over their energy sources to build more just, sustainable and secure economies (Fairchild et al., 2017). While this thesis does not address the concepts of energy justice, energy security, or energy democracy directly, they do relate to the approach taken to understanding renewable energy transitions, particularly as it relates to concepts of Indigenous energy and community energy, outlined in Chapter 2.

### *A Note on Indigenous Knowledge*

Indigenous Knowledge has long been marginalized in Western scientific and academic spaces, and there are ongoing efforts to support the acknowledgement of the value of Indigenous and Traditional Ecological Knowledge and ways of knowing (Norgaard & Fenelon, 2021). This study is limited in that it does not take on Indigenous Knowledge as a theme, although this knowledge may be reflected in the insights and experiences shared by our research participants. The information shared by Indigenous participants in this research may be inherently considered Indigenous Knowledge. However, as the research aims set out, with consent from participants and community collaborators, we focus on identifying the socio-economic context of the Tu Deh-Kah geothermal project along with concepts and ideas to assist in the analysis and interpretation of empirical findings.

### *Indigenous Ownership*

There are a growing number of Indigenous-owned energy projects globally. Māori-owned geothermal enterprises in New Zealand provide examples of the ways in which Indigenous-owned energy initiatives may support the development of local, diverse economies (Bargh 2012). In Canada, there are a variety of Indigenous-led energy transitions. Although community energy projects in Canada generally were not found to be supportive of reconciliation, Hoicka et al. (2021) propose that Indigenous equity ownership of, combined with control over renewable energy projects, can be one path to reconciliation. Community energy does not necessarily guarantee that Indigenous communities have ownership or control over the energy projects they have a stake in. It is also currently rare for Indigenous communities to have full ownership over energy projects in Canada, leaving a gap in the literature on how ownership and community engagement intersect with reconciliation and the benefits received by Indigenous communities that are stakeholders in energy project (Hoicka et al. 2021). TDK is the first 100% Indigenous-owned geothermal energy plant in Canada. As one of the first of its kind in Canada, TDK may draw particular attention to the relationship between full Indigenous ownership of an energy project and the benefits and risks faced by the local community.

### ***Settler-Colonialism***

Resource development and extraction in settler-colonial contexts, including Canada, can be complicated in terms of potential for Indigenous reconciliation. Academic discourse on resource extraction in settler-colonial contexts provides analysis on the ways in which traditional resource extraction may perpetuate the legacies and power imbalances of settler-colonialism, as well as highlighting potential paths forward for reconciliation in this work (Bacon, 2019; Stefanelli et al., 2019). Academic research in Canada may also be susceptible to the legacies of settler colonialism (Norgaard, 2019; Norgaard & Fenelon, 2021). A growing body of academic work is dedicated to applying settler colonialism theory in research to emphasize the dynamics of power present in research (Norgaard, 2019; Norgaard & Fenelon, 2021). This work draws attention to the importance of considering the ways in which settler colonialism may influence research approaches as we work towards Indigenous reconciliation (Norgaard & Fenelon, 2021). The present work seeks to use settler-colonialism theory to better identify the social and economic context of the TDK geothermal project, and to contribute to the understanding of how renewable energy projects may fit into settler-colonial contexts like Canada.

### ***Community Capacity***

A community-capacity theoretical lens, as modelled by Beckley et al., (2009) will be applied to this research to develop effective indicators of community success. I employ Beckley et al.'s (2009, p. 60) definition of community capacity in my research as “the collective ability of a group (the community) to combine various forms of capital within institutional and relational contexts to produce desired results or outcomes”, with the understanding that capacity has a different meaning to different people and communities. Capacity building, and the outcomes that are associated with it, will also look different in different communities and contexts. Building community capacity may be supported by the development of community-specific social indicators, in that these indicators may be used to measure the capacity of the Fort Nelson First Nation before, during, and after the development of TDK. Employing the natural, financial, social, and human capital framework that is tied to community-capacity building, provides a framework for baseline data for future assessment of the local social and economic impacts of TDK.

## **Methodology**

### ***Indigenous Research & OCAP***

There is a growing body of academic discourse on Indigenous research and methodologies. The principles of ownership, control, access, and possession (OCAP) are key in ensuring that First Nations and other Indigenous communities engaged in research relationships maintain self-determination (Schnarch, 2004). One theme that emerges in the literature on Indigenous research is that of relations and relationality. As Wilson (2008, p. 73) proposes, in an Indigenous research paradigm, “reality is not an object but a process of relationships”, and respect, reciprocity and responsibility are all key in Indigenous methodology. This study employs the principles of OCAP, and respect, reciprocity, and responsibility through the development of an ongoing collaborative relationship with the FNFN community. Relationships built with FNFN community members are discussed further in the *Time spent in community* section below.

### ***Time spent in community – Community Based Participatory Research***

This study takes a community based participatory research approach (Koster et al. 2012) with FNFN members. As Wray et al. (2020) argue, collaborative and community-based research cannot be used prescriptively but must instead be adapted to the research context in order to meet the specific needs and interests of the community involved in the research. To gain familiarity with the Fort Nelson context and to build relationships with community members, I spent 12 weeks in Fort Nelson during the fall of 2021. Prior to beginning data collection, a steering committee comprised of three FNFN members was set up. The intention was for this committee to provide ongoing feedback, recommendations, and local insight as the development of our research plan and methodology progressed. I met with two of the committee members once before arriving in Fort Nelson to gain initial insight. Due to scheduling conflicts, I was able to meet with only one of the steering committee members two times following the initial meeting. In these meetings, I shared research plans and asked for guidance on locally relevant and appropriate research focuses and methods. In mid-November, the community liaison for FNFN and the TDK project was hired, and I was able to work directly with them and a local TDK project manager to gain insight into appropriate research questions and methods. The research

partnership with the community liaison person has lasted throughout the data collection and writing process. The insight and feedback from the community liaison partner and other community contacts has been extremely valuable for ensuring that this research will be appropriate for both the local context and for the future goals of the community.

As community based participatory research places an emphasis on the collaborative nature of research conducted with, rather than on, a community, I requested feedback and insight from my community contacts when research-related decisions were being made. In developing the plan for this research, I acknowledged that the demands of community-based participatory research has the potential to place a burden on Indigenous communities (Leeuw et al. 2012). I aimed to mitigate this potential burden on the FNFN by giving its members the option to determine how involved in the research process they would like to be, and to be flexible with expectations of involvement of FNFN members in this research. I introduced myself as a visiting researcher to the community in the FNFN community newsletter in September, including my contact information and my general research goals with the hopes that any interested community members would be able to contact me with any questions, comments, insights, or concerns they may have.

Primary data collection methods used for this research include surveys and semi-structured in-depth interviews. Secondary data analysis of Statistics Canada census data is also used.

### *Surveys*

In December of 2021, we administered a five-minute long questionnaire online among members of the FNFN using Alchemer survey software. Invitations to participate in the online survey were sent to members of the Nation via an email to community members and a post on the members-only Facebook page. There were 45 participants in the survey. The survey was open to members who were 18-years old and older. To ensure participants were able to give fully informed and free consent, there was a description of the study prior to the first question on the survey, including that information from the survey would be used for this research, who will have access to the information collected, possible risks associated with participation, contact information for the research team, and the honoraria available to participants. As participation in the survey

required individuals to click a link and begin filling out the survey, consent was implied when participants chose to complete questions. Participants were able to skip questions if they did not want to answer them.

Survey content covered attitudes toward and knowledge about TDK and geothermal energy. Honoraria for survey participants were offered as a token of our appreciation for their time and participation. All participants who entered an email address were able to receive a \$5 gift card to Tim Horton's, and were entered into a one-time draw for a prize of a \$500 gift card to Amazon. It was required that participants provide their contact information for the honoraria due to the logistical requirements of being able to send gift cards online. All contact information collected in the surveys for honoraria was deleted following the draw for the prize.

At the end of the survey, participants were given the option to opt-in to being contacted to participate in an interview on their perspectives toward the TDK project. If participants responded "Yes" to being interested in participating in an interview, I sent them a follow up email with additional details regarding interview participation and inviting them to schedule a time for an interview. Data analysis of surveys was conducted using SPSS software to identify descriptive statistics including frequencies and means, and correlations.

### *Interviews*

Ten semi-structured, in-depth interviews were conducted with community members of the FNFN and external stakeholders in either TDK or the regional economy. Interviews ranged in length from approximately 20-minutes long to two-hours long, with an average length of approximately one-hour. One interview took place in person, eight took place over video-call, and two over telephone call. The community liaison for this project joined for six of the interviews with the consent of interview participants. A breakdown of the demographics of interview participants is provided in Chapter 2.

Prior to the interview, participants were sent a copy of the consent form. When the meeting with participants began, I reviewed the consent form with them to ensure that they were able to give fully informed and free consent. Participants were told prior to beginning the interview that they

may skip any questions or end the interview at any point. All participants consented to having their interview recorded and transcribed for use in this research. Interviews included questions regarding participants knowledge of the history of resource extraction in the region, attitudes toward geothermal energy, knowledge of TDK, and expected benefits and concerns related to TDK.

Interview participants were offered an honorarium of a \$25 gift card to a store of their choosing as a gift for their time and token of appreciation for sharing their expertise and experience with us. Interview recordings were transcribed with the assistance of Otter.ai transcription software and sent back to each participant so they could identify any errors and ensure they were comfortable with their interview being included in this research. Once transcripts were approved, transcripts were coded for emergent themes to be used in analysis. Pseudonyms have been assigned to all interview participants to help maintain their confidentiality.

### ***Secondary Data***

Secondary data from the 1996-2021 Statistics Canada Censuses is used in this research to assist in providing baseline socio-economic data about the FNFN and the Northern Rockies Regional District. All census data used is publicly available. SPSS statistics software has been used for the analysis of this data. The use of census data in this research allows for the comparison of data for the community in the future. The mixed-methods approach in this thesis through a combination of secondary data analysis with primary interview and survey data provides results that include rich qualitative and quantitative findings. Secondary data supports the experiences and knowledge shared by community members of the FNFN and the external stakeholders who participated in interviews and surveys for this research by identifying quantitative indicators of the FNFN community and regional socio-economic context.

### ***Deliverables (Reporting results to Community Members)***

Information and data collected from members of the FNFN through this research belongs to the participants' who shared this information. Results of this work have been shared with members of the FNFN on a few occasions. I have presented updates on the research at two community-information sessions for the TDK project to date, with a third presentation on the completed



findings of this research planned for the winter of 2022. These sessions are held via Zoom or hybrid in-person and Zoom events. Members of the FNFN are invited to join these events via community advertising (such as via posters around the FNFN Reserve, and posts on the FNFN Facebook page). My email address has been made available to community members during these presentations for anyone who would like to receive more details about the research or has questions regarding the results. Dr. John Parkins and I traveled to Fort Nelson to attend the FNFN's Annual Celebration over August 5-7<sup>th</sup>, 2022, at which we shared information sheets sharing results from the community survey conducted through this research. My contact information will be kept up to date with my contacts in the FNFN in case community members would like to discuss this research in the future.

### ***Challenges in developing the methodology***

This research has been conducted during the COVID-19 pandemic. Specifically, my time spent in Fort Nelson coincided with strict COVID-19 restrictions due to high rates of the virus in the Northern Health Authority's district, and relatively low vaccination rates in the region. Due to these restrictions and concerns about spreading the virus, meeting community members in person while I was in Fort Nelson posed challenging. I was fortunately able to conduct meetings and introductions virtually via Zoom at times. During the last two weeks of my time spent in Fort Nelson, the local office for TDK was opened on the FNFN Reserve. At this time, I was fortunate to be able to work out of this office space with the local staff for the project. The accessibility of video-calling software gave me the ability to conduct interviews with community members and external regional economic stakeholders remotely after I left Fort Nelson.

### **Positionality Statement**

I am a female, non-Indigenous researcher from Southern BC. I was born and raised in Tk'emlúps te Secwépemc territory, or Kamloops. For the past eight years, I have been living and learning in Vancouver, on the ancestral, unceded territory of the x̣ẉməθḳẉəỵəm (Musqueam), Ṣḳẉx̣ẉú7mesh (Squamish), and səlilwətəl (Tsleil-Waututh) Nations. As such, I do not claim to know the FNFN community, nor the Northeastern BC context. My intention in this research is

not to attempt to represent the FNFN or community members, but rather to provide an overview of the understandings held by and experiences of some members of the FNFN, as an example of the array of perspectives toward TDK held by FNFN members. I feel extremely privileged to have been able to spend 12-weeks in Fort Nelson, and extremely grateful to the participants in this research for being open and willing to share their experiences and perspectives with me. When possible, I sought the feedback of members of the FNFN on the methods and aims of this research to ensure it was conducted in an appropriate and respectful manner.

Although I do have previous research experience and training in research methods, I had no direct ties to Fort Nelson or the FNFN prior to beginning this work. There are power dynamics inherent in performing qualitative research, and participatory community research methodologies may risk enabling extractive research. In order to mitigate power dynamics between myself and community members, and to avoid performing extractive research, I placed an emphasis on engaging with and forming connections with members of the FNFN and the Fort Nelson community when possible. Decisions regarding the goals of this research project and the methods of data collection were made primarily based on conversations with four community members with whom I was in contact during my time in the region. Prior to conducting the survey among FNFN members, I presented my research plan to the FNFN Chief and Council for their feedback and approval. Prior to my 12-weeks in community, a steering committee, comprised of three members of the FNFN, was set up. The intention was for my research plans to be approved by the steering committee before any data collection was conducted. However, due to scheduling and communication challenges the steering committee was unable to meet during my time in Fort Nelson. One member of the steering committee was available to meet to review my work and provide feedback and suggestions for research directions during my time in Fort Nelson.

Interviews are a research method that have inherent power imbalances between the interviewer and interviewee (Anyan 2015). Based on Anyan's (2015) recommendations for counteracting power imbalances in qualitative interviews, I attempted to mitigate these imbalances by considering my positionality in relation to participants' positionalities to identify the ways in which our power relations may influence the interviews. In employing OCAP principles and

principles of respect, reciprocity, and responsibility, I consider all participants in this research to be experts in their own experiences and perspectives. As a researcher, my role has not been to assign judgement to the range of perspectives that were expressed, but rather to listen and learn from what participants have been willing to share with me.

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## Chapter 2 : Fort Nelson First Nation Member Perspectives

### Introduction

The push for shifting away from fossil fuels in favour of renewable energy sources is gaining traction, lending ways to advance academic research on topics relating to energy transitions. Community-owned renewable energy projects are one piece of global energy transitions and are becoming increasingly important in the shift away from the “traditionally centralized and fossil-fuel-dominated energy market” to renewable energy (Leonhardt et al., 2022, p.1). On a localized scale, community energy is touted by researchers and activists as having many potential benefits, ranging from community capacity building to social and economic opportunities, to supporting local empowerment and self-sufficiency (Leonhardt et al., 2022; Walker, 2008).

Within the research on Indigenous renewable energy in Canada, where a focus on self-sufficiency is taking place through community-based renewable energy projects, researchers are examining the ongoing context of settler colonialism and the potential for community-based renewable energy projects to help dismantle colonial legacies (Hoicka et al., 2021; Stefanelli et al., 2019). Norgaard (2019) defines colonialism as “the generation of wealth for colonizers through the material separation and alienation of communities from their lands” (p. 14). Settler-colonialism as a framework “describes the logic and operation of power when one group of people arrives on and colonizes lands already inhabited by another with the intention to remain” (Norgaard, 2019, p. 14). Understanding the settler-colonial processes and institutions in Canada is essential to understanding power structures and imbalances in the country, and therefore essential to reconciliation, which will require “awareness of the past, acknowledgement of the harm that has been inflicted, atonement for the causes, and action to change behaviour” (Truth and Reconciliation Commission of Canada, 2015, p.6-7).

The Truth and Reconciliation Commission of Canada (TRC) describes reconciliation as being “about establishing and maintaining a mutually respectful relationship between Aboriginal and

non-Aboriginal peoples in this country (Truth and Reconciliation Commission of Canada, 2015, p. 6), but the concept of reconciliation is not easily, nor consistently, defined. Reconciliation may be defined and experienced differently across the country, making it difficult to assess and identify critical elements of reconciliation. In this sense, there may not be uniformity in understanding of what a reconciled Canada would look like, but rather that reconciliation is a process involving intentional steps to overcome or repair historical and ongoing power imbalances and exploitative legacies of colonialism found in Canada, including the legacy of the Residential School system. For Indigenous-owned community energy projects, settler colonialism may serve as a helpful framework to better understand perspectives on such projects held by community members, particularly as members reflect on the legacy of resource development and the potential for new community-based projects to facilitate reconciliation.

The Tu Deh-Kah project in Northeastern BC provides a unique example of a fully First Nation-owned, commercial-scale geothermal project – one of the first of its kind in Canada. Adding to the growing literature on reconciliation through resource development, this paper offers a case study of this community energy project with a focus the knowledge, awareness and levels of local support for the project. This analysis presents insights from 45 online questionnaires and six semi-structured interviews from members of the Fort Nelson First Nation (FNFN). Our goal in this paper is to examine the possible ways in which the Tu Deh-Kah project can help dismantle colonial legacies as defined in the literature on settler colonialism. In this way, we seek to identify specific aspects of the Tu Deh-Kah project that facilitate decolonization and reconciliation. Furthermore, we use the lens of settler-colonialism to assist in understanding and interpreting the views of community members toward the project.

## **The Academic Context**

### ***Settler Colonialism***

In the field of sociology, the concept of post-colonialism is increasingly common. However, the idea that our society truly is “post”, or rather, past colonialism is contested (Norgaard, 2019;



Norgaard & Fenelon, 2021; Bacon, 2019;). Norgaard (2019) argues that colonization is ongoing and is perpetuated across scales of institutional practices and policies, and within individual interactions. Rather than situating the present research in the literature of post-colonialism, this analysis employs the concept of settler-colonialism. Settler-colonialism involves the displacement of Indigenous people, and the elimination of Indigenous knowledge and systems, which are replaced with those of the settler (i.e. colonizing) society (Norgaard, 2019). Not confined to history, settler-colonialism theory emphasizes dynamics of power that are relevant to studies in environmental sociology and to specific research regarding energy transitions. While the present paper focuses on settler-colonialism as a concept to situate the case of the FNFN-owned TDK project development, additional power dynamics are present in Canadian society, including capitalism, racism, and sexism, that can often play a part in ongoing processes of economic development, including renewable energy projects.

Norgaard and Fenelon (2021) contend that theories of settler-colonialism can, at the least, be useful in identifying the ‘settler mentality’, which “consists of the thinking and ideologies arising in the general population toward a conquest dominating frame that separates human society from the natural world environment in which we are in fact embedded” (p. 484). Tied to the ‘settler mentality’ are Western economic institutions that view the natural world as full of resources to be extracted or exploited in ways that maximize profits rather than people’s wellbeing (Norgaard and Fenelon, 2021; Bacon, 2019).

Conventional commercial fossil fuel extraction may be seen as inherently colonial as it relies on the exploitation of the so-called “natural world” for the purpose of economic gain. In particular, resource extraction that generates environmental risks or harms to Indigenous peoples’ and communities are a clear example of ways in which colonial power imbalances may persist through modern industrial activity (Bacon, 2019). Although renewable energy projects, specifically those that are owned by Indigenous communities, exist within colonial structures of power and institutions, some scholars purport these projects as having the potential to support reconciliation and decolonization efforts (Stefanelli we al., 2019).

## *Indigenous Energy*

Academic research complicates and challenges the common assumption that engagement in resource extraction consistently improves the socio-economic status of communities (Stienstra et al., 2019; Parlee, 2015; O’Faircheallaigh, 1998). Resource extraction is known to have varied impacts on communities – impacts including those on “employment, housing, education and training, health, social services and infrastructure, sex work, violence, crime and safety, food security, and culture and traditions” (Stienstra et al., 2019, p. 220) in addition to health care services in rural and remote communities, all of which have differential effects on groups or communities (Hanlon & Halseth, 2005). Indigenous communities in particular experience disproportionately low levels of benefit from local resource extraction (O’Faircheallaigh, 2013; Parlee, 2015). Stienstra et al. (2015) outline how resource extraction projects can either create crisis or intensify existing crisis, defining crisis as “a moment in time when what is understood or practices as the status quo is threatened and at risk of destruction” (p. 633). Resource extraction in Northern communities can indicate “a lack of resources, infrastructure and/or capacity” to manage the strains associated with the development of new projects when new or deepening crisis occurs (Stienstra et al., 2019, p. 633). In some Northern communities, crisis may be seen as chronic, as the cycles of resource extraction projects and the long-term effects of multiple projects may result in a consistent state of crisis as being seen as “normal” (Stienstra et al., 2019).

Indigenous energy transitions, specifically, are gaining increasing attention in academic literature (Stefanelli et al., 2019; Lowan-Trudeau, 2017; Hoicka, Savic, & Campney 2021). The motivations for renewable energy initiatives in Indigenous territories are varied and can be dependent on specific contexts (Stefanelli et al., 2019). Stefanelli et al. (2019, p. 25) find that some communities use the development of a renewable energy plan as a way to work toward new levels of autonomy and self-determination, and to “help redress the historical injustices associated with forcible dispossession of land and the erosion of cultural, social, physical, and mental health” – in other words, the injustices of colonization. Other communities may be motivated more by the prospect of reducing cost of energy and environmental damage (Stefanelli et al., 2019). While the motivations for taking on renewable energy initiatives are diverse,

Stefanelli et al. (2019) find that local control is of utmost importance in shaping local approval of a project, followed by participation, collaboration, and engagement in project planning.

### ***Community Energy***

The term “community renewable energy” tends to be an ambiguous concept that is not consistently, or clearly, defined. This lack of a clear definition of projects that are labelled as community energy can be of benefit because it allows for a wide variety of types of projects that are unique to their contexts to be developed under the community energy label. However, the ambiguity of the term also means that community energy may be politicized in public debate on the topic (Walker et al., 2010; Hicks & Ison, 2018).

In line with Seyfang et al. (2013) and Walker and Devine-Wright (2008), community energy, or community renewable energy is defined in this analysis as “projects where communities (of place or interest) exhibit a high degree of ownership and control, as well as benefiting collectively from the outcomes” (Seyfang et al., 2013, p. 978). There are a variety of ways in which renewable energy projects may be considered “community-owned”, from being fully owned by a particular community, to being co-owned by communities in collaboration with the private sector, to being owned by specific groups on behalf of ‘members of the public’ (Walker 2008, p. 4401). Community energy may be enacted through different processes, with different outcomes, and in line with various motivations (Hicks and Ison, 2018). Because of these different circumstances and the diverse range of communities (whether they be based in geographical boundaries or other forms of communities), it can be expected that no two community energy projects will look the same. External factors, such as government policies and instruments can also serve to shape community energy projects.

Walker (2008, p. 4402) identifies a range of incentives for community ownership of renewable energy projects, including the local generation of income and returns on investment through energy or heat generation and the creation of employment; the expectation that community owner projects will have an easier time obtaining planning permission and approval than others; the ability for communities to locally control aspects of the project such as location and scale; the cheaper provision of heating or energy for community buildings (although the cost-effectiveness

of renewable energy may challenge this); the sense of responsibility to act ethically and environmentally; and, the potential for smaller-scale energy projects to avoid the potential electricity grid issues associated with large-scale renewables. In outlining barriers to community renewable energy projects, Walker (2008, p. 4402-4403) draws attention to the potentially long return periods and high economic risks associated with some forms of renewable energy; the requirements for sometimes complicated legal conditions and assessments of economic and technical viability of projects; and the potential for local controversy surrounding community energy projects regarding the extent of community involvement and benefit.

Walker & Devine-Wright (2008, p. 498) propose a two-dimensional framework for community energy views of “policy makers, administrators, activists, project participants and local residents”. With the dimensions of process (who a project is run, developed, and influenced by) and outcome (who it is for and who benefits), Walker & Devine-Wright (2008) provide an initial framework with which understandings and interpretations relating to community energy may be understood.

Both the *process* and *outcome* dimensions as defined by Walker & Devine-Wright (2008) are of particular importance when discussing Indigenous-led community energy projects. Tied to Canada’s settler-colonial history, there is a longstanding history of exploitation of Indigenous peoples and communities by governments, researchers, and consultants. It is in this settler-colonial context that the process-outcome framework may be applied to identify the dimensions that underlie possible views and attitudes held by FNFN and Fort Nelson community members when considering the TDK geothermal project.

Renewable community energy projects, specifically those that are Indigenous-owned, exist in a unique space within academic discourse on settler-colonialism. Stefanelli et al. (2019) assert that renewable energy initiatives that are aligned with the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and the Truth and Reconciliation Commission (TRC) of Canada mandates have the potential to support reconciliation between the state of Canada and Indigenous peoples. Hoicka et al. (2021), however, find limited indications of reconciliation in their analysis of 194 renewable energy projects associated with Indigenous communities, arguing for Indigenous equity ownership as one path forward for reconciliation in transitions. Renewable

community energy projects inherently exist in a diverse range of social-economic contexts, making it difficult to assess whether they may be considered, on the whole, settler-colonial projects. Therefore, as indicators of decolonization and reconciliation, it may be more useful to identify the ways in which renewable community energy projects support Indigenous peoples and communities, emphasize Indigenous voices and knowledge, and the broader socio-economic context these projects are situated in to better identify ways in which future projects may be leveraged and developed so as to support Indigenous reconciliation and sovereignty. This analysis applies a settler-colonial theory lens in highlighting the local insights shared by FNFN members regarding TDK as a community energy project.

## **Collecting the Data**

This paper presents data from two sources relating to FNFN member's perspectives on the TDK geothermal project. First is a survey of 45 self-identified members of the FNFN. Second is data from six semi-structured interviews with self-identified members of the FNFN. Participants in both surveys and interviews were required to be 18-years-old and older to ensure that they were able to give full free and prior-informed consent to participating. Throughout this research, all insight shared by FNFN community members is recognized as a reflection of their traditional knowledge, experiences, values, interests, and concerns. That is to say, participants are considered to be experts in their own community and experiences, and the insights they share are valuable in our attempt to understand the local social context of the TDK geothermal project.

### ***Surveys***

Recruitment for survey participation was done in collaboration with the administration of the FNFN, and the assistance of a member of the FNFN and a project coordinator for TDK. The survey was conducted online and was open for participation for a total of two weeks in December, 2021. Although a total of 45 people participated in the questionnaire, 40 survey responses were complete. As the total number of FNFN Band members is approximately 800 people, our sample size is too small to draw generalizable conclusions from the resulting data. We can, however, use the results from this survey as an initial example of the spread of

knowledge about TDK and attitudes toward the project. This information may help inform the efforts being conducted by project proponents and community members to foster community engagement in TDK. It is important when analysing this data to be mindful of potential selection bias in this survey. Because the questionnaire covers topics relating to knowledge and attitude towards TDK, it is possible that it was perceived to be connected to the geothermal project rather than being an independent study. It is also possible that members of the FNFN who are unfamiliar with the geothermal project, or members who may hold views toward the project that they perceive to be against the norm may have elected not to participate in this survey. As this was a voluntary survey, response bias remains a distinct possibility.

To enrich our data analysis, our questionnaire included three demographic questions – participants’ age range, their gender, and whether they reside on- or off-reserve. All of the demographic questions had multiple choice response options, including a “Prefer not to say” option for participants who may have been uncomfortable sharing this personal information. There were at least two participants from each age category offered. Fourteen participants self-identified as “Male” and 25 as “Female”, with one responding “Prefer not to say”. Exactly half, or twenty, of survey participants identified as “On-Reserve”, with the other half as “Off-reserve”. Descriptive statistics are reported in Table 1.

*Table 2.1 Survey Demographic Descriptive Statistics*

Variables	<i>N</i>	Mean	SD	Min.	Max
Gender <sup>a</sup> <i>1=Male; 2=Female</i>	39	1.64	0.49	1	2
Age <i>1=18-24; 2=25-34; 3=35-44; 4=45-54; 5=55-64; 6=65+</i>	40	3.08	1.37	1	6
Residence Location <i>1=On-reserve; 2=Off-reserve</i>	40	1.50	0.51	1	2

Note: an “other” category for gender was included in the survey, however no participants selected this option. For the purposes of this analysis, Gender was recoded to include Male & Female, with the “other” and “prefer not to say” options coded as missing values.

The key themes from surveys included in this analysis are attitudinal variables and knowledge variables. Knowledge was measured in two ways – self-reported knowledge and factual-based knowledge questions. Self-reported knowledge was measured via two Likert-scale questions, “How much do you know about geothermal?” and “How much do you know about Tu Deh-Kah?”, with response options on a range of 1 to 5, with 1 indicating “Very Little” and 5 indicating “A lot”. Factual-based knowledge levels were measured using four true-or-false questions on topics relating to geothermal energy and the Tu Deh-Kah project specifically. The true-or-false statements included “The Tu Deh-Kah geothermal project is designed to provide hot water for homes in the Fort Nelson First Nation” (correct response: False); “Geothermal energy uses hot steam from the ground to spin a turbine and generate electricity” (correct response: True); “The Tu Deh-Kah geothermal project is 50% owned by the Fort Nelson First Nation and 50% owned by a private geothermal company” (correct response: False); and, “Sustainable geothermal energy production depends on having the right types of rock formations several miles (km) beneath the earth’s surface” (correct response: True).

Attitudes toward the geothermal project were measured using a Likert-scale question “Do you support the Tu Deh-Kah geothermal project?”, on a scale of 1 to 5, with 1 indicating “Not Support” and 5 indicating “Strongly Support”.

### ***Interviews***

Eight interview participants were recruited through self-identifying as being interested in participating at the end of the survey, and two interview participants were recruited as contacts I made during my time in Fort Nelson in the fall of 2021. As this Chapter is focused on perspectives and experiences shared by FNFN members, this chapter does not include an analysis of the external stakeholders who participated in interviews.

Interviews ranged from 20-minutes to 2-hours long, with an average of approximately an hour. Interviews all took place via phone-call or over Zoom video call. Interview questions included the history of resource extraction in the Fort Nelson region, hopes for the future of the FNFN, knowledge about the geothermal project and its potential offshoot projects, hopes and concerns about the geothermal project, knowledge of the Community Energy Plan, and preferences for

future communications about the geothermal project. The Community & Research Liaison for the TDK project and a member of the FNFN, collaborated with me on the interview guide, and joined in four of the six interviews with members of the FNFN. The insight of the Community & Research Liaison person helped to ensure that the questions asked and topics discussed in interviews were appropriate. Interviews were audio-recorded and transcribed using Otter.Ai transcription software. Participants were sent their interview transcript to review for corrections and accuracy, and to approve their inclusion in the resulting analysis. Transcripts were then coded using a grounded theory approach to identify emerging themes. Participants have been assigned pseudonyms to maintain their confidentiality. Table 2.2 provides a demographic breakdown of interview participants.

*Table 2.2 Interview Participant Demographics*

Demographic Characteristic	Number of Interview Participants
Gender	3 Male, 3 Female
Local to FN Region	4 Local (2 outside the community)

Similar to data from the survey, interviews are not generalizable to the entire FNFN. They do, however provide rich perspectives from members of the FNFN, and give voice to specific hopes and concerns community members hold for the TDK geothermal project.

### **What We Learned**

The findings of this research are divided into three categories: *Knowledge*, *Support for TDK*, and *Concerns About TDK*. In assigning these categories, the intention is not to assign value or judge the accuracy but to understand and interpret the views held by different community members. Although specific statements or points made by community members are categorized as *Support for TDK* or *Concerns About TDK* in this analysis, interviews demonstrate that some community



members hold mixed views towards TDK. Participants in interviews sometimes expressed concerns regarding the geothermal project while still appearing to hold generally positive attitudes toward TDK, and vice versa. Interviews included questions such as “Are there any benefits you hope to see from TDK’s development?” and “Are there any concerns you have for TDK’s development?” in attempting to develop an understanding of the array of hopes and concerns FNFN members have for TDK.

In survey data, we saw that a majority of participants expressed having a 4-5 (on a scale of 1 to 5, with 1 meaning “no support” and 5 meaning “strongly support”) level of support for the project. In Table 2.3, we see the frequencies of levels of support expressed by survey participants.

*Table 2.3 Support Variable Frequencies*

Variable	Frequency	Percent of total responses (%)
Support for Tu Deh Kah (n=40)		
1 (Not support)	3	7.50
2	2	5.00
3	11	27.50
4	8	20.00
5 (Strongly support)	16	40.00

While this general level of support for TDK is encouraging in regard to the level of community support for the development, in the context of ensuring effective community engagement in a community energy project, fostering further community engagement in the project may require the full acknowledgement and understanding of the perspectives held by participants who responded on the lower end of the support scale.

Regarding self-reported knowledge (Table 4), community member’s level of knowledge about TDK and about geothermal energy reported to be on the lower end of the self-reported level of knowledge scale in the survey data.

*Table 2.4 Self-Reported Knowledge Variable Frequencies*

Variable	Frequency	Percent of total responses (%)
<b>Self-reported Geothermal Knowledge (N=45)</b>		
1 (Very Little)	14	31.10
2	6	13.30
3	19	42.20
4	3	6.70
5 (A Lot)	3	6.70
<b>Self-reported TDK Knowledge (N=40)</b>		
1 (Very Little)	11	27.50
2	9	22.50
3	8	20.00
4	8	20.00
5 (A Lot)	4	10.00

Just over forty-four percent of survey participants reported having a 1-2 on the scale of 1 to 5 with one meaning “no knowledge” and 5 indicating “a lot of knowledge” about geothermal energy, and 50% of participants reporting having a 1-2 on the scale of 1 to 5 with one meaning “no knowledge” and 5 indicating “a lot of knowledge” about the TDK project specifically.

Bivariate correlations were tested to identify relationships between demographic and other variables in this study (Table 5). Two relatively weak relationships are indicated. Gender is negatively correlated with self-reported levels of knowledge about geothermal (-0.387\*), indicating that females are more likely to report lower levels of knowledge about geothermal energy. Age is correlated with one of the factual-based knowledge questions asking participants whether they think TDK is designed to provide hot water to Fort Nelson (-0.337\*), indicating that the older a participant is, the more likely they are to answer the true-or-false questions correctly. No other statistically significant correlations are indicated between demographic and attitudinal or knowledge variables.

Table 2.5 Bivariate Correlations Between Demographic Variables, Knowledge and Attitudes

Demographics	Self Reported Knowledge		Factual-Based Knowledge				Attitudes	N of Cases
	Geothermal <sup>a</sup>	TDK <sup>a</sup>	TDK is designed to provide hot water <sup>b</sup>	Geothermal uses hot steam to spin a turbine and generate electricity <sup>b</sup>	TDK is half owned by FNFN half by private company <sup>b</sup>	Sustainable geothermal requires specific rock formations <sup>b</sup>	Support <sup>c</sup>	
8. Gender <sup>d</sup>	-0.38*	-0.25	-0.01	-0.07	0.05	0.16	-0.03	39
9. Age <sup>e</sup>	0.21	0.13	-0.34*	0.17	-0.00	0.27	-0.02	40
10. Residence Location <sup>f</sup>	-0.13	-0.27	0.11	-0.23	0.15	-0.30	-0.08	40

Note: Spearman correlation analysis. Significance indicated by \*= $p < 0.05$ , \*\*= $p < 0.01$  (two-tailed). <sup>a</sup> Scale of 1-5, 1=Little Knowledge; 5=A lot of knowledge; <sup>b</sup> 1=Correct; 2=Incorrect; <sup>c</sup> Scale of 1-5, 1=Not Support; 5=Strongly Support; <sup>d</sup> 1=Male; 2=Female; <sup>e</sup> 1=18-24; 2=25-34; 3=35-44; 4=45-54; 5=55-64; 6=65+; <sup>f</sup> 1=On-reserve; 2=Off-reserve

## ***Knowledge***

Knowledge about geothermal energy and the TDK project specifically was measured in two ways on the questionnaire – via self-reported knowledge questions and factual knowledge questions. Although at minimum half of participants responded correctly to the four true-or-false factual knowledge questions (indicating a relatively high knowledge level), participants' self-reported knowledge was relatively low. One theme that emerged from interviews, regardless of their attitudes toward the TDK project, was the importance of information sharing about TDK with and among community members. The importance of information sharing was referred to from a variety of approaches, from one off-reserve FNFN member expressing hope that “people can learn more about geothermal and how it works” in addition to increased regional work opportunities, to other members expressing the need for members of the FNFN to have access to all available information about TDK in order to be able to develop informed opinions about the project – whether those opinions be in favour or against the project.

Dean communicated optimism toward and support for the TDK project, whereas Evelyn expressed a lack of support and skepticism toward the geothermal development. Both Dean and Evelyn, however, expressed a desire for more information sharing about the project.

Dean, a member of the FNFN who lives in community, discussed the importance of informing members of the FNFN about TDK in order to increase community engagement in the project.

*So we just got to keep our minds open and all the thoughts, ideas, everything moving. Because if not then we might end up on one good idea. And then we just hold it there instead of saying, “let's see what we can make of it, or what can come of it”, right? Instead of just saying, “let's just work on this one idea, and see where it goes”. If you don't get a lot of input, or a lot of other stuff to be involved in it, you might as well just throw that idea out the window. You know, I always tell people that - educate people. That's the first rule. Because if you start educating them in the right way, in the right direction, tell them the right information, you can move along.*

Dean took time in their interview to discuss the importance of life-long learning, applying the importance of learning to continue growing as people to the geothermal project.

*It's all a learning curve, it doesn't matter what we do or whatever. It's all a learning curve. And, if we can learn, great. Because everybody don't know everything. You got to learn every day. Like I always say, if I was telling you, "I know everything" or a lot of things, I'd be lying to you. I'm still learning as I'm going along, too. And every day, if I said I didn't learn something new, then I'd be lying to you too.... And that's what life is about - learning, teaching, growing. Geothermal is the same way. Growing educating, you know, and stuff like that. Then look at all the great things, the potentials, you name it, everything that can come from it. Right?*

The need for open dialogue and opportunities for community members to share their ideas for the project as it moves forward to open potential opportunities in the future was emphasized by Dean. Evelyn, also a member of the FNFN who lives in community, approached the need for information sharing from a more critical stance, discussing a lack of transparency in regard to the project development thus far.

*There's very little, and this goes, I hate the word transparency, because it's just not real. So I want hard facts. I want an analysis of what went right, what went wrong? Where are we ahead? Where are we behind?.....*

In discussing the context of TDK, Evelyn drew attention to the colonial context the FNFN is situated in, specifically in expressing modern resource extraction relationships between project proponents and First Nations as a continuation of colonialism. Tied to the colonial nature of resource extraction, Evelyn discussed the common lack of follow-through and overstating of outcomes for members of the FNFN by project proponents.

*So I think... we need some reality at some level or something substantial... yeah, not just the dream. You know, and I think they... can sustain this dream for years. You know, and*

*hundreds of thousands, millions of dollars. You know, dreams are easy to sell. But reality is a whole 'nother thing. So yeah, I don't know.*

Tied to the significance of information sharing with community members is the necessity for information shared to be accurate for members to develop appropriate expectations for the project. Maria highlighted how members of the FNFN may overestimate the benefits of TDK if they are not aware of the details of the project.

*They might be overestimating the benefits. Just in terms of, you know, if they don't realize the geothermal, because of where it's located, it's limited in terms of - You know, you can't reach - until the province starts buying into the hydro lines and starts... you know, that kind of stuff.*

Maria continued to discuss how sharing specific details about the project may help members of the FNFN adjust their expectations for the outcomes of TDK.

*So managing expectations. Let's see. Just explaining what it is. And why FNFN? Like, why is it in our area? Why is it not somewhere else? I guess that - just more information. And I guess just in terms of potential costs, and potential revenue.*

In interviews, participants were asked for feedback on current information sharing practices by project proponents, and suggestions for future communications. Some participants expressed satisfaction with current communication channels, including media releases, email updates, updates in the monthly FNFN community newsletter, and a members-only section with updates for community members on the TDK project website. Debra, a member of the FNFN who lives outside of community, specifically highlighted appreciation for community updates via Zoom, stating that they “find that really helpful.... I really enjoy just having both people who are in community and those who are away who are on those Zoom calls”.

For further information dissemination, Dean offered specific advice for moving forward. Creating a written script for a few fully informed community members to present to others in the

community and receive each other's input. Dean highlighted the importance of including a diverse range of community members in this process, including "young people, the elders, you name it. Because if you don't talk to the elders, well, then you're missing the whole big picture, because they've been around a lot longer. They know a lot more things". As broad feedback for ways that Council may overcome skepticism and misinformation surrounding the TDK project, Maria offered the following advice.

*I guess, basically just kind of providing information that's easy to understand and in many different forms. You know, not just read the forms, but you need to use videos, any - ... just need to keep delivering the messages, clearly, in many different forms and just over and over and over again, to get - You really have to counter that misinformation..... Yeah, so a bunch of factual, easy understand, easy to relate, relevant.*

In providing information about TDK in a variety of accessible formats, community members may face fewer barriers in accessing details regarding the project. Having project information, details and updates readily available will mean that community members who are interested in learning more about the project may increase their self-reported level of knowledge, and therefore, increase their capacity to develop fully informed attitudes and expectations of the TDK project.

### ***Support for TDK***

Approximately sixty percent of survey respondents expressed a high level of support (4 or 5 on a scale of 1-5, with 1 indicating "not support" and 5 indicating "strongly support"). The opportunities for survey participants to elaborate on their attitudes toward, and questions about, TDK were limited to an open-ended question box at the end of the questionnaire, unless they elected to be contacted to participate in an interview. In interviews, a key focus of questions was placed on identifying specific hopes and concerns participants have for TDK, and for the future of the FNFN. Here, supportive or positive attitudes or perspectives toward the project are categorized into two themes: TDK as an opportunity for career opportunities, and TDK as an investment in the FNFN's future. Similarly, to the categories of *Support for TDK* and *Concerns about TDK*, these subcategories are not intended to assign value to different views held toward

the TDK geothermal project, and these categories are also not mutually exclusive nor jointly exhaustive. However, these subcategories may serve as an initial consolidation of some of the attitudes and expectations held by members of the FNFN.

*TDK as Investment in FNFN's Future.*

There is a level of trust placed in fossil fuels that is not necessarily extended to renewable energy sources among community members. The use of fossil fuels for energy has allowed members of the FNFN, and the broader NRRM region to have access to consistent and predictable power, which is necessary in a climate that regularly reaches -40 degrees Celsius in winters. The phrase *when the sun doesn't shine and the wind doesn't blow, gas will be there* was expressed to me in conversations with community members, referring to the perceived un-reliability of renewable energy sources like solar or wind as they are dependent on weather and climate. As exemplified by Brian, it is possible that more trust will be placed in geothermal energy because it is seen as a more consistent source of power than other renewables like solar or wind power.

*I think if we had that stable power, we can plan for the future, right. We have this - we can produce so much power, and we can have these extra businesses, we can plan for the future not scrambling like, "oh, we want this business where we can produce power. We got to find a way to produce that power in order to get there". Yeah, I think that'd be good.*

Having a reliable, stable source of renewable energy could allow for increased planning and investing in future regional economic endeavors.

The context of potential offshoot projects of the TDK geothermal project is an important consideration when discussing the emergent theme of TDK being perceived as a potential investment in the FNFN's future. As stated in the *Study Setting* section of this analysis, there is a wide variety of potential offshoot projects of TDK including, but not limited to: heating greenhouses, aquaculture, onsen-style spas, roads, residential or commercial buildings; harvesting minerals from the geothermal brine; or, providing power to local industrial activities or for cryptocurrency mining. Of these offshoot projects, perhaps the most commonly discussed



is heating greenhouses for agricultural development. In addition to diversifying the local economy and providing local career and skill-building opportunities, local food production could have the potential to drastically change, and increase, access to nutritious, fresh food projects in the NRRM region. Depending on the size and scale of agricultural production, community members have pointed out the potential for greenhouses heated by the TDK project to even support food security further North, across the border into the Yukon. Brian highlighted the potential significance of increasing local food production.

*I do think if we had that opportunity to have fresh vegetables too, like fresh produce or fruits or something. I think it'd just be better overall for everyone involved. And then we could... people up north, if we can produce a surplus, because it would cut their transportation costs down and we could capture the remaining transportation costs. Right?*

Increasing local access to fresh, locally produced food is not the only potential impact TDK could have on health. Tied to the economic downturn and sudden population decrease in the NRRM has been the loss of healthcare services in the region. As Brian explained, the hospital in Fort Nelson has drastically reduced the services offered, meaning that individuals who require medical attention often need to travel the approximately four-hour drive south to Fort St. John for healthcare services.

*I don't know, that's just... what it seems like with the hospital disappearing slowly. But I think other than that, I think that's about the main concern that I see with trying to get an industry going here for the geothermal is... I don't know if it's the money situation or what, or just not enough people here. Like where the money doesn't really make sense to have all this money here and not get much out of it. I don't know. But I feel like if the hospital's gonna shut down then like that's closing up slowly. And I feel like everything else is just slowly behind it. Because... it's got to be one of the core industries, right? You know if the core ones shutting down and... I would imagine that the optional ones are shutting down yeah, I would hope that we can fix it. Hopefully get agriculture, like some revenue rolling in to support kind of the tax system to have more revenue for the hospitals*

*and stuff because, yeah, it's just... better for everyone to have a hospital. A full-service hospital. More doctors on staff....*

Against the backdrop of the boom-and-bust cycle experienced by communities in northeastern BC, in particular in the last two decades from the loss of both the forestry and oil and gas industry in the area, the potential for economic diversification in the region could play a significant role in buffering the region against future boom and busts related to industry.

*It'd be really nice to have this. You know, for it to go through and you know, our industries to come back, our hospitals and stuff. It'd feel a lot more comfortable in town for everyone, right?*

Brian discussed the loss of essential services, specifically healthcare, to the region at length, expressing the hope that the geothermal project will support the return of industry and services to the region, supporting the wellbeing of locals in the region.

*TDK as Career Catalyst.*

Tied to investing in the future of the FNFN is the potential for TDK to foster skill-building and career opportunities for community members. Consistently in informal conversations with FNFN community members, in formal interviews, and in survey comments, the potential for career opportunities for members of the FNFN is expressed as a key potential benefit to the FNFN. As Debra expressed, there may be potential for community members to apply their existing skills to positions with the geothermal project.

*From what I understand those who were in oil and gas, there's transferable skills so that they can actually sit there and look, you know, they can see themselves in the geothermal project.*

Murray expressed optimism in regard to increasing job opportunities in Fort Nelson, stating “I think it's really, really cool for people to get work back at home”. Although there is some

enthusiasm over the potential opportunities to come from TDK, other community members expressed more concern regarding the project.

### ***Concerns about TDK***

The twelve-point-five percent of survey participants who responded on the lower-end of the support scale (1 or 2 on a scale of 1-5, with 1 indicating “not support” and 5 indicating “strongly support”) represent how wide-spread the range of attitudes towards TDK held by FNFN members are. Two emergent themes tied to negative attitudes or concerns regarding TDK were regarding the feasibility and viability of the project, and concerns about the expectations for benefits from the project.

#### *Concerns About Feasibility.*

Although one survey participant expressed concern about the technological feasibility of TDK, this was not a common concern among interview participants. Instead, the feasibility of proposed offshoot projects was an important note of concern for some interview participants. Whether the TDK generated enough heat or power to support the development of additional projects, the FNFN community may not have the capacity, or specific members who are interested in and willing, to implement and maintain some of the possible offshoots. Two interview participants in particular raised this point. First was Maria.

*You know, some of the [offshoots] I've heard is like a greenhouse, or being able to grow food and provide... . But again, each of those initiatives, we'll need to do a total feasibility and the viability of it.*

While Maria emphasized the importance of the need for feasibility assessments to allow community members to manage their expectations for the project, Evelyn focused more on the current lack of capacity to take on additional projects.

*I don't, I think, if we had the capacity, and I think this is this is like, we're learning to ride a bike, but then we're putting on a drag racer that, you know, goes... it's just like, we keep jumping on these big, fast-moving things that go a million miles an hour, and we don't*

*even know how to ride a bike. So we just like, "let's jump on that guy's wagon", and then go. So I think if we don't - number one, we don't have the capacity. We have, what we have going for us our name as indigenous, you know, or band. And we have resources, money. And we have a, you know, a fabulous Chief that is white is the day as long. You know, so. And then all these old white government people, and people are just like, ripe for the pickings. So rape and pillage, here we go.*

*So I think if - in order to be successful, I think we have to have the capacity. And they keep saying, well, it's going to create jobs, where we can't even keep a small restaurant open. So, you know, we can't - any business project that they've had have an end, we have some gold mines here. We have gold mines. But we don't have the capacity, to capitalize on anything. So I think getting into these big projects. Yeah, it looks nice and fabulous. And we get all the kudos. And "oh, you're fabulous". But we have, we have no track record. We have no capacity. And it's just a big, it's a facade. So I don't know.*

*But I appreciate that [project staff from the FNFN] are in this position. So I think in terms of your learning and your building capacity within you guys is – that's probably the two major things that I find is an asset to this project, you know, but is it worth millions and millions of dollars? I think that you know, if we had - it better used, because that is not a million dollars. I mean, if I sent you to Stanford, if we sent you and [community member] to Stanford, and paid all inclusive, everything that would have more money, be more valuable than this geothermal plant. Or Cornell or wherever you - or wherever you guys want to go.*

*I think investing in our people in a real substantial, sustaining way would be far more productive than throwing in millions of dollars into a pipe dream. That looks good on headlines, right? It looks good. It's sexy and fabulous. And "oh yeah, we're gonna geothermal". But at the end of the day, people here are paying the price. And paying the price is... I don't know it's some kind of a... I don't know if you continually get ripped off. And you're continually not successful, but you continually have to pretend that you're successful and fabulous and all that sort of thing, I think that it's morally - it's soul*

*sucking, it's... I don't think we have the system in place to foster success in this community and I and it's a long way coming it's not coming anytime soon, probably not in my lifetime maybe in your lifetime Taylor and yours Sara, but not in my lifetime.*

In terms of community engagement and buy-in for TDK, it is important that the feasible outcomes and benefits of the geothermal project are communicated to members of the FNFN. It may be challenging, however, to ascertain the capacity for and viability of potential offshoots and other potential benefits of TDK.

#### *Concerns About Benefits.*

As Maria pointed out, the number of job opportunities expected to come from TDK is quite limited when compared to more traditional oil and gas projects.

*The actual number of jobs - that's not many actually occurred at a physical plant - or geothermal plants. There's not a lot of jobs. And there's not a lot of jobs in terms of construction and everything with that either. There's nothing - you know, comparing that to when NCANA was gonna build the Cabin Gas plant out there, and it ended up being one of the largest in the world and the amount of people that worked out there? The amount of positions that were out there? Like you're talking thousands of people. And so then you have just a handful of jobs here for the geothermal plant.*

Maria expressed concern that the expectations of FNFN members will not match the feasible outcomes of the project. In addition to concerns about FNFN members having realistic expectations for the TDK project, Evelyn discussed the project as a whole as being a modern continuation of the colonization of the FNFN.

*I think renewable energy, I don't have any qualms about that specifically. And I'm a big, you know, advocate for that sort of stuff. However... how it usually happens is, and colonization, you know, it's like, the white person comes in, usually an old white person, man comes in, has this bright idea. And then comes to the whomever, the Chief and Council, says "hey, I got this great idea, we're going to make millions of dollars, blah,*

*blah, blah, but I'll run the project, I'll be in control of everything, I'm going to do this for you". So the First Nation's like, "hey", you know, and then they, you know, and they give their name, they give their organization, and they think, "Oh, well, they're gonna do everything and all this sort of stuff". So it's like a get rich, quick kind of scheme to me. So they'll come in, they'll run the project, have control of the project, the band will say, "yeah, that's my name, you can use my name to whatever" the project uses the FNFN's name, and then gets all the money, all the grants that will be funneled through the old white guy's company, and they all have control, and then it'll drip down to us and then and we'll get a few jobs, and then they nickel and dime the contractors.*

*And you know, "well, you know, we're only going to give you this much money, and we're not going to give you this and that" and so there fighting... the contractors at the ground level from this community are fighting over the little peanuts that... But meanwhile, buddy's, you know, buying Chief and Council six glasses of wine at dinner that you know, probably... you know, and flies around and does all that sort of stuff.*

Evelyn drew explicit connections between the history of colonization and modern resource extraction projects.

*So I think it's... The same old model is the DIA [Department of Indian Affairs] - the colonization model, whereas this - so basically it's the Indian agent coming in and they're taking 85% of the dollar that we get for an operation for all that sort of stuff. So I think there's no difference. It's just the faces have changed, the people have changed, and we call it a different thing. But in the... end of the day, the millions of dollars that we've got for our name is not coming to us. So yeah, so I feel, and I live this and I see it, and I've been able to see it at every level. And that's basically it. So it's just another shell game, by the dominant [of] colonized people.*

Inherent in colonization of Indigenous peoples in Canada is exploitation, and in this case, as Evelyn argues, the exploitation of the FNFN and the nation's resources. The cycles of colonial exploitation that have been experienced by the FNFN and its' members are important to consider

when examining TDK and the context it is being developed in. Without being able to identify cycles of oppression and exploitation, it is possible that Indigenous community energy initiatives will inadvertently feed further cycles of settler-colonialism, despite intentions of promoting Indigenous energy sovereignty, autonomy and reconciliation.

## **Discussion**

In using settler-colonialism as a concept for better understanding the context of community energy projects in Canada, this paper provides insights into Indigenous-owned renewable energy projects that may contribute to addressing the legacies of colonialism in Canada.

Inherent to community energy is that projects are situated in unique geographic, social and economic contexts. Interview participants expressed hope for benefits that are commonly tied to community energy in the academic literature – namely, support for the local economy and the creation of career and skill-building opportunities (Walker, 2008). Some participants, however, also expressed concerns regarding the project which may be linked to the academic literature on the context of settler colonialism contemporary renewable energy projects in Canada are situated in.

### ***Concerns***

Walker & Devine-Wright's (2008) process-outcome framework for community energy views, may be applied to TDK and the FNFN in identifying attitudes held toward the project. The project is fully owned by the FNFN's economic development branch, Deh Tai. In terms of process, TDK is owned by Deh Tai, which is the FNFN's economic development branch. However, the Barkley Project Group, based in Southern BC, was hired to manage the project. As the project develops, more members of the FNFN are being hired to work on the project, including for roles such as project managers and community and research liaisons. As the proportion of staff who are members of the FNFN increases on the TDK project, the process dimension of TDK will shift towards being a more locally-based project. As Walker & Devine-Wright (2008) suggest, having increased involvement of local community members in the

project may serve to increase community acceptance and support of the project. That being said, it is possible that a higher level of local community member involvement in the process of TDK from the outset of the project may have yielded a higher level of community acceptance and support earlier on in its development.

In terms of outcome, due to the nature of geothermal energy having limited capacity for transport, the energy produced by this project will likely be used to service the local region. Similarly, any excess heat generated by the project will need to be used in a limited distance from the geothermal wells for any offshoot projects, such as district heating or warming greenhouses, due to logistical requirements of transporting the heat. In terms of outcomes, it is also likely that groups external to the FNFN, such as Barkley Project Group and construction crews and companies that are hired to work on the project will also receive benefits as the project continues. Throughout the development of the project, Barkley Project Group and other external project stakeholders may receive positive public attention for being involved in the project, while the benefits of the geothermal project may not be received by members of the FNFN until after TDK is operational, or after its offshoots are being developed. Outcomes of Indigenous community energy projects may warrant special attention, as disproportionate distributions of benefits between non-Indigenous project stakeholders and Indigenous community members may be seen as one example of the legacy of settler-colonialism in resource extraction, as discussed by Evelyn in their interview. The cycles of exploitation by non-Indigenous institutions (including governments, state actors, and private companies) of Indigenous peoples and communities are a part of the ongoing processes of settler colonialism. Community energy projects that are aiming to contribute to reconciliation and decolonization may aim to eliminate this form of exploitation by supporting a proportionate distribution of benefits from projects to community members.

At this stage, it is unclear what proportion of the benefits of TDK will be received by consultants and other non-FNFN member stakeholders in the project, although the concern expressed by interview participants regarding the distribution of benefits is not surprising given the context of historic and ongoing exploitation of Indigenous peoples and their territories by resource extractive industries and other settler colonial processes. TDK is a unique project in the context of Indigenous resource extraction and development, as it is 100% owned by the nation. Thus far



in the project development, there have been efforts to indigenize TDK, such as through the effort to rename the project to Tu Deh-Kah (previously named Clarke Lake Geothermal Project), which is a Dene name, and updating the project logo to use art from an artist local to the FNFN. Moving forward, the proportion of benefits received by members of the FNFN may be indicative of how full ownership by an Indigenous community may shift power balances in resource extraction that have historically been exploitative of Indigenous peoples.

In seeking to identify gaps in how community energy literature fits into the context of Canada as a settler colonial state, our attention is drawn to the significance of ownership structures. As is identifiable through the process and outcome framework when applied to TDK, local ownership structures may have the potential to support successful community energy projects. However, the distinction between community ownership and community engagement is notable. Depending on the metrics being used to assess the success of a given energy project, community engagement and buy-in of community members seems to be an important piece of community energy projects that may require ongoing efforts of project proponents and community members. Efforts of reconciliation and decolonization through community energy projects may be fostered by supporting ongoing community engagement in project development and processes.

### *Hopes*

In employing settler colonialism as a framework for situating Indigenous renewable community energy projects, it is helpful to revisit the academic understanding of settler colonialism. Because settler colonialism is focused on power imbalances that result from displacement and colonization of land inhabited by people who had the intention to remain (Norgaard, 2019, p. 14), resource extraction projects that are owned by the First Nation whose land the project is situated in may be expected to have different power balances (or imbalances) than resource extraction projects with external ownership. Although Indigenous-owned community renewable energy projects will not necessarily involve the displacement of FNFN members, these projects are not necessarily immune to the deeply entrenched and long-lasting legacies and structures of settler colonialism that exist in Canada. There is potential room, however, for further decolonization and reconciliation work to be done using Indigenous-owned renewable energy projects as a way of fostering future social and economic development for the community.

A striking theme in the FNFN-TDK case study in the context of community energy is the practical difference for community members between community-ownership and community engagement in a project. The social dimension of community member's connection to and engagement in energy projects is one that requires further examination in much of the academic literature on community energy. In the case of the FNFN, situated in a region that has historically benefitted greatly from the oil and gas industry, and in the stage of an energy project before full feasibility of the project is known, there is a wide range of expectations, hopes and concerns for project outcomes. Although majority of survey participants demonstrated support for the TDK project, self-reported levels of knowledge were relatively low. Ensuring that knowledge sharing and communication channels are open and effective may support the capacity for community members to develop realistic expectations and informed opinions toward community energy projects. The survey results, in addition to the range of perspectives shared by community members in interviews, support the community energy literature that emphasizes the complexity of social factors that are involved in community member's understandings of, and attitudes toward their own community energy project (Hicks & Ison, 2018; Walker, 2008; Walker & Devine-Wright, 2008; Leonjardt et al., 2022; Seyfang et al., 2013). Academic literature on community energy seems to suggest that having strong community engagement or buy-in may serve to strengthen the project.

To the extent that traditional resource development is associated with extensive ecological impacts, commercial-scale resource extraction may be considered inherently colonial (Bacon, 2019). Yet, Indigenous-owned community renewable energy projects may pose more of a challenge to this legacy of settler colonialism. Geothermal energy, which is expected to pose limited environmental or health risks, is a unique form of energy development when compared to more conventional forms of resource extraction like fossil fuel extraction. By providing energy with minimal environmental degradation or harm, geothermal energy is promising in terms of minimizing the level of exploitation involved in resource development. For Indigenous communities who have faced long-lasting risks and harms to their environments and health, geothermal may serve as a relatively safe resource extraction endeavor where it is viable.

A common insight among interview participants who expressed strong support for the TDK project is that it has the potential to provide significant opportunities for development of the FNFN and for members of the FNFN in the future. The potential for renewable community energy project to jumpstart economic development and support local community members (for example, should industrial activity increase healthcare services to the region) is a significant hope for the future of community energy projects. In the case of TDK, the potential for agricultural development to bring in increased revenue, provide additional career opportunities for FNFN members, and to support local access to nutritious, locally grown food is a source of hope and optimism among some community members. Although the number of long-term careers expected from renewable energy projects may be relatively low, the stability of having a sustainable source of energy for the indefinite future seems to have high potential for fostering further diverse economic activities in the region.

## **Conclusion**

Much like other community renewable energy projects, TDK is situated in a very unique context. It is, to date, a one-of-a kind project in Canada, as the first fully First Nation-owned, commercial scale geothermal energy project in Canada. This paper takes a case study approach to analysing the perspectives held by FNFN community members toward the TDK project, situated in the context of Canada as a settler-colonial state. Using survey and interview data, this analysis identifies a relatively low level of self-reported knowledge among research participants, and an expressed desire by some research participants for continuous and increased information sharing about the project with community members. Participants expressed hopes for career opportunities from TDK, as well as hopes for the development to support future opportunities and economic diversity for the FNFN and the NRRM region. Concerns, including that, despite owning TDK, FNFN members will experience disproportionately low benefits from the project, and that the feasibility of the project and its offshoots are not yet confirmed, were expressed as well.

Trust, and distrust, relating to the TDK project proponents and decision makers was alluded to in multiple interviews. While the concept of trust was not included in this analysis, future research may examine the levels of and influences on trust among FNFN community members to deepen the understanding of the role trust plays in community engagement and community buy-in in the TDK project. It may be valuable to address gender and other social dimensions in future research with the FNFN, and on other community energy projects to identify the intersectional dimensions of these initiatives.

The optimism surrounding the potential for community energy projects to play a key role in energy transitions gives way to gaps in the academic literature on how community energy fits in the context of Canada as a settler colonial state, what Indigenous community energy may look like, and what reconciliation and decolonialization may look like in these projects. Despite the scope of this research being limited to a community energy project in a remote, rural community, it demonstrates the vast complexities involved in renewable energy transitions. As the global shift away from fossil-fuels continues, strengthening our academic understanding of the social and economic factors of renewable energy projects may help to facilitate more effective and appropriate policies to support energy transitions.

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## Chapter 3 : Tu Deh-Kah Socio-Economic Context Analysis

### Introduction

The Fort Nelson First Nation (FNFN) is on the forefront of geothermal energy developments in Canada as they develop the Tu Deh-Kah (TDK) geothermal project. Understanding the social and economic context of the TDK project may help provide a starting point for identifying the regional impacts of the project as it progresses.

Academic literature identifies socio-economic assessment of community capacity as one way to gain insight into the sustainability of a community, including through economic indicators and trends that can show how community assets are changing over time (Crosby, 2008; MacKendrick & Parkins, 2004). Used in both academic and professional settings, socio-economic (or social and economic) indicators are used for the assessment of local trends and impacts of resource development. Social and economic indicators research is one method that can be used to identify or assess the sustainability or capacity of a community. Traditional indicators research uses a top-down approach (or expert-driven), prescribing lists of indicator categories to be used in providing socio-economic assessments that may be compared across different contexts or communities. More recently, there has been a push in the academic literature on indicators research to create more local-level indicators that are relevant to the specific communities they are being used to measure or assess (Parkins et al., 2001; Adam & Kneeshaw, 2008; Grafakos et al., 2017; Sterling et al., 2017). In this analysis, to build a baseline of socio-economic conditions that can be remeasured in future years with secondary datasets, we utilized a tradition top-down approach. Accordingly, social and economic indicators are used to understand of the social and economic standing of the FNFN and its regional context, which may be used for future assessment of the social and economic impacts of the TDK project, as well as cross-community comparisons for similar projects.

To guide the development of social and economic indicators, a community capacity framework helps identify the components of community assets that facilitate the achievement of desired

community outcomes (Beckley et al., 2008; Emery & Flora, 2006). Research on communities has taken a deficit or needs-based approach in the past by focusing on capacities or resources communities are lacking. Community capacity frameworks approach theorizing community development in a holistic way rather than a deficit-focused approach by emphasizing the strengths and assets of communities (Emery & Flora, 2006). Resource development projects, including renewable energy like TDK, are sometimes seen as catalysts for development of different assets, also called capital, that exist within a community. Examples of types of capital include human, economic, social and natural capital. Specific assets held by communities are categorized into the different types of capital when applying a community capacity framework. For example, natural resources like minerals or wildlife may be categorized as natural capital, whereas assets like educational attainment or technical training may be categorized as human capital (Beckley et al., 2008).

This paper employs a community capacity framework and indicators research approach to identify key trends in the FNFN's regional social and economic context; to identify how these trends compare to Fort Nelson and the region; and, to identify how the social and economic data relates to the regional context as described by interview participants. Results of this analysis are intended to be used as baseline data for future assessment of the regional socio-economic impacts of the TDK geothermal project as its development progresses.

## **Literature Review and Theoretical Framework**

### ***Social Indicators Research***

Social indicators have historically been used for academic assessments of quality of life (Boelhouwer, 2017), and as assessments of community sustainability and capacity (Crosby et al., 2008; MacKendrick & Parkins, 2004). Economic analyses of quality of life often focus on measures such as Gross Domestic Product when comparing nations, although this measure does not represent the different aspects of quality of life, nor community sustainability or capacity (Boelhouwer, 2017). Over the course of the last 50 years of research on social indicators, the literature has shifted to account for more of the human-dimensions of social and economic



assessment. In the case of local-level community social and economic assessment, indicators like GDP are irrelevant. Instead, there are a variety of indicators frameworks that have been and continue to be developed for identifying baseline data within communities (Adam & Kneeshaw, 2008; Adam & Kneeshaw, 2011; Sherry et al., 2005; Parkins et al., 2001, Crosby et al., 2008). Although there is debate in the academic literature on whether a consolidated index, which may be applied across contexts and communities, should be developed (Boelhouwer, 2017), it seems as though there is a general shift in social indicators research on a community-level that focus on more context-specific measures of community sustainability and capacity.

The academic literature on social and economic indicators has largely been focused on forestry and forest-dependent communities (Adam & Kneeshaw, 2008; Adam & Kneeshaw, 2011; Sherry et al., 2005; Parkins et al., 2001). However, indicators frameworks may be adapted to other development contexts, such as communities engaging in energy transitions like the FNFN. There is an ongoing push in academic literature for social and economic indicators to be community-specific and locally defined, in particular when being applied in Indigenous communities (Parkins et al., 2001; Adam & Kneeshaw, 2008; Grafakos et al., 2017; Sterling et al., 2017). Locally defined indicators frameworks allow for more culturally and community-appropriate measures of capital to be used than a prescribed list of indicators, as has been used in indicators research in the past. Non-local-level indicators may be seen as top-down approaches toward resource management, as there are often gaps between the people involved in selecting these indicators and decision makers (Adam & Kneeshaw, 2011). Local-level indicators have the potential to provide a starting point for communities to identify assets (or capitals) they would like to see strengthen as outcomes of resource development. A variety of methods have been used to identify local-level indicators for communities. Parkins et al. (2001) use a mixed-method approach, combining workshops, and indicator evaluation framework and survey data to identify local-level indicators in two Saskatchewan communities.

However, local-level indicators do not necessarily allow for cross-community comparisons. If all indicators are unique to the community being measured, comparing social and economic trends between communities (such as for assessing the impacts of comparable community energy projects) may be difficult. For this reason, a blend of local- and pre-determined indicators may

be useful for assessing social and economic trends and baseline data. The present analysis employs a list of indicators that are informed by a community capacity framework as key elements of community sustainability.

### ***Community Capacity***

Beckley et al. (2008, p. 60) define community capacity as “the collective ability of a group (the community) to combine various forms of capital within institutional and relational contexts to produce desired results or outcomes”, involving forms of capital, catalysts, mobilization of resources, and the end results. The four types of capital in Beckley et al.’s (2008) community capacity framework include social capital (such as social networks and norms), economic capital (including infrastructure and liquid assets), human capital (tied to formal and informal learning, skill development, and health), and natural capital (including natural resources and amenities like clean water). Emery & Flora (2006) utilize 7 categories of capital in their framework, including natural, cultural, human, social, political, financial, and built capital.

Emery and Flora’s (2006, p. 22) application of the community capacity framework demonstrates how communities that invest in some assets (or forms of capital), such as human, social or financial capital, “spiral up” by resulting in increased assets in both those capitals and in others. Similarly, a loss in one or two vital capitals may result in a decline in other capitals of a community, called “spiralling down” (Emery & Flora, 2006). These processes are tied to a theory of *cumulative causation* from Gunnar Myrdal (1957), in that the assets that are gained or developed by communities increases capacity for further capitals to be strengthened elsewhere in the community. In this way, the strengthening or gaining of capital is cumulative across categories of capital, rather than siloed.

Utilizing a community capacity framework can support analyses of social and economic contexts because they allow for a wide range of capitals to be considered beyond just economic or financial capital, as has been used as a measure of community success in the past. Using a range of capitals to measure dimensions of community sustainability may also help in supporting communities achieve their desired outcomes in cases where these outcomes are rooted in diverse community values. Community capacity frameworks may also help researchers in avoiding a

deficit approach to working with communities by identifying strengths, or capital, held by communities that may be built upon to foster the community's desired outcomes. Using indicators that may fit into different categories of capitals may help frame the assets communities have and identify areas for growth or strengthening via "spiralling up", rather than viewing indicators as mutually exclusive and disconnected.

### ***Selected Indicators***

This analysis looks to previous academic indicators research for guidance on general indicators. Crosby (2008) uses the indicators of population, income, employment, poverty, human capital, and real estate indicators to provide a socio-economic assessment of population and mobility (also called migration in some analyses), employment and labour force participation, income distribution, educational attainment (as a proxy measurement for human capital) and real estate values to provide a socio-economic analysis of forest-based communities within the jurisdiction of the Foothills Research Institute. In a similar way, indicators selected for this study are population, mobility, age, educational attainment, household income, and employment and labour force rates. Trends, or fluctuations, in population and rates of mobility are used as an indicator of community well-being and sustainability (Stedman et al., 2004). Changes in population, or changes in rates of mobility, may indicate a higher or lower level of transience in a given community. Age distributions provide additional insight into a communities' population dynamics. For example, populations with young age structures may have differing priorities for meeting community needs (Parkins et al., 2001). Educational attainment, household income and income distributions, and employment rates have been used to indicate quality of life and community wellbeing in academic literature (Stedman et al., 2004; Parkins et al., 2001; MacKendrick & Parkins, 2004). Johnson & Stallmann (1994) suggest that increased educational attainment is connected to other forms of human capital. Communities with resource-dependent economies have access to more jobs that require lower levels of education, meaning that there may be less incentive for individuals to attain education and that individuals who do have high levels of educational attainment may move out of their communities to find work (Johnson & Stallmann, 1994). Therefore, changes in educational attainment over time may indicate changing dynamics in job composition and opportunities in a community. Higher household incomes may

be associated with higher levels of wellbeing and community sustainability. Employment or labour force participation rates reflect the amount of work available to community members. Consistent employment and labour force participation rates across time may indicate a level of stability in local industry (Parkins et al., 2001).

While this analysis adopts a prescribed set of indicators based on academic literature, there are certain indicators that seem to resonate with the values and experiences expressed by research participants. As participants discussed the history of people moving in and out of the region as the industrial landscape changed over time, the measures of mobility and population changes may be of relevance. Measures of educational attainment and employment rates directly relate to the potential for increased skill building and job opportunities associated with the TDK project, as commonly expressed as a valued potential outcome by interview and survey participants.

## Methods

This analysis uses data from Statistics Canada Census Profiles from 1996 through 2021, supported by data from 10 semi-structured interviews with members of the FNFN and external economic stakeholders in the Fort Nelson region. Interview data is used in this analysis to provide deeper context of the Fort Nelson region and the TDK geothermal project. Interviews took place between November, 2021 and April, 2022 were conducted via phone or Zoom call, and averaged approximately 1 hour long.

*Table 3.1 Interview Participant Demographics*

Demographic Characteristic	Number of Interview Participants
Member of the FNFN	6 Members, 4 Non-Members
Gender	7 Male, 3 Female
Local to FN Region	7 Local, 3 Outside of Community

Interview participants included a mix of participants who are from the Fort Nelson region and outside of the area, members and non-members of the FNFN, and a mix of gender identities between male and female. Interview participants were recruited through word-of-mouth connections with contacts in the region and via an option to opt-in to interview participation in a survey administered among FNFN members in December of 2021.

Census data variables were selected to represent indicators of economic and social standing in the FNFN (Census subdivision: Fort Nelson 2, Indian Reserve) and the Northern Rockies Regional District (Census subdivision: Northern Rockies, Regional District) based on indicators used in previous academic socio-economic indicators research. The variables that were selected for this analysis include total population, mobility, age, educational attainment, income, and employment participation rates. Mobility indicates whether community members have moved within the last year or the last five years. Educational attainment is categorized into No certification, diploma or degree, secondary (including high school diploma or an equivalent certification), and postsecondary certificate, diploma, or degree (including college, non-university certification, trades certification and university certification). Income is indicated by the median household total income for private households. Labour force is measured using the labour force participation rate, employment rate and unemployment rates.

Comparative analysis of census data is also provided here for the FNFN, the Northern Rockies region, and Sauleau First Nation (Census subdivision: East Moberly Lake 169, Indian reserve). Sauleau First Nation was selected as a comparable nation to the FNFN because it is also a signatory to Treaty 8 located in British Columbia. Sauleau was also initially a partner on the TDK geothermal project, although this is no longer the case. It is important to note that Sauleau, identified as “East Moberly 169 Indian Reserve” by Statistics Canada is smaller than the FNFN, with a population of 297 according to 2021 census data. Comparison between the Northern Rockies region is offered to provide context for the changes in social and economic indicators in light of the changes in forestry and oil and gas industries in the area over the last few decades. The Northern Rockies Regional Municipality has a population of 3,947 according to 2021 census data.

In applying a community capacity framework to this analysis, the indicators selected may be categorized into different forms of capital based on Beckley et al.'s (2008) capital framework. Educational attainment and labour force participation may be categorized as human capital, mobility and population as social capital, and income as economic capital. This analysis does not take natural capital into account as the focus is on socio-economic indicators and census data.

## **Results**

The following regional context description has been constructed using a combination of interview data from 10 interview participants. The northeastern corner of BC, where Fort Nelson and the FNFN are situated, is connected to Alberta's energy grid. As part of a resource reliant region for economic development, the Northern Rockies Regional Municipality, and the FNFN, have been susceptible to the boom-and-bust cycles as is typical for resource towns.

### ***Population, Age and Mobility***

For years, the dominant industry in the region, and source of economic development, was the forestry industry. Forestry peaked in 2006, and declined rapidly until it all but left the area in 2008. The loss of forestry coincided with an increase in oil and gas exploration and development in the region. Locals who lost work in the forestry industry often transitioned to working in the oil and gas industry, which commonly involves different work schedules including two-week onsite, two-week off work, impacting local social and family dynamics. Oil and gas peaked between 2010 and 2013, at which time it began to decline until it left the area in 2016.

*That's just what I've noticed with resource extraction is it's... not stable. And then I don't know what it is, if it's the people running the show, or if it's just the industry in general. But I don't know, it seems like other people in other countries can keep it stable. And they're doing well, but it seems like we're just having a hard time keeping the lights on. 'Cause, yeah... It's very unfortunate seeing all your friends move away. Like my family is one of the older families in town. And yeah, it's just unfortunate seeing the other older families leave too. Like it's only mainly - there's only like a few families that are older in*

*town. Everyone else pretty much left. We got a few people moving back in but I don't know. I don't know what to think of it, exactly.*

*Just because we've been hit so hard and I thought the logging issue was bad, but then when this oil one happened and it literally shut down our town like... yeah, I just remember.... Yeah, it was bad. Like I had [a job] lined up for the oil and gas industry and I got thrown out. My family had like no work. They're working basically nine to five in a job that they should have been doing 14, 16 hours a day. And that's them stretching nine to five. Technically they only should have been out there for like, two, three hours. But they're like, "well, there's no other work". So like, you got to stretch it for eight hours, or you don't get paid. Yeah, that's just the reality of the situation. And then that's just what we experienced. I can't imagine what other people went through. Because I know like, my family has their own family business going on. So like they have other things lined up. But for people who are just working for other companies, like, that's unfortunate. Because I know a lot of people have to just leave town. I know people who just - they live in town. Everything's in town, but they're never here. – Brian, FNFN Member*

Since the loss of oil and gas, services in Fort Nelson, including hospital services, have decreased. As Brian refers to, many community members have moved away from the area in order to find work since the loss of industry in the area.

Statistics Canada Census data provides a starting point for social and economic indicators of the FNFN and the regional context. The following tables and figures may be used as baseline data for future assessment of the impacts of the TDK geothermal project, and of social and economic trends in the FNFN and Northern Rockies Regional Municipality. The knowledge of industrial shifts in the Northeastern BC region provides important context for situating the census data in this analysis. Because oil and gas had peaked by 2013 and was beginning to decline until it went bust in 2016, and data for the 2016 census was collected in 2015, we may expect to see a lag in the census data showing declines in some of the social and economic indicators being measured.

We expect that the social and economic impacts of the loss of industry will be more evident in the forthcoming 2021 census data.

*Table 3.2 Population & Mobility for Fort Nelson First Nation, 1996 to 2021*

Demographic Variable:	1996	2001	2006	2011	2016	2021
Population	341	390	359	457	451	419
Median Age	*	26.7	28.9	29.0	35.2	40.8
<i>Mobility Status</i>						
% Moved place of residence within 1yr	15.4	*	14.3	7.2	10.1	*
% Moved place of residence within 5 yr	41.3	*	27.9	18.2	25.9	*

Note: \* = data unavailable.

The data in Table 3.2 shows the overall population and mobility rates (whether community members had moved within the last year or five years) of the FNFN reserve over the time period of 1996 through 2021. We can see the population growing in size from 1996 to 2011, beginning to decline from 2011 to 2016, and declining more dramatically from 2016 to 2021. Mobility status paints a less clear picture, with the rates of movers for both a previous one-year and five-year period declining between 1996 and 2011, and increasing slightly from 2011 to 2016. Mobility status data for the FNFN suggests that the level of transience in the FNFN was declining leading up to 2011, at which point the level of transience began to increase again.

Population data for the FNFN (Table 3.2) demonstrates a relatively significant increase in the FNFN population between 2006 and 2011, a slight decline in population between 2011 and 2016, and a more significant decline between 2016 and 2021. This may be explained by an influx in work in the region leading up to 2011 as the oil and gas industry was growing, followed by a



slight decline as the industry slowed and a more significant decline after the industry had left. Mobility rates increased during the 2006-2011 time period. This may be explained by a change in the community as more individuals relocated for work during the shifts in work opportunities tied to industrial development, as explained by one regional economic stakeholder.

*When things began to wind down [in] 2013, there was a significant impact on the community. The economy of the community leading up to that - forestry had been a primary driver, and forestry goes back quite a ways as well. In 2006, Fort Nelson was designated by the Professional Foresters Association as the Forest Capital of BC. Two years later, there was no forestry happening when the plywood mill, the dimensional lumber mill and then the OSB mill successively shut down. There had been a chopstick plant which was the biggest in the world at one point, capitalizing on the Aspen resource that had shut down previously as well. And we would have fallen flat at that point, except that intersected with the upswing in frack gas exploration and development. And a lot of the labor force, including many of the trades, made the transition into oil and gas that wasn't always happily done. But the inducement was both lack of employment locally and the premium involved - the wage and compensation premiums involved in oil and gas. The disadvantages - the discouraging factors were that you were taking the labor force that was largely involved in work that allowed them to be home at night in their own beds, and you made the transition to camp work and things of that nature with extended stays away from home.*

*And that brought with it the social issues that that come along with that, and it was accompanied by a lot of fly-in fly-out, much of which was strenuously objected to by successive regional councils. [Chuckles] The high level of presence of red and white license plates on Main Street on the back of local pickup trucks and so on was really quite a flag - maybe a bit of a red flag in front of the bull sometimes - when local contractors didn't always feel that they had a fair opportunity at work. And there was something of a sentiment - I think somewhat justified - that there was a working network within the sector, and players in the sector, that made it easier for them and for them to*

*give preference to firms that they were doing business with already from outside the region, ahead of local firms and point of opportunities for locals. – Gordon*

Moving from population and mobility statistics, the next section provides insights into comparative age structures of the FNFN, Northern Rockies Regional District, and Saulteau First Nation in 2021.

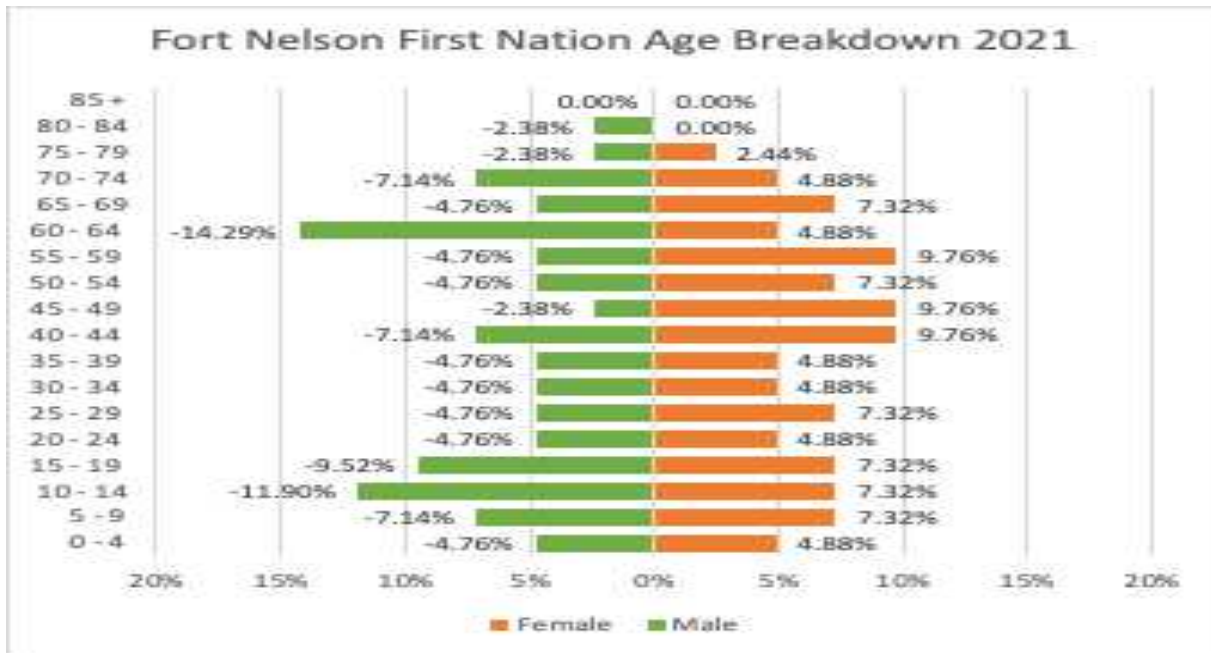


Figure 3.1 Population Age Breakdown for Fort Nelson First Nation, 2021

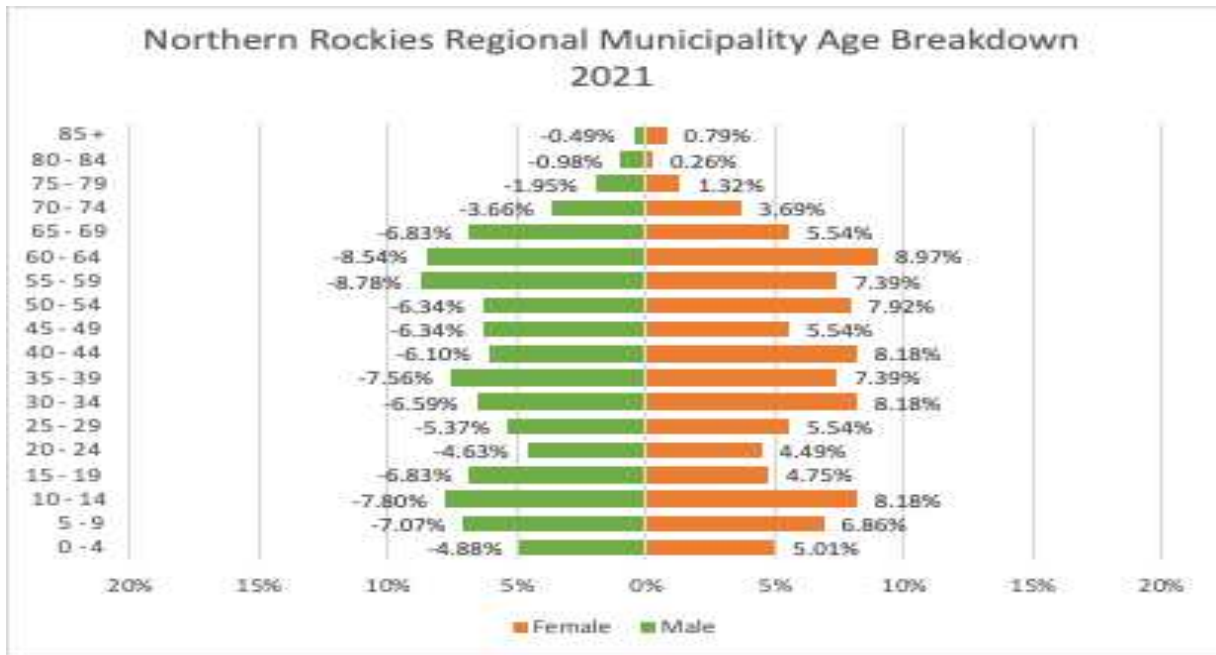


Figure 3.2 Population Age Breakdown for Northern Rockies Regional Municipality, 2021

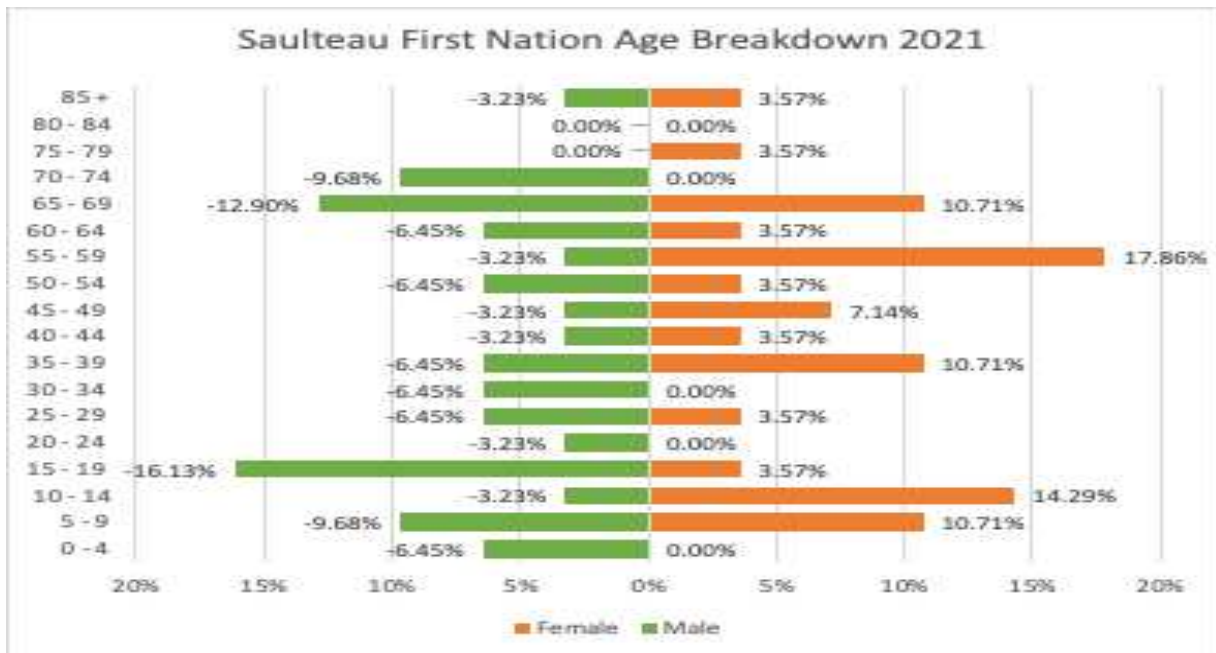


Figure 3.3 Population Age Breakdown for Saulteau First Nation, 2021

The 2021 age breakdown, as shown in Figures 3.1 and 3.2 of the FNFN population compared to that of the Northern Rockies Regional Municipality shows that the FNFN has a less evenly-distributed age range compared to the region. In particular, the FNFN has a comparatively lower

proportion of community members in their 20s through 50s than the region does. Sauleau First Nation (shown in Figure 3.3) has a comparatively uneven age distribution to both the FNFN and the Northern Rockies Regional Municipality.

### ***Income and Education***

Table 3.3 shows that the median household income for the FNFN increased from \$9,376 in 1996 to \$47,040 in 2021. The income data for the FNFN (Table 2) demonstrates how significant the boom in industrial economic cycles can be for individuals – that is, household income increased dramatically between 2006, when forestry had peaked in the area, and 2011, when oil and gas was peaking in the area. Income increased less significantly between 2011 and 2016, perhaps explained by the beginning of the loss of oil and gas in the area being felt by individuals.

*Table 3.3 Education & Income for Fort Nelson First Nation, 1996 to 2016*

<i>Education &amp; Income:</i>	1996	2006	2011	2016
Median Household total Income (all private households, in CAD)	9,376	25,280	45,298	47,040
<i>Highest Educational Attainment (percent of population)</i>				
No certification, diploma or degree	43.9	60.4	44.4	45.8
Secondary (High school diploma or equivalency certification)	39.0	11.3	19.1	20.8
Postsecondary certificate, diploma, or degree**	19.5	24.5	34.9	31.9

\*Note: Data from 2001 and 20021 unavailable. \*\*Includes college, non-university certification, trades certification, and university certification.

One regional economic stakeholder shared the following information when asked about the history of oil and gas in the Northern Rockies region.

*It reaches back as far as the 50s and 60s. It had its heyday in the 80s. Since that time.... It ramped up when fracking became a realistic alternative. The discovery sort of mapped out a huge non-conventional – unconventional gas reserve that had the capacity to produce enough heating fuel for natural gas, if it was measured in heating fuel terms, to probably power – keep warm - all the houses in Canada for 70 odd years. That's the frame of reference we were given at one point. And then there were more discoveries thereafter. It sideswiped the rest of the economy, and became a myopic focus for a few years. Again, its heyday was probably in the early double digits of the century - 2010, - 11, -12 and then started to take off. It had a dramatic effect on a lot of things. It gave reason to support the significant expansion of infrastructure here, which is why we've ended up with such things as a double ice rink, a \$50 million recreation facility that really was specced out to suit a population from 7,500 to 10,000 or so, or beyond. Likewise, because it was supported by a lot of fly in, fly out, it required improvements to the infrastructure, which is why we have what we have at the airport now - taxiways etc. The terminal facility itself was upgraded; parking was upgraded. There were a lot of decisions made in that direction. The regional municipality also responded by building out infrastructure including sewer water, land for development, both commercial, industrial, and residential and, in turn, expectations on what was going to happen in gas and oil also secured agreement from the province for what took the form of Fair share agreements elsewhere. But this was more specifically tied to infrastructure development, and the acronym is IDCA. Nobody can ever remember what that acronym stands for. Infrastructure deficit, something or other. But it was intended to address the infrastructure deficit. Partly that had arisen over time and partly that, uh, was resulting and expected to continue for oil, gas, frack gas developments. – Gordon [Note: IDCA stands for Infrastructure Development Contribution Agreement].*

This regional economic stakeholder discusses the broader economic impacts of the growth of the oil and gas industry in the region in the 2010's – namely, the influx in funding for and construction of community infrastructure, including the airport, community recreation center, and sewer water infrastructure.

The trend of highest level of education attained by FNFN members has fluctuated over the years, with the percentage of members holding less than high school or its equivalent certification decreasing overall from 60.38% in 2006 to 45.80% in 2016. The rate of members with secondary level certification decreased from 1996 to 2006, and increased from 2006 to 2016, with 20.80% of members having attained secondary-level certification in 2016. The rate of members with postsecondary-level educational attainment increased from 19.51% in 1996 to 34.92% in 2011, then decreased slightly to 31.90% in 2016. After declining between 2006 and 2011, the rates of educational attainment in the FNFN (Table 3.3) remained relatively constant between 2011 and 2016. This may be explained by the slow-down of industrial (and associated work opportunities in careers that require high levels of formal certification) activities after 2011. As economic growth in the region slowed and the oil and gas industries left without a different resource-based industry taking its place, the rates of higher educational attainment may have remained constant as the proportion of jobs requiring lower levels of education may have stayed relatively constant in the region following the loss of industry.

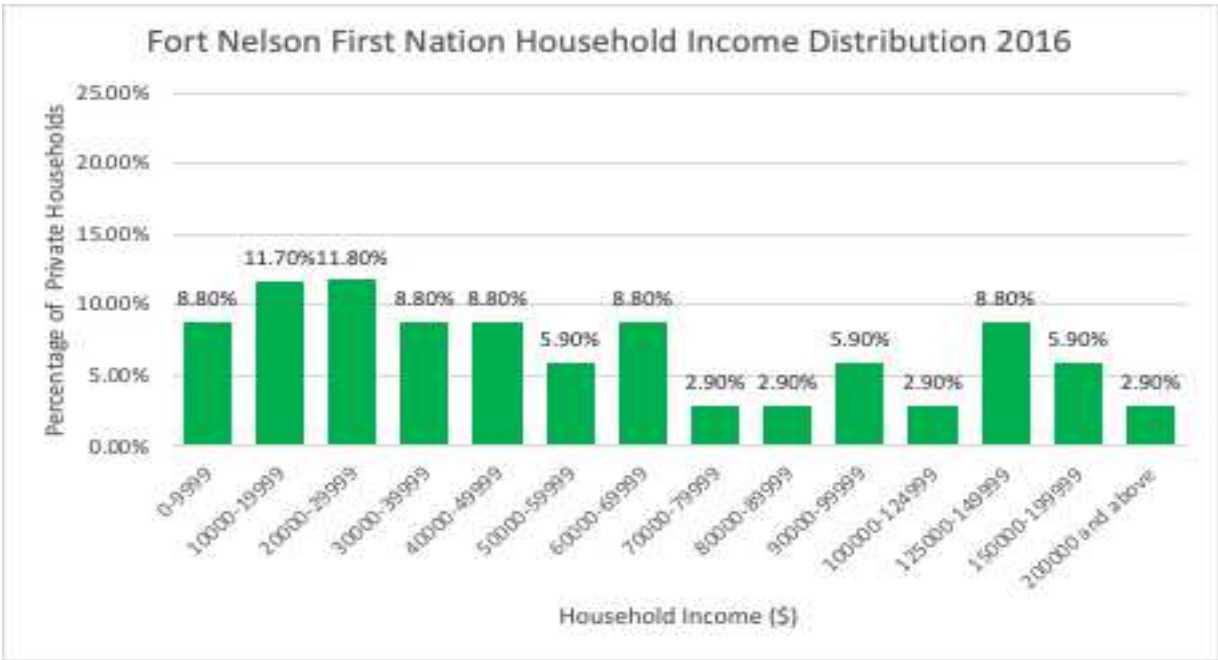


Figure 3.4 Household Income Distribution for Fort Nelson First Nation, 2016

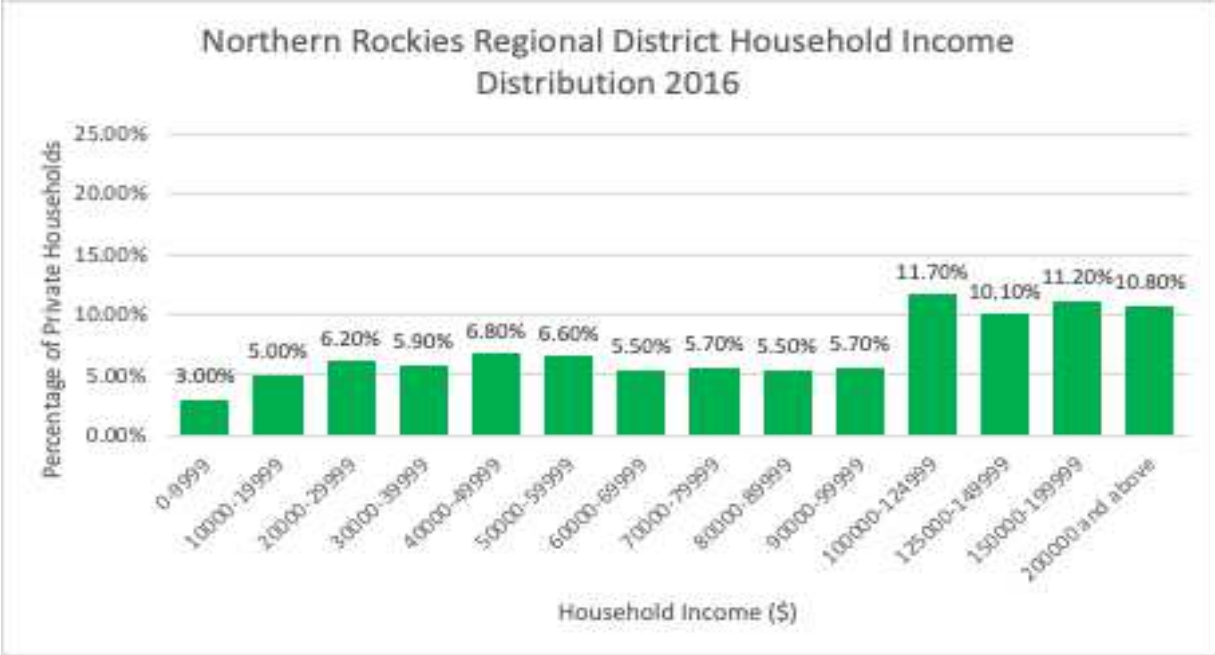


Figure 3.5 Household Income Distribution for Northern Rockies Regional District, 2016

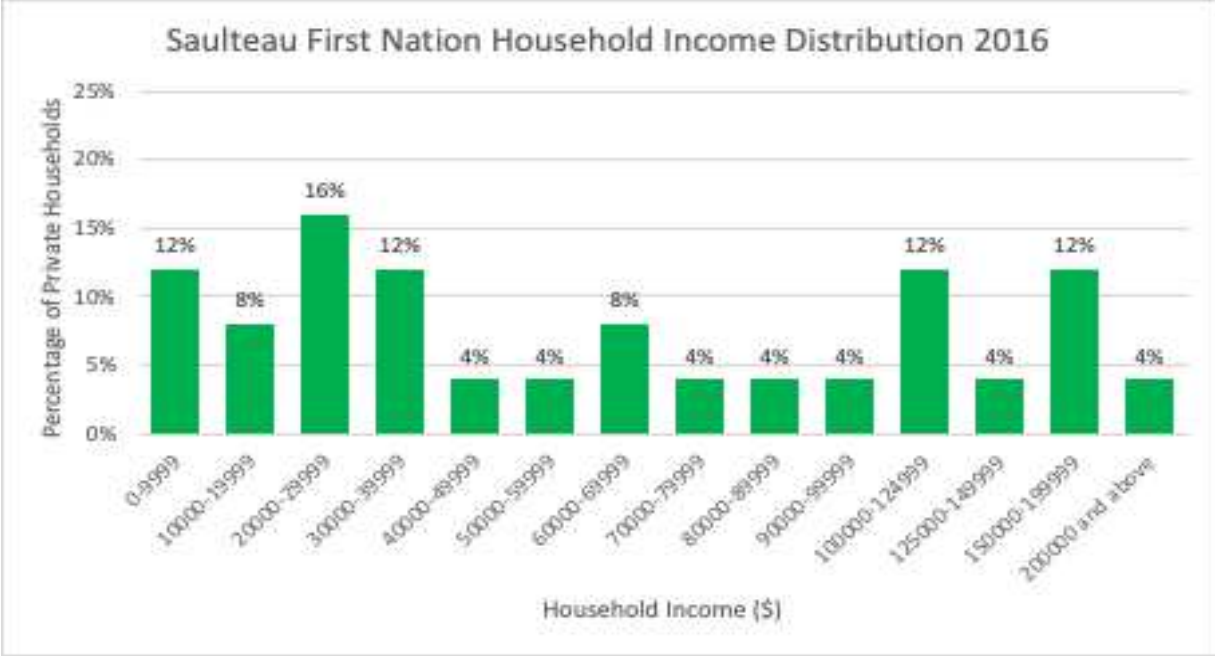
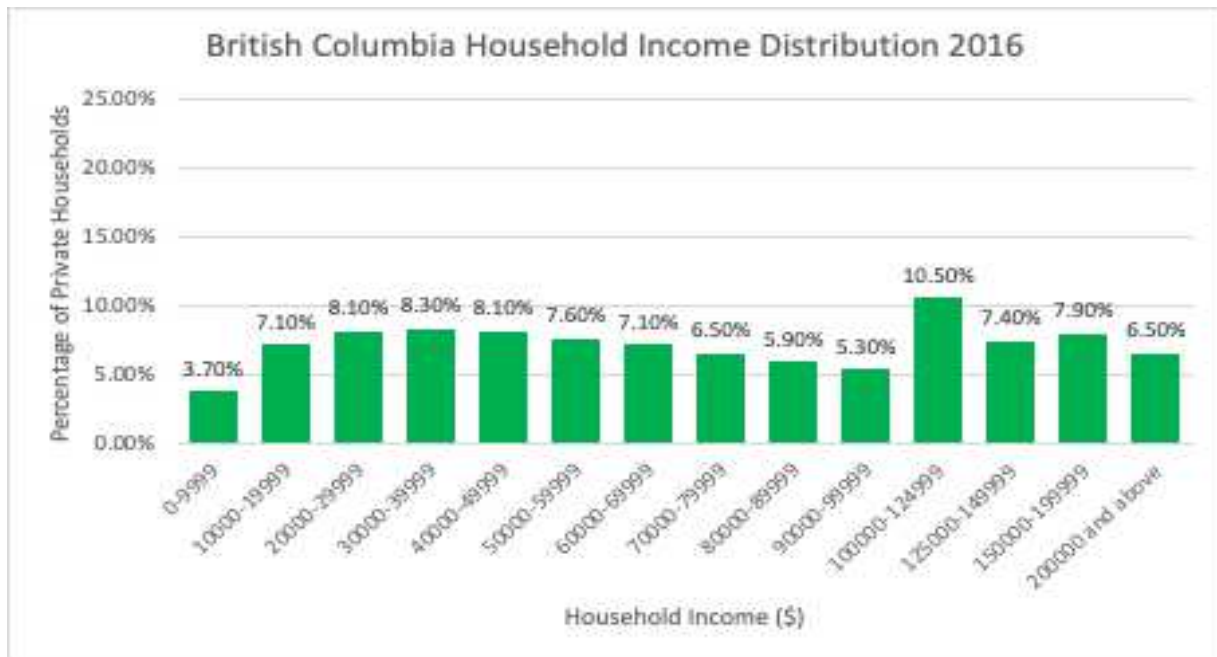


Figure 3.6 Household Income Distribution for Saulteau First Nation, 2016



*Figure 3.7 Household Income Distribution for British Columbia, 2016*

Comparative data for income distribution across the FNFN, Northern Rockies Regional District, and the province of British Columbia provides an understanding of how these communities compare in terms of the distribution of wealth among members. The province of BC demonstrates a general bell-curve distribution, whereas the FNFN demonstrates a distribution that is almost bimodal, with higher rates of lower and higher incomes than those in the \$30,000-\$60,000 range. The Northern Rockies Regional District has a roughly bell-shaped curve, although approximately 43% of it's population is in the \$100,000 and above income category. In 2016, the income distribution of the FNFN (Figure 3.4) does not follow a normal distribution as can be seen in the income distribution for the province of BC (Figure 3.7, however, it is more evenly distributed than the distribution in the Northern Rockies Regional District that year (Figure 3.5) – in which 43% of the population was earning over \$100,000.

### ***Employment and labour force***

Employment and labour force participation rates may be indicative of the work opportunities, specifically the level of consistency of work, available to community members. This section includes employment and labour force participation trends for the FNFN, and a community



comparison between employment and labour force participation rates and occupation categories in the FNFN, Northern Rockies Regional District, and Saulteau First Nation in 2016.

Employment and labour force participation rates for FNFN over the course of 1996 to 2016 are shown in Table 3.4. The Labour force participation rate, or the percentage of the population that is actively in the workforce, in FNFN increased from 53.7% to 57.1% between 1996 and 2011, then declined to 50% in 2016. The employment rate increased from 24.1% to 45.3% between 1996 and 2006, then declined to 41.3% in 2011 and 30.6% in 2016. Following a similar, inverse, trend, the Unemployment rate in the FNFN decreased from 40.9% to 20% between 1996 and 2006, then increased to 27.8% in 2011 and 38.9% in 2016. The employment and labour force participation trends for the FNFN indicate that there was a loss of work between 2006 and 2011, with a continued decline in employment through 2016.

*Table 3.4 Employment & Labour Force Participation for Fort Nelson First Nation, 1996 to 2016*

<i>Employment Rates</i>	1996	2006	2011	2016
Labour force participation rate (%)	53.7	56.6	57.1	50.0
Employment rate (%)	34.1	45.3	41.3	30.6
Unemployment rate (%)	40.9	20.0	27.8	38.9

\*Note: Data from 2021 and 2001 unavailable.

A community comparison of labour force participation and employment rates in 2016 for the FNFN, Northern Rockies Regional District, and Saulteau First Nation is demonstrated in Table 3.5. Northern Rockies Regional District had the highest labour force participation rate (73.1%) and Employment rate (62%), and lowest unemployment rate (15.1%) in 2016. Saulteau First Nation had the second highest Labour force participation (55.4%) and employment rates (42.9%), and the second lowest unemployment rate (19.4%). The FNFN had the lowest labour force participation rate (50%) and employment rate (30.6%), and the highest unemployment rate (38.9%) of the three communities in 2016.

*Table 3.5 Community Comparison of Labour Force Participation for Fort Nelson First Nation, Northern Rockies Regional District and Saulneau First Nation in 2016*

<i>Employment Rates</i>	Fort Nelson First Nation	Northern Rockies Regional District	Saulneau First Nation
Labour force participation rate (%)	50	73.1	55.4
Employment rate (%)	30.6	62	42.9
Unemployment rate (%)	38.9	15.1	19.4

\*Note: 25% sample data of each population.

The data that supports the regional economic story the most clearly appears to be the FNFN employment and labour force participation rates (Table 3.4). The labour force participation in the FNFN decreased by 7% between 2011 and 2016, while the oil and gas industry was in decline. At the same time, the communities' employment rate also decreased by approximately 10% and its unemployment rate increased by a corresponding approximate 10%. This may also be explained by the decline of industry in the area during this time.

*Table 3.6 Community Comparison of Occupation Category Percentages for Fort Nelson First Nation, Northern Rockies Regional District and Saulneau First Nation in 2016*

<i>Occupation Category (Percentages)</i>	Fort Nelson First Nation	Northern Rockies Regional District	Saulneau First Nation
Occupation - not applicable	8.1	2	6.7
All occupations**	91.9	98.2	93.3
Management occupations	10.8	10.5	6.7
Business, finance and administration occupations	16.2	12.6	13.3
Natural and applied sciences and related occupations	0	4.3	6.7
Health occupations	0	3.1	6.7

Occupations in education, law and social, community and government services	13.5	10.7	13.3
Occupations in art, culture, recreation and sport	0	1.5	0
Sales and service occupations	10.8	21.3	16.7
Trades, transport and equipment operators and related occupations	29.7	25.4	23.3
Natural resources, agriculture and related production occupations	5.4	3.1	6.7
Occupations in manufacturing and utilities	5.4	5.4	6.7

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\*Note: Categories based on National Occupational Classification (NOC) 2016, based on 25% sample data. \*\*“Includes the experienced labour force which refers to persons aged 15 years and over who, during the week of Sunday, May 1 to Saturday, May 7, 2016, were employed and the unemployed who had last worked for pay or in self-employment in either 2015 or 2016.” (StatsCan, 2016).

The comparative occupation categories for the FNFN, Northern Rockies Regional District, and the Sauleau First Nation in 2016 provides an understanding of the different work sectors filled by members of the labour force in each community. Interestingly, the FNFN has the highest percentage of its labour force (8.1%) in occupations that are unaccounted for in the National Occupational Classification used by Statistics Canada. The FNFN has 0% of labour force participants working in health occupations, compared to 3.1% of the Northern Rockies Regional District’s and 6.7% of the Sauleau First Nation’s labour forces. The FNFN has the highest proportion of its labour force in trades, transport and equipment operators and related occupations, with 29.7% (compared to the Northern Rockies Regional District at 25.4% and the Sauleau First Nation at 23.3%). The second most common category of occupation in the FNFN in 2016 is business, finance, and administration occupations, with 16.2%, compared to 12.6% of the labour force in the Northern Rockies Regional District and 13.3% in the Sauleau First Nation. The FNFN has 10.8% of its labour force in sales and service occupations, compared to 21.3% of the Northern Rockies Regional District’s and 16.7% of the Sauleau First Nation’s labour forces. The FNFN also has 10.8% of its labour force in management occupations, similar to the Northern Rockies Regional District’s 10.5%, whereas 6.7% of the Sauleau First Nation’s labour force is in the management occupations category. The FNFN has 5.4% of its labour force

in each of the natural resources, agriculture and related production occupations, and the occupations in manufacturing and utilities. Three-point one percent of the Northern Rockies Regional District's labour force is in the natural resources, agriculture and related production occupations, and in line with the FNFN, 5.4% of its labour force is in the occupations in manufacturing and utilities category. The Sauleau First Nation has 6.7% of its labour force in each of the natural resources, agriculture and related production occupations, and the occupations in manufacturing and utilities.

Occupation category data for Fort Nelson, the Northern Rockies Regional District, and the Sauleau First Nation (Table 3.6) provides more detail on the types of work members of each community were engaged in in 2016. As may be expected for resource-dependent communities, all three communities had the largest proportion of their work force in the "Trades, transport and equipment operators and related occupations" category. Careers in geothermal energy production often require transferrable skills from the oil and gas sector. This means that we may expect a similar breakdown of employment categories as the project progresses. However, it is possible that there will also be an increase in other categories, such as careers in the "Management occupations" and "Business, finance and administration occupations".

Of anticipated benefits tied to the development of the TDK project, the most common benefit identified by interview participants is the potential for skill building and career opportunities. The geothermal project is not expected to create as many career opportunities as commercial scale oil and gas projects have in the past. However, as a sustainable, renewable energy project, the geothermal project is purported by project proponents as having the potential to provide long-term career opportunities for community members that will not be susceptible to the traditional boom and bust cycles associated with resource-dependent economies.

*My vision of success [in reference to the TDK project] is to have a number of businesses up here. Have a steady cash flow going back to the Nation. Opportunities for people to grow and develop themselves and have some just amazing careers up here in this absolutely wonderful part of the world. – Frank, Non-FNFN member, project stakeholder*

*And there's a lot of really sharp young people up here. It would be nice to have them – give them the chance to have a career in their community, grow up with everybody around them, but still fulfill their dreams. So that's what I'm looking at this as. – Frank, Non-FNFN member, project stakeholder*

As a regional economic stakeholder highlighted, TDK is seen as one piece of a broader plan for economic diversification for the FNFN and for NRRM region.

*I strongly feel this is a Nation building type project. I strongly feel that this is a project that has a longevity that will break the cycle of boom and bust. And that will provide a foundation for Fort Nelson First Nation to grow around. I think that the fact that what we're focused on initially is electrical generation doesn't exclude the fact that it brings in a massive amount of energy security to the region, and particularly to the community. I think there's... just by a matter of fact of building an electrical generation facility, we are in fact providing all this heat. And that heat can be used in so many different ways in the cascade of opportunities. And within those opportunities, there's a diversity of skills and industries that could be initiated by this, that could hop into the industries. So that in itself creates sustainability, it creates a foundation of security for the Nation, it provides opportunities for employment, and it provides opportunities for food security. So, energy security, food security, and climate security. – Robert, Project stakeholder, non-FNFN member, from outside region*

*So we're pursuing development in the oil and gas sector and in the forestry sector, and in the tourism sector which is not as sexy, doesn't generate as much in terms of revenue, nor does it come with those high paying jobs that people were endeared to here in the days of oil and gas' and forestry's heyday. But we're also looking at not just multi sectoral development, but diversification, rather, diversification within sectors. The idea of value added is important to us, and we see that any development here has certain advantages attached to it through added value. – Gordon, Non-FNFN member; regional economic stakeholder*

This diversification is intended to reduce the regional reliance on any-one industry, creating more of an economic buffer against the boom-and-bust cycles of industrial resource development.

## **Discussion**

In the case of the TDK development, the potential fostering of human capital through skill-building opportunities for community members promises further potential spiraling-up in the community to support the strengthening of community capacity. Although Emery & Flora (2006) assert that social capital may be the most likely to instigate a spiral-up in community capacity, increased human capital in the FNFN may have the potential to support the fostering of other forms of capital, including increased social and economic capital. Once community members have had access to skill-building or career opportunities, there may be additional opportunities in the region, supporting more widespread opportunities and capacity building in the FNFN.

The potential spin-off projects using excess heat and energy from TDK have the potential to further support capacity building in the FNFN. Spinoffs like agricultural development may support an increase in regional natural capital, while increased diversity of work opportunities may increase the range of educational and skill diversity among community members, strengthening human capital. Although increased economic capital may not be expected to set off as significant of a spiral-up as other forms of capital (Emery & Flora, 2006), the diversification of economic endeavors in the FNFN and in the broader Northern Rockies Region may help to buffer the community from future loss of industry that experience boom and bust cycles. If the FNFN or the broader regional district's economy is diversified, may be an influx in higher education-requiring jobs, potentially creating incentive for individuals in the FNFN to seek higher educational attainment to find work locally (Johnson & Stallmann, 1994). Increased educational attainment and skill building may support the strengthening of other capitals or assets held by the FNFN. A more consistent population in the FNFN, and lower levels of mobility, may indicate a higher level of stability in the community (Stedman et al., 2004),

possibly fostering stronger social capital through the strengthening of social ties and networks among community members.

To date, there is no universal framework for identifying or assessing social and economic indicators, although some indicators scholars argue for the development of one (Boelhouwer, 2017). This analysis demonstrates the potential value of combining data collection methods in indicators research. While we can ascertain a quantitative, cross-community-comparable collection of data from census data, qualitative interview data provides an in-depth, ground-level understanding of community qualities, values, and experiences. In the present analysis, interview data provides the story of changes to industry in the Northern Rockies region and for the FNFN. Census data analysis serves to support the stories and experiences shared by interview participants by providing high-level quantitative data that may be relatively easily re-measured and analysed for regional trends moving forward. By using interview data as baseline data for future assessment of the impacts of the TDK project, future socio-economic research on TDK may be more community-specific for measuring how the projects impacts fit with local values and expectations compared to using census data alone.

This analysis draws attention to potential weaknesses of exclusively using top-down, previously defined, quantitative indicators for assessing any one project's social or economic impact. That is, changes in social and economic data, as may be seen in census data, may not be attributable to a single resource development project entering or leaving a community. In this analysis, interviews, which were approved as an appropriate research method for the FNFN context by community partners, provide important insight for the experiences of individuals who have lived through the upswings and downswings in resource-based industry in the Northern Rockies region. Along with this context, interview participants provide valuable insight into the tangible effects they expect to see from the TDK on their community. A growing body of indicators scholars are arguing for the importance of developing locally defined indicators frameworks. This study supports the implementation of locally defined indicators frameworks, as well as the use of mixed-methods for measuring indicators within communities (in particular when researchers are not previously familiar with the community context). In this study, a mixed-

method approach has allowed for an interpretation of widely available secondary data that is supplemented with insights from local community members and project stakeholders.

## **Conclusions**

The context that the TDK project is situated in is unique, and having baseline social and economic indicators may serve to support assessment of the impacts of the project on the FNFN community and the broader Northern Rockies region. This paper has sought to identify social and economic trends in the FNFN employing a community capacity framework, using a combination of census data from 1996 to 2021 and interview data. Future research may be done using this analysis as baseline data to assess the social and economic impacts of the TDK project.

Resource-dependent communities are often vulnerable to boom-and-bust cycles as resources are depleted. The regional loss of the forestry and oil and gas industries in the Fort Nelson region between approximately 2006 and 2016 are visible in the census data via indicators like labour force participation rates. Data from the 2021 census may provide further evidence of the social and economic impacts of the regional loss of the oil and gas industry. However, economic development projects like the TDK project are promising in their potential for local capacity building among community members. Increased career and skill-building opportunities for FNFN members have the possibility to kickstart additional capitals strengthening or broadening through the spiralling-up process as identified by Emery & Flora's (2006) "spiralling-up" framework. Increased community capacity for the FNFN may mean that the community has a stronger ability to meet its goals and desired community outcomes moving forward. Community capacity is not static, but changes as the capitals within a community fluctuate, meaning that capacity can be built upon in a community, often starting with forms of capital such as human or social. A common hope for the TDK project among interview participants is for career and skill-building opportunities, which may support such capacity building.

Census data can be a helpful tool as a starting point for socio-economic indicators and baseline data. However, there are some limitations in using census data. Certain variables may be suppressed in communities' data profiles that are relatively small in order to protect



confidentiality. Gender data by age was unavailable for the FNFN, as was data for the variables used in this analysis for the 2001 census (as indicated in tables). Future research in communities that have insufficient survey data for indicators research may need to identify alternative data sources. Comparing communities social and economic data can be difficult, especially between communities with unique cultural values and contexts. Lower Post First Nation, which is located in Northern BC, was considered as a comparison community to the FNFN, however, it was not selected for comparison due to suppressed census data for the community.

Future indicators research may go beyond pre-prescribed indicators to identify more locally relevant indicators of community capacity. Collaborative and mixed-method processes with community members to identify indicators frameworks and measure community capitals that are specific to the values and goals of the community may serve to create more effective measures of community capacity and sustainability.

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## **Chapter 4 : Conclusion**

This thesis has set out qualitative and quantitative baseline social and economic data for the TDK geothermal project. Situated in a settler-colonial context, the TDK geothermal project is one of the first of its kind in Canada as a fully First Nation-owned, commercial scale geothermal energy project. Chapter 2 introduces a range of perspectives regarding TDK held by FNFN community members, rooted in primary interview and survey data. Chapter 3 employs a community capacity framework in providing social and economic baseline data rooted in secondary census data analysis, supplemented by primary interview data with FNFN community members and other economic and regional stakeholders. Concepts of success in community energy projects are not universally defined across such projects. Instead, communities may determine what success of projects means in terms of their own community and capacity development. While this research has not sought to identify what success of TDK means to the FNFN, it provides data that may be used for future assessment of the project.

The provision of more traditional indicators of social and economic community capacity (as found in Chapter 3) in addition to perspectives of community members (in Chapter 2), the results of this thesis may be used for future assessment of the impacts, and success, of the TDK project as its development continues. Analysis of specific social and economic indicators over time, including population, mobility, educational attainment, income, and employment participation rates, may be used as a quantitative impact assessment, while work with community members may ascertain whether specific benefits or concerns as expressed in interviews for this work have been met or accounted for in the future.

### **Considerations for TDK and socio-economic outcomes**

Outcomes of this research provide some insight into specific hopes and concerns some members of the FNFN have for the TDK geothermal project. Career and skill-building opportunities for members of the FNFN were consistently highlighted as a desired outcome from the project. Relatively low self-reported knowledge about geothermal energy and about TDK specifically,

combined with comments in interviews with community members, draw attention to the importance of continued efforts on the part of project proponents to share information about the project as its development progresses. Some feedback from interview participants provided encouragement for the efforts being made by the local TDK staff to continue their efforts to engage with community members. Existing information sharing methods include information on the TDK website, emails to community members, posts on the FNFN Facebook page, and community information and update sessions. As more job opportunities through the TDK project are identified and shared with community members, there may be increased engagement in these existing communication channels.

### **Limitations**

Due to the context-specific nature of community energy projects and the small sample size of the survey and interviews, the results of these analyses are not generalizable. There is potential selection bias in the survey and interviews. Because community members had to opt-in to the survey to participate, community members who do not feel like they know much, do not feel strongly, or believe that they hold unpopular opinions toward the project, may have decided not to participate in the survey. To try to reduce this selection bias, participants in both surveys and interviews were offered an honoraria. As a non-Indigenous researcher from outside of the community who was researching the TDK project, it is also possible that community members perceived me to be a proponent of the TDK project. Although I attempted to communicate that I, and my work, are not affiliated with TDK, this perception may have influenced who decided to participate in my research and how participants responded to my questions. It is possible that interview responses were biased based on the responses participants anticipated being desirable for myself or for the community liaison, who was present for four of the interviews with community members and one interview with an external stakeholder.

The use of census data in indicators research is beneficial because it allows for cross-community comparisons and is quite widely available. Census data is used to provide social and economic indicators for the FNFN, but we acknowledge that there are certain limitations to its use. Census data for small communities may be suppressed or otherwise unavailable to protect confidentiality

of community members. Questionnaires are edited over time, meaning that certain long-term trends are incomparable if they use different phrasing between years. Finally, the use of census data in indicators research in this analysis involved using top-down, previously identified indicators rather than community- or locally-defined indicators of community capitals. As discussed in Chapter 3, the use of top-down indicators may allow for cross-community comparisons, but it also may exclude indicators that are specific to the needs, interests, or goals of specific communities.

### **Future Research**

Future research with the FNFN and related to the TDK project may benefit from increased time spent in the community. I am grateful to have been able to spend three months in Fort Nelson to build connections with FNFN community members and an understanding of the local community. Developing stronger and more long-term relationships with members of the FNFN may serve to support a better understanding of the local impacts of the TDK project.

Future research may focus on the role ownership structures of community energy projects play in project sustainability. Within ownership structures, research may examine the significance of equity ownership in projects as opposed to community buy-in. Tied to ownership structures, future research may draw more directly from concepts such as energy justice, energy security, and energy democracy in analyzing local impacts of community energy projects and renewable energy transitions (Bickerstaff et al., 2013; Fairchild et al., 2017). Individuals' experiences of resource extraction have been demonstrated to be influenced by their gender identity in academic literature (Manning et al. 2018; Stienstra et al. 2016; Stienstra et al. 2019). While gender was not a focus of this research, gender identity and other intersectional characteristics will be an important area of research for future work to better understand the impacts of community energy.

This thesis provides an example of how initial baseline research for community energy projects may be approached. As communities are unique and may have diverse values, culture, and goals, there may not be a one-size-fits-all research framework for approaching research with



communities engaging in community energy projects. However, using a combination of quantitative and qualitative methods has proved helpful for identifying a more well-rounded set of baseline data for the TDK project and the FNFN than would have been possible from using just one form of data. Specific methods used in data collection for this research were deemed appropriate for the FNFN community by contacts in the community in adhering to principles of OCAP (Schnarch, 2004). Collaboration with community members to identify locally appropriate methods may help to support developing context-specific methodologies.

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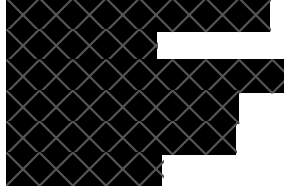
## Appendices

### Consent Form & Information Sheet

**Study Title: Fort Nelson First Nation-Owned Tu Deh-Kah Geothermal Project Socio-Economic Study:**

**Research Investigator:**

Sara Chitsaz

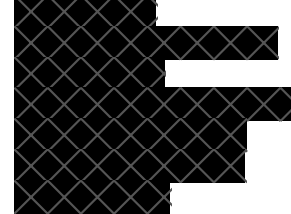


**Community & Research**

**Liason:**



**Supervisor:**



#### Background

You are being asked to be in this study because you may provide insight into the local perspectives on the Tu Deh-Kah Geothermal project. The results of this study will be used in support of my thesis. Funding for this research has been provided by the Social Sciences and Humanities Research Council (SSHRC) and Future Energy Systems. Before you decide, one of the researchers will go over this form with you. You are encouraged to ask questions if you feel anything needs to be made clearer. You will be given a copy of this form for your records.

#### Purpose

The purpose of this research is to develop an understanding of the perception's members of the Fort Nelson First Nation have of the Tu Deh-Kah Geothermal Project. We may also look at differences in the ways people of different genders perceive the geothermal project.

#### Study Procedures

This study will include the interviews of 10-20 Fort Nelson community or Fort Nelson First Nation members who are over 18 years old. If you consent to participating in this study, you will be asked to participate in a 45-minute-long interview. Interviews will be held in person or online via Zoom video call. We will ask about your knowledge of and experience with resource extraction in the area, and your thoughts on the Tu Deh-Kah Geothermal Project. If you consent to it, your interview will be audio recorded and transcribed. You will receive your transcript within six weeks after your interview and will have one month to review it for accuracy.

#### Benefits

You may be benefitted by participating in this study by having an opportunity to voice your hopes for and/or concerns about the Tu Deh-Kah Geothermal Project and its impacts on the Fort Nelson First Nation community. The results of this study may be used for recommendations for the Tu Deh-Kah Geothermal Project to ensure that it is benefitting the Fort Nelson First Nation socially and economically. The results of this study also may help us better understand the local social and economic impacts of Indigenous-owned renewable energy projects.

#### Risk

We do not foresee any physical risks posed to you by participating in this study. This study is being conducted within the COVID-19 restrictions set out by the BC health authorities. We will ask questions about your experiences and opinions that may seem personal. You may choose to skip any questions or topics that you are uncomfortable with and may end the interview at any

time. Some readers may be able to attribute certain quotes or ideas to participants because Fort Nelson First Nation is relatively small. To mitigate this risk, we will remove as much identifying information from your interview data as possible before reporting results. We will ask for your approval of how you are identified in the research before we report our findings.

#### Reimbursement or Remuneration

As a token of gratitude for your participation, you will receive a \$25 gift card to a local store.

#### Voluntary Participation

You are under no obligation to participate in this study. The participation is completely voluntary. You are also under no obligation to answer any of the specific questions in this study if you do decide to participate. You can end the interview at any point without penalty.

#### Freedom to Withdraw

Even if you agree to be in the study, you can change your mind and withdraw up to a month after you have been sent your interview transcript. If you withdraw, we will only use the data that we have collected if you give us permission to do so.

#### Confidentiality & Anonymity

This research will be used for a graduate thesis and may be presented in conferences and used for a research article. Unless you request to be named in these reports, you will not be identified in them. Data from this study will be kept confidential, and only the researchers will have access to your data. You will have access to your interview data at any time. Once you have approved your interview transcript, your identifying information will be removed from the transcript. All audio recordings, transcripts, and a master list of identifying information will be stored on a password-protected computer or university drive for five years. Physical copies of signed consent forms will be stored in a locked filing cabinet at the University of Alberta for five years and will then be destroyed. All information gathered within the Fort Nelson First Nation will also be kept within the community and stored using their discretion.

#### Contact Information

If you have any further questions regarding this study, please do not hesitate to contact Sara Chitsaz or John Parkins. The plan for this study has been reviewed by a Research Ethics Board at the University of Alberta. If you have questions about your rights or how research should be conducted, you can call (780) 492-2615. This office is independent of the researchers.

#### Consent Statement

I have read this form and the research study has been explained to me. I have been given the opportunity to ask questions and my questions have been answered. If I have additional questions, I have been told whom to contact. I agree to participate in the research study described above and will receive a copy of this consent form. I will receive a copy of this consent form after I sign it.

\_\_\_\_\_  
Participant's Name (printed) and Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name (printed) and Signature of Person Obtaining Consent

\_\_\_\_\_  
Date

## Survey Questionnaire

### TDK FNFN Attitudes & Knowledge Survey

(untitled)

1. I confirm that I am 18 or older and am a member of the Fort Nelson First Nation\*:

- Yes
- No

2. Please answer the following questions on a scale of 1 to 5, with 1 meaning very little and 5 meaning a lot.

	1 (Very Little)	2	3	4	5 (A Lot)
How much would you say you know about geothermal energy?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How much would you say you know about the Tu Deh-Kah geothermal project in Fort Nelson?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. Please answer the following questions on a scale of 1 to 5, with 1 meaning no benefit and 5 meaning a lot of benefit.

	1 (No Benefit)	2	3	4	5 (A Lot of Benefit)
How much do you <u>expect to benefit personally</u> from the Tu Deh-Kah geothermal project?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How much do you <u>expect the Fort Nelson First Nation to benefit</u> from the Tu Deh-Kah geothermal project?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. Please answer the following question on a scale of 1 to 5, with 1 meaning not support and 5 meaning strongly support.

	1 (Not Support)	2	3	4	5 (Strongly Support)
Do you support the Tu Deh-Kah geothermal project?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. Are the following statements True or False?

	True	False
The Tu Deh-Kah geothermal project is designed to provide hot water for homes in the Fort Nelson First Nation.	<input type="radio"/>	<input type="radio"/>
Geothermal energy uses hot steam from the ground to spin a turbine and generate electricity.	<input type="radio"/>	<input type="radio"/>
The Tu Deh-Kah geothermal project is 50% owned by the Fort Nelson First Nation and 50% owned by a private geothermal company.	<input type="radio"/>	<input type="radio"/>
Sustainable geothermal energy production depends on having the right types of rock formations several miles (km) beneath the earth's surface.	<input type="radio"/>	<input type="radio"/>

6. What is your gender identity?

- Male
- Female
- Other
- Prefer not to say

7. What age group do you belong to?

- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65+
- Prefer not to say

8. Do you live on-reserve or off-reserve?

- On-reserve
  - Off-reserve
  - Prefer not to say
- 

9. Do you have any other comments or questions about the geothermal project in Fort Nelson?

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10. Full Name

---

11. Email Address

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12. Are you interested in participating in an interview to discuss your views on the geothermal project in more detail?

- Yes
  - No
- 

13. Please provide your name and contact information (email address or phone number) so we can follow-up with you.

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## **Interview Guide**

### **Introduction:**

Hello, how are you? [review consent form; ensure consent is given; ask if they have any questions before proceeding]

Thank you very much for agreeing to this interview. Is it okay if I start recording now?

I will be asking a few questions about your experiences with resource extraction and your understanding and opinions on the Tu Deh-Kah Geothermal Project. If you are uncomfortable with any of the questions, please let me know and we can skip it, or we can end the interview at any time you would like. This interview will be recorded and transcribed. Once I have transcribed the interview, I will send you the transcription so that you can review it and redact any information that you don't want to be included in this study. Do you have any questions before we begin?

### **Introductory Questions:**

1. Can you tell me a little bit about yourself?
  - [Age, gender, employment status, education level etc.]
2. Can you tell me about your connection to the Fort Nelson First Nation?

### **Fort Nelson First Nation**

3. How would you describe the Fort Nelson First Nation to someone who was visiting the area?
  - What are some strengths of the Fort Nelson First Nation?
  - What are some ways that the Fort Nelson First Nation may grow or improve?
4. What are your hopes for the future of the Fort Nelson First Nation?

### **Resource Extraction**

5. Can you tell me about the history of resource extraction in this area?
6. Do you personally have a connection to resource extraction [or oil and gas]?

7. How do you feel about oil and gas?
8. Do you think the men and women in the Fort Nelson First Nation have different experiences with resource extraction in the area?
  - Do you think they have different feelings about resource extraction?
- 9. When I say renewable energy, what do you think of?**
- 10. How do you think other members of the Fort Nelson First Nation feel about renewable energy?**
  - Do you think members of the Fort Nelson First Nation with different genders feel differently about renewable energy?
- 11. When I say geothermal energy, what do you think of?**
- 12. How do you think other members of the Fort Nelson First Nation feel about geothermal energy?**

#### **Tu Deh-Kah**

13. Can you tell me what you know about the Tu Deh-Kah Geothermal Project?
- 14. How do you feel about the Tu Deh-Kah Geothermal Project?**
- 15. What kinds of benefits do you think the Clarke Lake Geothermal Project may bring?**
  - **Can you tell me about any benefits the Clarke Lake Geothermal Project may bring to the Fort Nelson First Nation specifically?**
- 16. Are you worried or concerned about any aspects of the Clarke Lake Geothermal Project?**
  - **Can you tell me about any negative impact you think the Clarke Lake Geothermal Project on the Fort Nelson First Nation?**
17. Give your comments about the project, if the project moves forward and is producing energy, what are the main things that you hope will come from this project?
  - Are there any ways you hope the Clarke Lake Geothermal Project will support the growth or improvement of the Fort Nelson First Nation?
    - [may refer to specific areas for growth/improvement participant outlined in question #3]

18. Do you think the men and women in the Fort Nelson First Nation may experience different impacts of the Clarke Lake Geothermal Project?

### **Public Engagement of the CEP**

19. Are you familiar with the Community Energy Plan?

20. Were you involved in the development of the Community Energy Plan?

- [if yes] What did that look like for you?

21. How do you feel about the Community Energy Plan?

22. Was there an opportunity for you and other members of the Fort Nelson First Nation to ask questions about the Clarke Lake Geothermal Project or to voice any concerns you had about it?

- *If yes*, What did this look like? Did you ask any questions or voice any concerns you had?
- *If no*, Would you have liked the opportunity to do so?
- Do you feel like there will be opportunities for you to have a say in the Clarke Lake Geothermal Project moving forward?
- Do you feel like there will be opportunities for you to ask questions or raise concerns about the Clarke Lake Geothermal Project moving forward?

### **Ending Questions**

23. Is there anything you would like to add to what we've talked about, or anything you'd like to talk about more?

24. Are there any ways you would like info about TDK to be communicated with you (in Taylor's role)?

- What is the best way for updates about TDK to be shared with you (ex. Email, newsletter, community meetings/sessions, etc.)?

25. Do you have any questions for me?