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## ORIGINAL ARTICLE

# Towards energy sovereignty: biomass as sustainability in interior Alaska

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**Abstract** As the price of oil and gas fluctuates in the world economy, and the consequences of a global reliance on fossil fuels resonate in the Anthropocene, Indigenous communities in Alaska are making sustainable choices away from these enterprises. The overall economic effect of high fuel costs and varying land tenure status has put stress on remote Alaska's mixed subsistence and commercial resource economy. These communities in Alaska pay at least two times as much for diesel fuel on average when compared to prices in the lower 48 states. As a result, Gwichyaa Zhee Corporation, a local Alaska Native owned company, is actively pursuing woody biomass as an alternative energy source in pursuit of energy sovereignty for the village of Fort Yukon, Alaska. This research was interested in what influenced the corporation to pursue biomass. To explore the central themes that promoted energy sovereignty, the authors interviewed biomass personnel and examined archival materials to inductively develop themes during the summer of 2015. These findings indicate that remote, rural Indigenous communities, like Fort Yukon, are not solely motivated by government policies that encourage decreased dependence and a transition away from nonrenewable energies. Rather, rural Indigenous communities implement alternative energy projects like this as a course of action towards their sustainable future development.

**Keywords** Energy sovereignty · Biomass · Gwich'in · Sustainability · Alaska · Fossil fuel

## Introduction

Globally, remote Indigenous communities are working to secure and reclaim sovereign rights over resources such as energy, food, health, and land management. By asserting self-determination over their political and economic futures, Indigenous communities are becoming integrated into the sustainable energy movement. As Stewart et al. (2011: 3085) note, “the transition to a low carbon economy provides potential opportunities for Indigenous communities living in remote areas”. These communities have a high carbon footprint due to “a frequent reliance on diesel-powered electricity generators [and] fossil-fueled vehicles” (ibid). Some remote Indigenous communities are responding to this reliance on fossil fuels by pursuing innovative and sustainable approaches to meeting their energy needs (see Johnson et al. 2016). As Howitt (2012: 824) observes, “sustainable Indigenous futures in communities and territories that are remote from mainstream markets and other institutional arrangements cannot arise from policy interventions that rely on creating wealth for state and corporate appropriation and assume enough of this wealth can be redistributed or will trickle down to local Indigenous communities to constitute ‘development’”. Likewise, there is no one-size-fits-all solution to resolving unsustainable fossil fuel dependence.

As a society, our reliance on fossil fuels for transportation, electricity, and heating is unsustainable and counterproductive to sovereign movements towards sustainability. In literatures on national sovereignty—sovereignty is often looked at as an impediment to sustainability,

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such as in United Nations Framework Convention on Climate Change (UNFCCC 2016), as nations' pursuits of self-interest means they do not have incentives to lower emissions. This reliance on fossil fuels continues to contribute significantly to global climate change (Vitousek et al. 1997) with expanding impacts predicted over the next few decades and with impacts being experienced to a greater degree in remote Indigenous communities, particularly those in the Arctic (Krupnik and Jolly 2002). One response to mitigate new as well as longstanding climate, economic, and political impacts is by actively pursuing renewable and alternative energy sources, with rural communities increasingly working towards bioregional energy planning away from dependence on fossil fuels (Kronk 2009; Karkesi et al. 2006; Howes 1979). Notions to energy sovereignty at various relational scales internationally have been couched in literature on politics for some time now. What seems to be giving rise to another form or expansion to the energy sovereignty literature, still in the early stages of development and somewhat suggestive, is the "land grabbing" literature (Borras et al. 2010), which often centers on rural communities. Regularly, these rural communities share similar social, political, bioregional and economic attributes, and we find these communities are often Indigenous to the very places and landscapes where these movements are born. Although, Indigenous peoples, have ultimately never been formally tied to energy sovereignty in the literature there is much to learn from the Indigenous experience.

For Indigenous peoples of the US, Native Americans, Alaskan Natives, and Native Hawaiians, maintaining sovereignty is paramount. Though, Indigenous peoples of the US have often been subject to creating unsustainable infrastructure in attempts to *develop* according to federal mandates instead of local priorities (Posey and Dutfield 1996). Indigenous peoples have their own ideas about how to create more sustainable futures that are not only environmentally friendly, but reinforce the sovereign rights guaranteed to them by existing treaty law and land claims (Dove 2006; Zeppel 2006). Sovereignty for Indigenous people in the US includes the inherent right of a collective society to exercise self-determination and therefore express political authority over the ecosystems they occupy and thus the lives of its members (Borrows 1997; Napoleon 2005; Whyte 2016a, b). Indigenous studies scholars have recently begun writing about the relationship between sovereignty and sustainability. Whyte's (2016a, b) notion of collective continuance seeks to understand sovereignty as involving political, economic, and cultural layers built from the cultural knowledge of their societies knowledge systems, which provide Indigenous peoples the capacity to adapt to environmental changes and have the capacity to resist oppression (Whyte 2016a, b). In addition to

sovereignty as an economic and political goal, these scholars see sovereignty as a social and cultural matter. Broadly speaking, the literature on Indigenous law understands sovereignty to mean the expression of regionally specific Indigenous legal orders that demand reciprocal relations in a community reliant upon the ecosystem, in order to shape environmental sustainability (Napoleon 2005). Corn tassel (2008) argues that sustainable sovereignty involves the cultivation of reciprocal responsibilities within communities that support their abilities to maintain cohesive societies in the face of daunting environmental challenges. Hence, for Corn tassel (2008), sovereignty is not primarily a "right", as it is typically taken to be, but instead a "responsibility". Whyte (2016a, b) in his discussion of Indigenous food sovereignty, argues that food sovereignty is more than an aspiration of food self-sufficiency, but is a strategy for communities to cultivate and repair social and cultural relationships damaged by colonialism.

Remote off-the-grid Alaskan villages, largely populated by Indigenous populations, where fossil fuels are the primary source of energy production and transportation are demonstrating their strategic ability to adapt and resist modernity. For these communities, policy-driven decisions by non-Indigenous governments have forced the Indigenous peoples into the costly and burdensome dependence on fossil fuels. Once completely reliant on the resources nature provided, now primarily living a mixed commercial and subsistence lifestyle, Alaska Natives find themselves in a precarious situation only 66 years after statehood. Motivated by growing economic opportunity in the late 1800s Alaskan Native populations began to centralize themselves into villages. This process continued in the 1970s and 1980s due to US policy that sought to settle these populations in order to enforce land claims (Case and Voluck 2012). For Alaskan Natives, the 1970s–1980s brought about an unprecedented era of land loss, in which they found themselves cut off from geographies they had subsisted on for generations. Much of this land loss was justified by the US and corporations to create space for the oil and gas development industry (Naiman 1995), which remains one of Alaska's primary sources of economic livelihood. The establishment of villages was a major paradigm shift away from a subsistence driven economy to a mixed subsistence and commercial lifestyle. The shift forced Alaskan Natives to subsist within smaller geographies, and in turn rely on increasingly localized and limited resources (Schroeder et al. 1987). During the twentieth century, Alaskan Natives' ability to manage their environment was replaced by state and federal entities' absolute control over large areas of land and resources (Case and Voluck 2012; McGregor 2004; Berkes 2009). Without the ability to make larger land management decisions,

residents were required to acknowledge and rely on the will of multiple authorities. This era ushered in a new dependence not only on fossil fuels but on the delivery systems necessary to transport those fossil fuels and other supplies to remote village locations (Gerlach et al. 2011).

Financial constraints, geographic remoteness, limited access to technology, and an inability to manage large-scale natural resources on their own terms have compromised many interior Alaskan villages' energy sovereignty. We have found that energy sovereignty in the case of an off-the-grid interior Alaskan Native Village was just as important as an economic priority as it was for bringing people together to renew the fabric of the society. Re/envisioning the production of environmentally sustainable energy as Gwichyaa Zhee Gwich'in sovereignty is the philosophical underpinning upon which this project centers. As such this paper will accomplish three things: (1) explain why this particular Alaskan Native owned and led corporation is pursuing sustainable energy; (2) provide insights for other communities with similar geographies, social conditions, and energy needs that can benefit from this information in their own decision-making process, and (3) add to the sparse literature about remote Indigenous communities' pursuits of alternative and renewable energy sources as a means of further defining energy sovereignty on their own terms. This article outlines how this village in part has come to this point of unsustainable fossil fuel dependence. The methods and case study section that framed this research follows. Finally, the article then goes on to bring forth the findings from our research and discusses the themes in relations to the broader literature, and concludes with insights that better situate a more Indigenous energy sovereignty.

### En route to unsustainable times

Today, remote Indigenous communities in Alaska operate within a US state whose economy is largely fueled by the export of locally extracted resources (i.e., fossil fuel, fish, and minerals) for global consumption (Goldsmith 2010). Interior Alaskan communities are largely left out of this economy, due in part to their geographic remoteness. While the Alaskan pipeline may run through, or near, many interior communities, direct access to the state's oil resource is largely unavailable to these villages. For remote, interior communities, the only fuel available is provided through the very costly purchase of diesel from corporations that truck, fly, or barge in the resources (Szymoniak et al. 2010). At the state level, Alaska's 2010 Energy Policy sought to increase energy efficiency by 10% in 2015, and 15% by 2020, creating renewable energy production credits to help fund more alternative energy projects statewide (AEP 2010). Until such goals can be

realized, remote locations like Fort Yukon, an interior Alaskan low income, mixed commercial and subsistence, off-the-grid diesel fuel dependent community home to the Gwich'in (Indigenous population), where this study is situated will continue to face high fuel costs. Of reasonable validity, some villagers agree that only internally pursued alternative opportunities and the continuous control of lands for Alaskan Natives promotes moving away from fossil fuel dependence. Today 60.8% of homes in Fort Yukon use fuels like kerosene for heating, while 38.4% use wood (white spruce is preferred), and 0.8% use electricity as a primary heating source (US Census 2000).

On varying scales, the history of Fort Yukon is the history of how a number of Alaska Native villages shaped an unsustainable relationship with fossil fuels. Initially established as a trading outpost of the British-owned Hudson Bay Company by Alexander Murray in 1847 in what was Russian Alaska (Murray 1910; TCC 2016). The trading companies that operated in Fort Yukon primarily dealt in furs with Gwich'in and Koyukon Athabaskan trappers throughout the Yukon Flats (Murray 1910). A Catholic mission school was established in 1862 to educate village children. It was not until the Alaska Purchase by the US in 1869 that American influences began to predominate, opening Fort Yukon to the establishment of churches, and additional mission schools. By the early 1900s, Fort Yukon had become a major trading outpost in interior Alaska, with a number of families establishing semi-permanent residence as they traveled to fish and hunting camps throughout the year, eventually returning to Fort Yukon for social gatherings and trade (Shimkin 1955). Many Gwich'in families made the decision to move permanently to Fort Yukon for economic opportunities during the 1920s. Fort Yukon, one of Alaska's largest Native villages, has had a population of approximately 500–600 permanent residents since the 1930's (Osgood 1936). The subsistence lifestyle Gwich'in people had lived for millennia began to change when they started taking up permanent residence in villages such as Fort Yukon. Still practicing a primarily subsistence or traditional and customary lifestyle in the 1950s, Gwich'in people began to actively participate in the growing mixed commercial and subsistence lifestyle Fort Yukon provided. It is worth noting that while many Gwich'in living in Fort Yukon no longer live a subsistence-only lifestyle, what has not changed is the strong connections to the intricate geographies of this vast landscape that still provide subsistence opportunities.

Historically, in the interior of Alaska, Alaskan Natives used sled dogs and canoes, constructed from forest materials, to travel seasonally to their fishing, hunting, and gathering camps as well as trap lines (Andersen 1992). Today, most Fort Yukon residents use motorized vehicles,



which require some form of fossil fuel to operate, in order to access these remote subsistence locations (Brinkman et al. 2014). Prior to village life, travel to these seasonal camps meant taking up residence in that location for the entirety of a particular season (Stewart et al. 2011), for example winter months were spent on the trap line, summer months in fish camps. The current dynamic for travel requires shortened stays in camp, or quicker trips. As Brinkman et al. (2014, pg. 1) state,

Households invest monetary earnings into efficient technologies such as motorized vehicles to facilitate harvest of wild resources for their own consumption, rather than for the commercial market. Since the middle of the 20th century, involvement in wage employment has increased so that residents can afford technological innovations that augment subsistence.

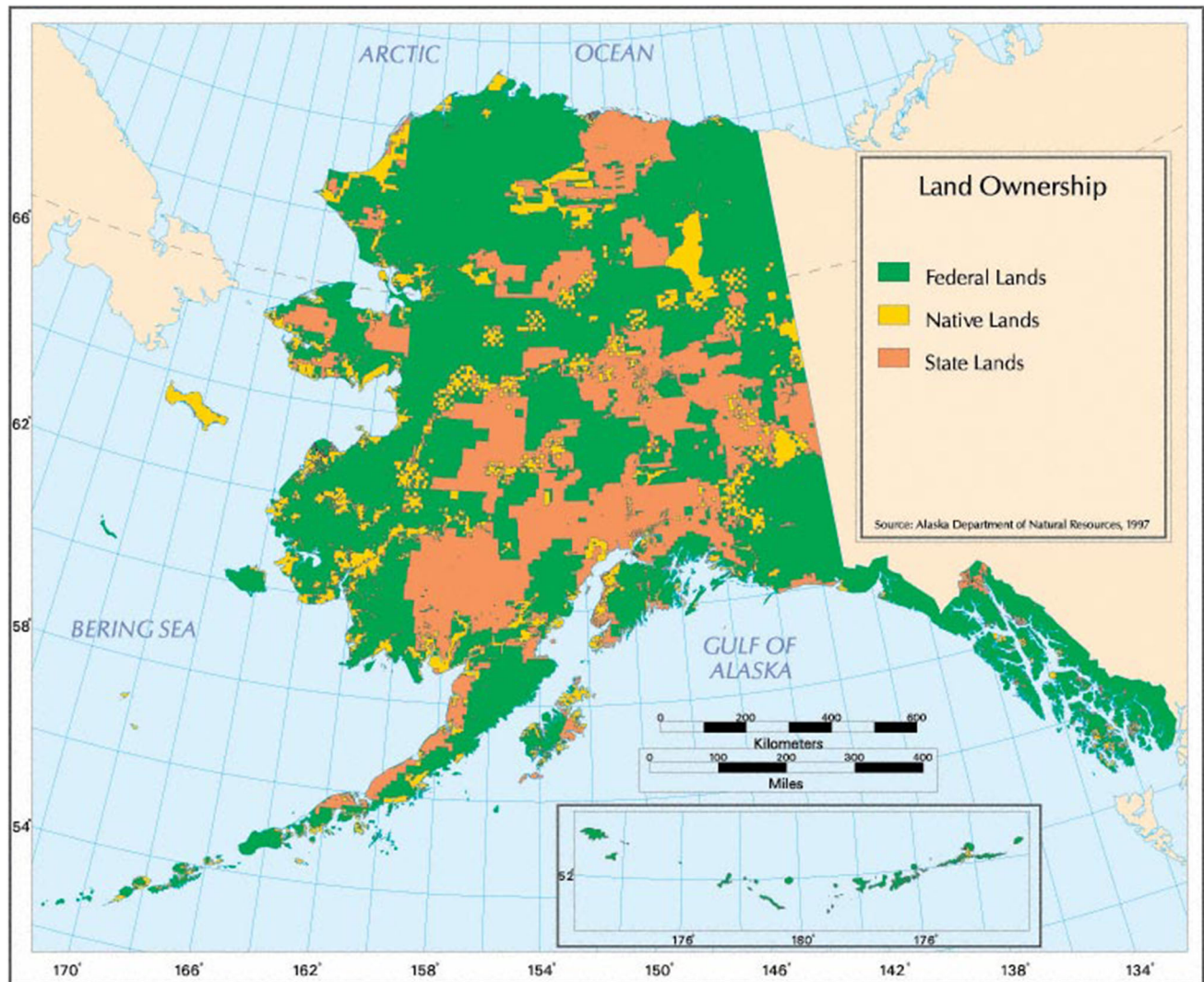
While gasoline-dependent vehicles present a number of advantages for subsistence activities, the challenges of a mixed subsistence and commercial dependent lifestyle means community members must obtain wage paying jobs in order to supply the fuel for this lifestyle (Chapin et al. 2008). The constant push–pull of subsistence versus commercial is always present. The subsistence-dependent resident cannot offset extraordinarily high commercial costs without participating in the commercial economy.

The move from self-sufficiency to fossil fuel dependence for Alaska Natives comes during an era in US history of intensified natural resources extraction, dependence, and reliance. As Alaska became more central to US security interests during World War II, and the Cold War that followed, the accelerated pace to build infrastructure often neglected Native concerns, leading to land disputes over ownership that continue today. Following statehood in 1959, the Federal Government gave the state free reign to choose one hundred and four million acres from the public domain (Jacobs and Hirsch 1998). Contention arose as the state began selecting lands that interfered with Native traditional and customary uses and occupation of land (Berry 1975). The Alaska Native Claims Settlement Act (ANCSA) of 1971 was enacted to settle ongoing land title disputes between the Federal Government and Alaskan Natives. By terminating land title claims, the Federal Government hoped to bypass the Alaskan Native dependence on federal programs, and provide more economic opportunities for Alaskan Natives (Thornton 2007). ANCSA extinguished Native title to 352 million acres of land, or Alaska writ-large, in exchange for 44 million acres of land in fee simple title and US \$1 billion (Berardi 2005). Twelve regional and two hundred remote village/local corporations were formed as landholders, enrolling Alaskan Natives as shareholders, each corporation is Native owned and operated. In total, ANCSA provided economic opportunities in the form of commercial

possibilities for Alaskan Natives. At the same time, the extinguishment of title and access to the majority of Alaska lands restricted the ability of Alaskan Natives to access lands that have provided subsistence opportunities for generations. For example, with the establishment of large tracts of state and federally managed lands within the immediate geography of Fort Yukon, the ability to access some traditional subsistence locations has been virtually cut off, or placed in limbo from year-to-year, therefore limiting the amount of available land for hunting and gathering. Less land in close proximity to the villages to subsist on creates a demand to go further from the village in order to access those resources, which in turn promotes or exacerbates the issue of fossil fuel dependence.

Further complicating the pursuit of energy sovereignty, the Alaska National Interests Lands Conservation Act (ANILCA), passed in 1980, put designations on another 104 million acres as national parks, wildlife refuges, and conservation areas, and 56 million acres as wilderness (PL 96-487) (Fig. 1). These land divisions further limited Alaska Native access to lands and put subsistence uses at odds with recreational and commercial uses. Under federal management, much of the lands transferred were areas Alaskan Natives had long called home. Lands were suddenly legally disconnected from Alaskan Natives continual use, as their ancestors once used them. Currently, Alaskan Natives must continually negotiate for subsistence rights, as a right to feed their families and for subsistence areas closer to their communities, involving lands managed under ANILCA (Krupa 2009). While Alaskan Natives may have access to lands for subsistence purposes one-year, the following year they may not, and some lands are permanently off-limits. Due to the complex legal interpretations of ANILCA, in short, Alaskan Natives no longer have the continuous right to live the subsistence lifestyle their forebears did, as access to lands are only allowed with federal, state, tribal, or corporation approval. The relatively abrupt-forced changes to Alaskan Native self-determination and hence sovereignty in the 66 years since Alaska statehood creates a number of social, legal, policy, and environmental issues for these populations. While, federal and state land tenure restrictions call into question Alaskan Natives ability to promote energy sovereignty, interestingly the current land tenure system in concert with developments in sustainable technology provide Alaskan Natives with opportunity to pursue alternative energy options, well away from costly fossil fuel dependence.

As a result, Fort Yukon is utilizing woody biomass in a high-efficiency wood-chip fed combined heating system as an alternative energy source. Positive environmental feedback in the form of new technology and management of lands that are accessible gives ample opportunity to diversify the uses of biomass, not only as a heat source but also as



**Fig. 1** Alaska Land Ownership (Alaska department of natural resources (1997))

an energy commodity available for purchase by local consumers. The Fort Yukon biomass project allows the village to grow in a sustainable manner, while exploring the financial opportunities possible for the region. Unemployment is three times above the national average in Fort Yukon, and economic development is virtually nonexistent (Sumida and Andersen 1990; US Census 2000). This project is designed to bolster economic development, which will begin freeing up millions of dollars in fuel costs allowing that money to be utilized for other village needs (EA 2013) while moving towards energy sovereignty (Fig. 2).

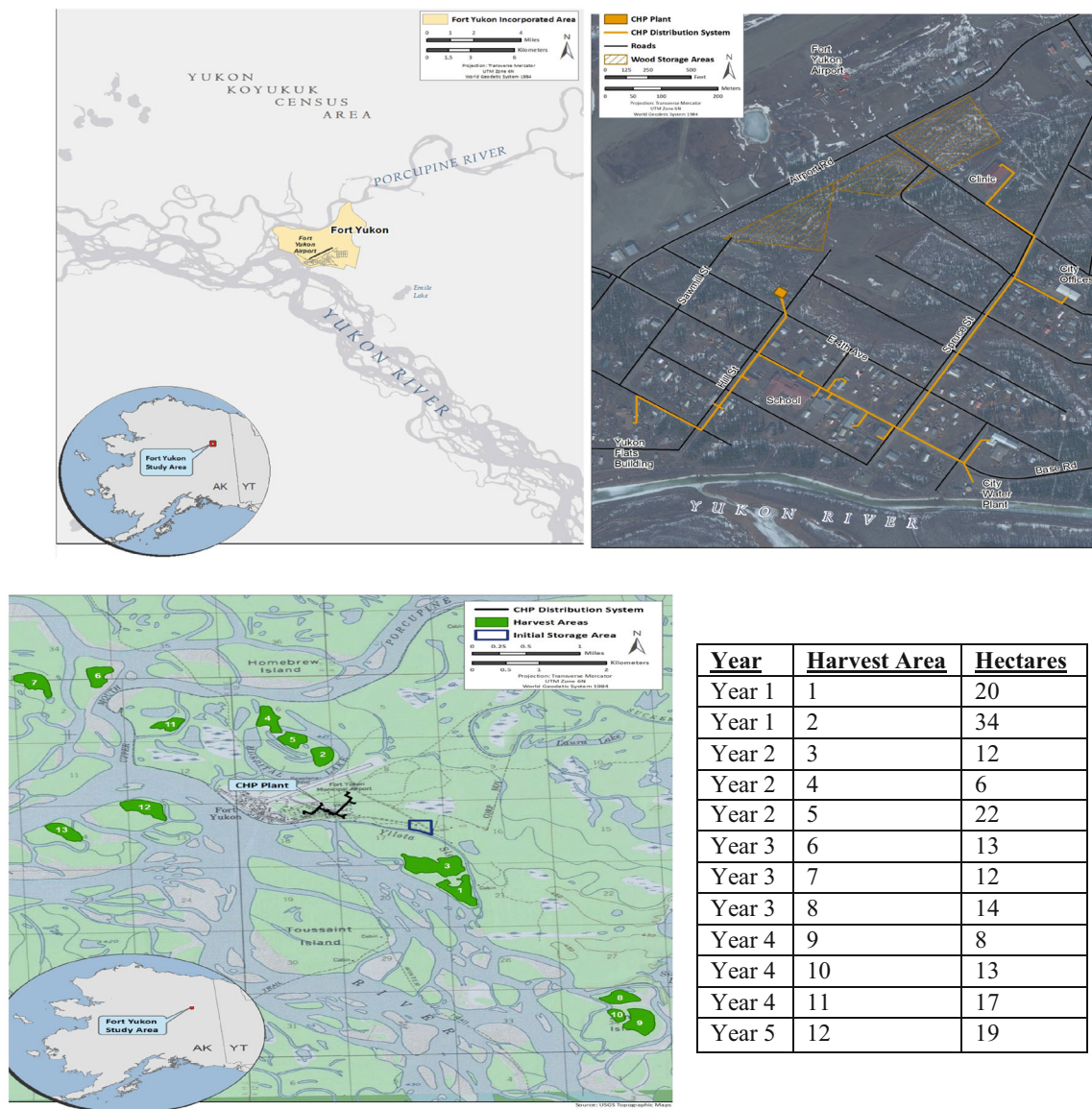
As a heating source, woody biomass<sup>1</sup> boiler systems provide remote Alaskan Native villages with warmth in peak winter conditions. The Gwichyaa Zhee Corporation (GZC)<sup>2</sup>

<sup>1</sup> From here on, the term woody biomass will be used to refer to the vegetative cellulosic material that can be used to create energy. Woody biomass will also be used because it is consistent with the way the participants and archival materials refers to this form of biomass.

has identified stands of cottonwood trees as biomass for heat for the following reasons: availability, fire suppression, they are not preferred for domestic uses, and habitat enhancement (EA 2013). In 2015, it was reported that nearly 550,000 L of low sulfur-diesel was consumed by the community every 5 years, at a costing of US \$4,080,000. The incorporation of

<sup>2</sup> For clarity, there are three distinct governing bodies in Fort Yukon, Alaska, all of which have a stake in this project. The Gwichyaa Zhee Corporation (GZC) is a Village Alaska Native Claims Settlement Act Corporation, who, like most corporations is responsible to the shareholders (local Gwich'in), they are the proprietors of the Biomass project. The Council of Athabascan Tribal Governments (CATG) is a tribal consortium made up of ten Gwich'in and Koyukon villages. The Gwichyaa Zhee Gwich'in are the local tribal government. Each entity is based in Fort Yukon, Alaska, and each entity has responsibility in part or in whole to the people of Fort Yukon, Alaska. The tribe is a separate governing entity that does not control GZC, shareholders own GZC, which is managed by a CEO overseen by a Board of Directors.





**Fig. 2** Fort Yukon 3. Heat loop heat delivery 4, Harvest areas 5 harvestable hectares (EA 2013, and some data sourced from USGS)

an efficient biomass boiler system is predicted to reduce these fuel expenses by 80%. “The savings would stay in the community instead of being exported to oil delivery companies, and would pay for creating jobs...” (EA 2013). When GZC began making plans to construct a woody biomass boiler system in 2008 they benefited from the work of other Alaskan communities already operating similar projects throughout Alaska. This in part made the buy-in for initiating the project feasible as there were aspects of other projects that could simply be replicated.<sup>3</sup> In the past 10 years,

<sup>3</sup> There is a unique quality that sets this biomass project apart from other existing biomass projects in interior Alaska; being an “off-the-grid” community does present its challenges, such as purchasing and barging in harvest equipment a season before intended harvest.

neighboring Alaskan Native villages such as Tok, Craig, and Tanana have become examples of remote Alaskan communities who are utilizing local biomass as a sustainable energy or heat source (Nicholls and Miles 2009; Nicholls 2010).<sup>4</sup>

A 5-year harvest plan has been created to maximize the energy potential in the area with minimal environmental impact (EA 2013). Logging or harvesting practices are largely dependent on the topography of the area and

<sup>4</sup> With such a complicated operation, it is crucial that the community be invested and educated about the work and product. The project includes plans for local foresters and individuals familiar with woody biomass operations to teach community members how to operate every aspect of the combined heating system, further empowering the community to be self-sufficient. This self-sufficiency is crucial given the geographic isolation of Fort Yukon.



distribution of cottonwood stands. Operation crews, made up of local community members, use seed cutting techniques to leave smaller stands of cottonwoods and other important species like white spruce to reseed. In other sections of harvest areas, the harvesters clear-cut where there is an abundance of dense growing cottonwood stands shading out the vegetative understory and seed cutting is not advisable.<sup>5</sup> Harvesting is carried out in the winter months to avoid or limit environmental impacts on the proposed areas, and make use of frozen watersheds by creating ice roads on the river to access the harvest areas.

The local tribal government, made up of a seven-member Tribal Council, maintains oversight of nine distinct departments, handling everything from housing and finance, to natural resources, tribal court, schools and elder care. The Council of Athabascan Tribal Governments (CATG), based in Fort Yukon advocates for ten Gwich'in and Koyukon (another Athabascan tribe) villages in the interior. CATG was founded in 1985 as a mechanism to engage with ongoing social, economic, cultural, health care, education, subsistence hunting, fishing and gathering as well as governmental issues within these villages (<http://www.catg.org/>). Through grant funding, CATG oversees the forestry and harvest of the biomass project, in partnership with GZC (Fig. 1). GZC, is a village corporation created by ANCSA, based in Fort Yukon that represents local shareholders including but not limited to residents of Fort Yukon.

## Materials and methods

The researcher(s) developed a collaborative relationship with CATG over the course of 3 years working on the biomass project in various capacities, including planning, field testing, research/field work design, and compliance reports for federal/state regulatory law. University IRB and CATG research protocols were adhered to, accompanied and informed by other ethical research protocols working with Indigenous peoples (see IPSG 2010). The CATG, initiated the interest in exploring and documenting the key themes driving the decision to pursue woody biomass as a renewable, alternative energy source. Researcher(s) interests lie in the interests of the project stakeholders, which we recognize is not couched in the common rule of self-interest per the usual driving force of

academic research. Thus, bringing the point forward of positionality of the researcher(s) to the research, which can be generally described as “where one stands in relation to ‘the other’” (Bourke, 2014). There is no separation between the researchers and the “other”. As American Indian researcher(s) there was no illusion that our ethnic or racial backgrounds as American Indian would benefit or bias our research in a way that would compromise integrity (Ranco 2006). The hope that this project is successful, and that energy sovereignty is very real creating sustainable and responsible energy opportunities away from the reliance on fossil fuels is something we are invested in. Given the relationship and trust built over the course of 3 years working on the project and the interest for this paper arising from CATG, and not from the research team, therefore adhering to what the Indigenous Peoples Specialty Group refers to as addressing the needs of the Indigenous peoples first (IPSG 2010). Researcher(s), were then more focused on structuring a research agenda that was inclusive of the ideas and needs of CATG, in a way that the research methods incorporated the interests of the project stakeholders (IPSG 2010).

## Participant characteristics

All of the personnel involved in the biomass project, five in total, live in Fort Yukon, and along with one previous employee participated in semi-structured, open ended, exploratory, and face-to-face interviews.<sup>6</sup> Participants were all CATG employees, and represent their perspectives and experiences as both employees, and community members. The interviews were recorded and lasted between 1 and 2 h. One of the participants was female and the rest were male, ranging in age of 22–60 years. Three of the five personnel were born and raised in Fort Yukon, but all were living in Fort Yukon at the time of their involvement in the project. All biomass personnel, past and present, are either local Gwich'in community members or from other Indigenous communities.

## Interviews and data collection

In the summer of 2015, a multi-pronged research approach was employed to explore the Fort Yukon biomass heating project, including to: (1) collect, organize, and analyze all project information; (2) identify the primary themes that lead to Fort Yukon's pursuit of biomass as alternative energy; (3) measure habitat enhancement

<sup>5</sup> The project is committed to habitat enhancement while harvesting. This is a two-pronged approach: 1) reduction of forest canopy to allow understory vegetation to reestablish for herbivores habitat, and 2) fire suppression. The Yukon Flats, particularly the forested areas where harvest sites have been identified, are prone to wildfires, by reducing the fuel load, i.e., woody vegetation this helps to suppress fire.

<sup>6</sup> It is important to state that the authors agreed not to quote or directly reference any of the primary documents owned by the village unless they were public documents.

via regeneration of vegetation during the optimal growing season in harvested areas; (4) identify and assess initial feasibility of fire stricken (standing dry/dead timber) in harvestable areas near the village; (5) investigate how local traditional ecological knowledge was negotiated with technical knowledge during the timber harvest. The second of the five research initiatives are the central focus of this article.

All of the interviews were recorded in English using a digital voice-recording device. Recordings were then transcribed verbatim and organized based on responses or themes that arose during the interviews. Using an inductive approach, each theme was assigned a numerical value to establish how often the theme emerged and the significance or how important the interviewee thought it was.

Indigenous research methodologies, which rely on various theoretical approaches and are informed by Indigenous epistemological foundations, helped to inform the semi-structured interviews (Kovach 2010). More specifically, the conversational method respects the “culturally organic means to gather knowledge within research” while engaging Indigenous people as a part of a research agenda (Kovach 2010, p 42). The conversational method allows for some western methodologies, such as semi-structured questions, and aids the interview process to engage the participants in more organic conversation.

### Content analysis and archival materials

A content analysis of all accessible archival materials relating to the project was completed during the summer of 2015. The project focused on gathering hard copy documents, digital photos, audiovisual recordings, and digitizing them into a local network database only accessible to those granted permission. The metadata related to each document was indexed into a spreadsheet based on the origin of the document. The archival research enabled the authors to look at all the accessible documentation to help determine what themes influenced the pursuit of alternative energy. Once themes were inductively identified and openly coded from the archival documents, they were compared to the themes established in the interviews.

All archival data collected for analysis was first approved by CATG and GZC. Appropriateness of archival data was established at the onset of collection to exclude all financial and non-public documents. Data collection took place throughout the summer of 2015 and consisted of nearly three hundred archival documents. All archival data made available to the research team was collected, organized, and openly coded to account for content and themes.

### Case study context

The data accessed in the form of interviews and open coding of archival materials is presented here as a bounded or single-case study using a linear-analytic structure (Crowe et al. 2011; Yin 2013). This method and structure were used to help frame the research design, as interviews and archival materials were explored to identify themes to help tell the story. A linear-analytic structure helped to organize the manner in which the story was told, i.e., relevant background/literature, methods, data collection, analysis, findings, and discussion/conclusions. Generally, case study research helped to situate this research as it is directed toward one case, as opposed to a particular way of doing research (Verschuren 2003). Due to the overall unique nature of the project, people, and goals of the project in light of larger more self-determinative ideals by a small population, case study methods were implored to structure the content and message of this article. As Yin (2013) states, “Sharing a case study and its findings can involve a more diverse set of potential audiences than most other types of research.” In utmost respect for the community and individuals committed to energy sovereignty the authors considered the audience with managers and personnel of the project, moreover who did they want to tell this story to, which when narrowed down resonated in practitioners, and energy/sustainability sovereignty scholars.

### Results

Overall, four themes arose in the interviews and open coding of the archival materials. What follows is a thematic (as opposed to a numeric) presentation of these themes. The first theme, access of available renewable resources to offset extraordinarily high diesel fuel costs was initially thought of as two separate themes, but upon closer evaluation of the findings and participant responses we soon realized that without the availability of the resource the project is not viable. The second theme, creation and development of economic opportunism is a by-product or positive feedback of this project. Participants thought of this as a chance to partially address the nearly stagnate economic development in Fort Yukon. The third theme, movement away from fossil fuel and fossil fuel systems and towards self-determining energy opportunities/sovereignty seems a much broader discussion, but in consideration of how financially tied fuel miles,<sup>7</sup> for example, are to the overall cost of fuel in Fort

<sup>7</sup> Fuel miles refer to the actual cost of transporting the fuel to Fort Yukon, which is added on to the already expensive gas prices.

Yukon, participants identified this as a real possibility to intentionally reshape their relationship with fuel. The fourth theme, cultural significance and connection to burning wood speaks to millennia of Gwich'in observations and experiences within this landscape. Gwich'in people have been a part of the environment in interior Alaska, using conservative archeological records, for the better part of 30,000 years (Bodley 2006), having adapted their societies to what the environment provided in order to thrive.

The first theme—access of available renewable resources to offset extraordinarily high diesel fuel costs—speaks directly to the need to think about what renewable resources Fort Yukon has access to given land title issues. What resources are available and can be developed as a means to create an alternative energy structure that is sustainable, and developed while protecting the longevity of the resource; with the goal of offsetting the high diesel fuel costs? In all of the interviews, participants clearly stated that high diesel fuel costs played a role in the conception of the project. Participants shared that long before interest in the project began, the village of Fort Yukon was well aware that the current infrastructure built around diesel fuel was unsustainable, as documented in the 1-year heating fuel cost agreements for remote villages.<sup>8</sup> Participant 3 shared:

“And I think the thing that is driving a lot of villagers to start seriously identifying these kind of projects is the cost of fuel as well as the transportation of getting the fuel they need in their village to run their power plants, and everything comes from an urban area and it's very costly”. Participant 2 stated “...it seems fuel costs in Fort Yukon have always fluctuated but what has been consistent is that cost is always high, so it fluctuates at high dollar amounts, you're paying for the fuel to be flown or barged in, so that cost tacked onto the actual fuel cost itself”.

Fort Yukon paid over \$6.00 per gallon of diesel heating fuel in 2007 (some villages paid more) with 40% of the cost accounting for transportation, storage, and retailer markup due to their rural location, not including taxes (Wilson et al. 2008). As of this writing in 2016, the cost of diesel fuel in Fort Yukon was \$6.18 a gallon. Meanwhile the average diesel fuel consumer in the lower 48 states paid \$2.18 per gallon in April of 2016. Such constraints make this project a top priority for the community.

<sup>8</sup> One-year heating fuel cost agreements are common fuel costs agreements between GZC and fuel companies that deliver to the village. At times, and in archival materials, officials will comment on the price of the fuel or their concerns. In this case, it was documented that officials of GZC and the village recognized that the cost of fuel was too high and unsustainable.

The second theme—creation and development of economic opportunity recognizes the need to stimulate the local economy by providing jobs and freeing up money that would otherwise have been spent to purchase diesel fuel. Economic development in the context of job creation has been slow, availability of local jobs is minimal, as most employment opportunities are with tribal, state, or federal agencies, and much of that work is seasonal in nature. For Fort Yukon, the challenge of creating jobs and keeping employees is consistent, so the only real option for longevity of this project is to invest in community members as employees. Participant 3 elaborates, “...we want to see people willing to see this thing from whatever it takes from harvesting to maintenance of the boilers, to every part this whole operation...when we run and get this project off the ground and it's operational, then we really have to concentrate on who was in the community can really help us and we really got to give them an attractive contract with incentives to keep them on board”. Participant 1 considered how the income rate (salary) of this job compared to what normal pay on other labor skills jobs would be “...yeah, it's good pay”. Participant 5 spoke directly to the need for Gwich'in driven economic development, “it's the only way this community can self-sustain, is by their own hand”. Participant 4's perspective resonates with other participants, “...we live off the land and just self-sustaining”. The project would create, “local jobs for the underserved minority community of Fort Yukon” (EA 2013). Respectfully, the interviews and archival documents both agree with each other, this story is common throughout, as interviews and documents often demonstrated a very succinct message spanning nearly 8 years (2007–2015). In concert with observed or anecdotal evidence community members alike recognize that the cost of fuel is not sustainable and comment regularly on the hope that the combined heating facility comes to fruition sooner rather than later. Accordingly, of the nearly 250 archival documents, job creation and competitive recruitment of employees was consistent.

The third theme—movement away from fossil fuel and fossil fuel systems and towards self-determining energy sovereign opportunities pulls from a more community oriented ideology about implementing this project with the intent of reclaiming and further defining how the Gwich'in of Fort Yukon will pursue a new energy future, by moving away from fossil fuel dependence towards energy sovereignty. Participant 2 shared “...the idea that this community was really taking the lead on such a cool thing really made me excited” in relation to a community led energy initiative in interior Alaska. In the context of empowering past, present and future generations of Gwich'in, participant 3 gave a very poignant explanation of what this project is working towards:



Our elders, I know, look back at the land and say that's what's going to sustain you. If your shelves in the store are empty you'll be able to set a snare, you'll be able to fish, you'll be able to do this but you gotta be there before you ever get to that time because you got to protect it. You know, we're fighting a lot of battles everywhere on mining and everything, and then now we're also dealing with climate change up here. Climate change don't happen overnight but it'll happen way after I'm gone. So you know it's the people behind me that, that's the younger people. My kids and all them are all probably going to see things that are talked about today. That's why we got to look at everything and we got to talk about, you know, how to use what we have locally—the resources, you know, which is biomass. Other areas it's different things, there's solar, you know, wind generators. You know but that won't work as well in the flats as it would out there in the coast...

Community member support as both employees and advocates will help realize multiple benefits from the project, such as “energy costs...[that will] help maintain the cost of education and health care in Fort Yukon” and minimize “measurable impacts on traditional use and subsistence hunting and fishing” (EA 2013).

The fourth and final theme—cultural significance and connection to burning wood—relates to the cultural practices of using wood for energy, or heating and building materials. The only documented and observed uses of cottonwood in Fort Yukon were to build structures and as a smoking agent to cure wild-game. While Gwich'in forestry practices have a long and highly developed system in interior Alaska, the relationship to preferred species of wood have remained consistent. Participants recognized the growing relationship to cottonwood, and literally built in a new management of cottonwood stands to maintain a sustainable harvest, to create new forestry practices, which will ultimately enhance their already well established forestry practices. For example, with the use of the proposed technology to produce and distribute heat to the identified locations cottonwood can play a much larger role in the community. Beyond distribution the carbon dioxide inputs from burning wood will be substantially suppressed in the boilers, therefore further minimizing environmental impact. Each participant acknowledged and archival documents support the need for cottonwood could then potentially drive a new wood market in Fort Yukon, which will then in turn create a different community consciousness around cottonwood. Participants agreed that burning wood for energy or heating purposes is something that Gwich'in people have been doing for a very long time. Participant 5 added, “burning wood is culturally relevant”.

Participant 3 followed by sharing “using wood as their by-product for the boilers... It's not a new concept”.

## Discussion

We initiate this discussion by highlighting what may seem like an obvious limitation of this study. The geography of Fort Yukon represents a very unique part of the world and the Arctic in general, therefore the geography can seem to limit the broader application of the findings. On the other hand, depending on the need for alternative energy options for small rural, or off-grid communities throughout the world, this study can potentially inform those who may fit or partially fit this demographic.

We have organized the discussion into sections that replicate the “Results” in order to maintain clarity and give respect/attention to the themes. Although the themes are presented as separate esthetically, we realize now the inception of the biomass project is possible via a concerted effort. Therefore, the themes are separate for the purposes of disseminating the results of this article; however, they are not necessarily separate in the minds of interview participants or archival materials.

Taking a step back and looking at this from a broader context in association with theme one, the longevity of this project will ultimately be tied to land tenure status (Karkesi et al. 2006). Though land title is complex, in and around Fort Yukon the available woody biomass resources to support this project are in abundance. The research shows the delivery of this project will hinge on the access to the resource, which will depend on a number of variables<sup>9</sup> present in this project as can be highlighted in the international literature (Howitt 2012; Godoy et al. 2005; Finley-Brook and Thomas 2011). For example, environmental change is part of this broader picture; while GZC has access to 215,000 acres (EA 2013) of heavily wooded bottomland, wildfires have been a “wicked” problem around Fort Yukon (Chapin et al. 2008). The land title issues can potentially be problematic in a larger land management scenario where GZC can actively manage one area, and adjacent to that area is a piece of land not under GZC management (Case and Voluck 2012). Ideally, off-setting high diesel fuel costs is a requirement of this project; however, land title limitations have provided GZC the opportunity to think about the long-term availability of cottonwood on lands that are accessible but also subject to adjacent non-GZC lands. This particular land title scenario reminds us that while remoteness might provide opportunity, the political and legal status of remote lands can act as

<sup>9</sup> Such as remoteness, access to land, management of land, climate change, and environment to name a few.

both an antagonist in the support of fossil fuel and a road block in the promotion of alternative energy initiatives (Howitt 2012). Therefore, the longevity of this project is theoretically viable, but subject to a complex land tenure status regime and a changing environment.

The creation of economic opportunism, as stated in theme two through the development of alternative energy seems to be an obvious need. Carefully evaluating how Fort Yukon came to these economic cross-roads (Ganapathy 2011) is paramount in consideration of the larger Alaskan or global economy. Fort Yukon, like many Alaskan Native villages participates in the fossil fuel “game”, which is an infrastructure built around fossil fuel without many economic incentives (Isherwood et al. 2000) in exchange for participation. This research shows that in Fort Yukon technology is providing opportunities to reevaluate what this relationship can look like. In juxtaposition to a one-way relationship that defines the fossil fuel industry, this new relationship would focus more on reciprocity, as this project is dependent on a heating source that is renewable, sustainable, and culturally significant, but does require active management (Chapman 2010, 2013; Aslan 2012).

The decision to move away from fossil fuel and the drivers of the fossil fuel industry and towards energy sovereignty on their own terms echoes the interests of other, more global, Indigenous communities (Stewart et al. 2011; Wachsmann and Tolmasquim 2003). As Brewer recognizes, the ability to self-determine energy choices is not about asking for permission to make an energy choice, it is in fact a reflection or exercise of the sovereign status of Alaskan Native people collectively to *support the ability to choose* (Brewer 2017). Additionally, it is not the choice itself, but the inherent right to make a choice; therefore, the deeply inherent sovereign rights of GZC shareholders are also the deeply inherent sovereign rights of all Alaskan Natives (Brewer 2017).

The right to decide is a continuation of the relationship Gwich'in have maintained with their environment over millennia, to think of wood as energy. The newly forming relationship to technology broadens the opportunity to eliminate carbon input, which is developed on protocols of reciprocity (Whyte et al. 2016). Accordingly, the international literature suggests that when Indigenous communities have a choice about their relationship to energy they are choosing more sustainable directions (Krupa 2012). Indigenous people, generally, want to move away from extractionist economies that wreak havoc on the environment, and towards energy systems that maintain the human–environment relationship (Robyn 2002).

## Conclusions

This research explored the key themes motivating Gwichyaa Zhee Corporation to pursue a combined heating system burning woody biomass as a renewable and alternative energy source. The results of this research demonstrate GZC's desire to move beyond a dependence on outside industries that have imposed fuel systems (i.e., purchasing, delivery and consumption) that are unsustainable economic practices on the community; and move towards energy sovereignty. All things considered, GZC, CATG, and Gwichyaa Zhee Gwich'in's motivations speak to the growing field of energy sovereignty scholars who have suggested more local dependence on access to energy potential (Royster 2012).

While key historic events have produced dramatic social and economic transitions in Fort Yukon in recent decades, the one common denominator always present is the high financial costs associated with these transitions, such as diesel fuel for heat and electricity. These are adjustments the community continually makes. Although transitions create issues, high fuel costs have created an opportunity to reconsider and reclaim their sovereign right to decide what energy options they want to pursue. Then, in order to conceptualize Indigenous Energy Sovereignty or the pursuit thereof one must generally understand the protocols of that particular society and how its knowledge systems work to understand how priorities are set, as Indigenous peoples are extraordinarily diverse (Whyte et al. 2016). So, we bring this conversation forward from distinct communities' experiences in hopes of working outward toward the broader discussions of energy sovereignty. This is where we situate this paper in the literature on energy sovereignty, as the establishment of energy sovereignty in the literature is international, which seems to be away from the place-based or more locally Indigenous (Johnson et al. 2016). Maybe now, this can not only broaden the discussion but also establish a unique voice and distinction as the momentum of energy sovereignty continues.

One thing is certain, the pursuit towards energy sovereignty alone opens up a number of known and unknown economic development, environmental, and community opportunities. For example, creating a broader wood market where CATG or GZC can pay wood-vendors, and therefore circulate money in the community, will ultimately broaden the availability of the resource as individual land owners would have access to other cottonwood stands the corporation, the tribe, or CATG does not. Anecdotally, and in concert with theme four, this is a common perception and consideration of interviewees and those ideals present in archival materials, which seem to

only equate to a long-held way of life promoted in the community of Fort Yukon “I am Alaskan Native: Hunt, Fish, Share”. Independence in the form of true sovereignty for this community hinges on their ability to make their own decisions as they have for millennia, away from outside governing forces. There is actually the possibility that this rural/remote village can show the world, and Alaska how to move away from fossil fuels, and how to invest in community, how to work around land tenure/title issues, and maybe more importantly make their own choices to move away from the destructionist behaviors of the Anthropocene. The clear example Fort Yukon is setting for Alaska, the Arctic, and the world is the move away from fossil fuels, the challenge but importance of investing in community resilience, how to work around complex land tenure/title issues in the interior of Alaska, and how to develop such projects with a small workforce. In Fort Yukon, the biomass project seems to hinge on the incorporation of new practices, which in turn opens up new possibilities for Gwich'in people to lessen their environmental footprint and reshape forestry practices on their traditional homeland. For the foreseeable future in Alaska, change will always be a part of the political, legal, and environmental landscape. At multiple scales, we can learn to manage or even mitigate all of these changes by including Indigenous ways of knowing and doing into the management of all Alaskan lands.

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#### Compliance with ethical standards

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