



BRIEF TO THE SELECT STANDING COMMITTEE ON INDUSTRY, SCIENCE & TECHNOLOGY: A PROSPEROUS TRANSITION

OVERVIEW

The global energy economy faces a crisis on two fronts — adjusting to record low oil prices since early 2020 and navigating complexity and uncertainty as the COVID-19 pandemic unfolds. These events take place against the backdrop of a warming planet and diminishing [carbon budget](#), demanding urgent action to decarbonize and build climate resilience. How nations respond to this triple crisis will set the trajectory for the economy, our society and the environment for generations to come.

This brief is framed around which aspects of our economy and society will need to be transformed to address this triple crisis effectively. More comprehensively, this brief offers **a blueprint to support a prosperous transition to net-zero emissions by 2050, catalyzed by a green recovery from the COVID-19 pandemic.**

This policy brief has been developed by Iron & Earth, a not-for-profit organization founded and led by workers from the fossil fuel industry with a stated mission to *empower fossil fuel industry and Indigenous workers to build and implement climate solutions*. Through our lived experience and our research, we know that workers like ourselves must play a leading role in building the infrastructure required to reach climate targets and to lead a green recovery from the COVID-19 pandemic.

Fossil fuel industry workers and stakeholders across the entire value chain have the skills, knowledge and expertise required to help shape a bold new future, providing vital leadership during this period of unprecedented change. In this policy brief, we have proposed four broad-reaching national initiatives that could ensure our workforce, manufacturing sector, businesses and infrastructure are rapidly upgraded to meet the demands of this moment and the

future. We have provided multiple case studies for demonstrating exactly how this type of rapid diversification could be supported through specific policies and programs.

Given the broad systemic shock caused by the COVID-19 pandemic, economic recovery is a central objective of this plan. The pandemic has exposed the fragility of our supply chains of goods and materials over which we should have greater control. Part of that control is ensuring that a greater proportion of critical capability remains not only within our borders but becomes distributed widely across our regions and communities. For the global economy to be strong, we need to ensure that the supply chains of individual nations will not break under the strain of a future global emergency. Therefore, resilience must be at the forefront of our planning for the net-zero economy.

OUR VISION OF A PROSPEROUS TRANSITION TO NET-ZERO

Iron & Earth defines a ‘prosperous transition’ as the process of transforming society and our global economic system to achieve broad-based prosperity and multi-generational sustainability for people and the planet. Therefore, this transition must strive for equity, fairness and well-being for all workers, families, communities *and* the natural environment. Many of the technologies required to power the transition are already available and ready to scale. Our challenge is to create and implement a blueprint to rapidly upgrade the world’s workforces, manufacturing, businesses and infrastructure to implement these technologies and streamline the transition. Along the way, we must ensure that those who are currently the most vulnerable and marginalized within our current energy economy can meaningfully participate in, and benefit from, this transition.

Shovel-Worthy Net-Zero Solutions

Achieving a net-zero world will also call for a vast array of technologies, from emerging zero-emission energy solutions to ‘negative emission technologies’ that remove existing atmospheric carbon. Many transformational solutions are already available to us, including the suite of rigorously vetted solutions [identified by Project Drawdown](#). In addition, the Energy Futures Lab has identified [five ‘shovel-worthy’ technologies](#) well suited to mobilize fossil fuel industry workers, stakeholders and infrastructure as a foundation of the transition. Although many such technologies are already in use, they require policies, strategies, and, above all, vision and leadership to introduce them into the mainstream at scale.

Achieving net-zero requires us to understand the interconnectedness of social and economic factors and the varied characteristics of our geographic regions. The pathway to net-zero must be paved with realistic, pragmatic, and intersecting steps. The journey will be decades-long but the groundwork, in terms of investment in technology, infrastructure, manufacture and training, must begin immediately with stimulus funding focused towards a green recovery.

Prosperity for All Workers

Re-envisioning and re-shaping the world’s energy infrastructure to deliver net-zero by 2050 calls for bold action that will create many millions of new jobs, even as traditional jobs are gradually superseded. Indeed, if we are to reach net-zero by 2050, efforts must focus on recruiting new

apprentices into the trades, even assuming every existing fossil fuel tradesperson successfully makes the transition. The drive toward net-zero will also create demand for expertise in new sectors with entirely new job descriptions, requiring workers to adjust to this dynamic environment. As such, it is critical to illuminate pathways for change, supporting workers undergoing transition, enabling them to thrive and support others, in turn, to make the switch. The urgent nature of the transition cannot rely solely on ‘organic’ job growth or purely market-driven mechanisms - clean energy roles must instead be created by a series of measures that are calibrated, cooperative and comprehensive.

Indigenous Economic Leadership and Reconciliation

This new economy must be grounded in recognition of Indigenous peoples’ right to be self-determining over their own lands and resources. Indigenous and non-Indigenous communities have an opportunity to build a prosperous transition together, one that is based on a principled, rights-based approach. The journey to deliver decentralized, autonomous zero-emission energy offers the opportunity for Indigenous communities to attain ‘energy sovereignty’, new prosperity based on self-determination and a new blend of complementary skills.

Prosperity for Families

The global pandemic has given us fresh insights into the value of the diverse skills that contribute to our economy and we must strive to ensure that all workers earn a fair, living wage that is sufficient to support a family. In a transforming economy, we must adopt new and more relevant metrics to assess the well-being of society, measures that give us insights of far greater value than ‘gross domestic product’. And, as jobs evolve, we must ensure prioritization of continuous skill development, along with equal opportunity and access to secure, well-paid and durable jobs, so that no family gets left behind. Existing studies point to the potential marginalization of Indigenous, immigrant, and racialized groups and also of women in a so-called Just Transition. It bears repeating that ‘equity for all’ is a lens through which we must view all proposed recovery measures.

Prosperity for Communities

Communities should benefit from local renewable energy and sustainability projects, in terms of employment and economic opportunities. Sustainable local development has the potential to enhance the quality of life and the cohesion of communities. This includes initiatives for decentralized power, localized agriculture, urban greening and zero-emission transportation. Development planning should ensure that knowledge and skills are imparted to community members to a degree that enables members to secure employment on projects within or near their community. Additionally, all projects should include community benefits agreements and provisions for community ownership. The energy transition can potentially enable more uniform distribution of opportunity that builds resilience and restores community pride.

Prosperity and Protection for the Environment

A prosperous transition must be framed around maintaining the thresholds of the 9 key [planetary boundaries](#), including:

1. Climate change
2. Ocean acidification

3. Stratospheric ozone depletion
4. Bio-geochemical flow (Nitrogen and phosphorus cycle)
5. Global freshwater use
6. Change in land use
7. Biodiversity loss
8. Atmospheric aerosol loading
9. Chemical pollution

THE FOUR POINT PLAN

OVERVIEW

In order to initiate and implement a prosperous transition, every nation must transform its energy systems and economies, including 1) Workforce, 2) Manufacturing, 3) Business and 4) Infrastructure. Effective policy-making is critical for ensuring that these transformations are as impactful, efficient and economically beneficial as possible. **We have developed a four-point plan to support this process.**

Thankfully, no nation will need to start from square one. On the contrary, most nations have an existing base of workers, manufacturers, businesses and infrastructure that can be rapidly re-deployed toward building the net-zero economy. While there is a short term upfront cost to implementing these policies, the mid and long term payoffs will be significant.

Transformation area	Policy Recommendation
1 - Workforce	A <i>National Upskilling Initiative</i> to rapidly upskill fossil fuel industry and Indigenous workers for careers in diverse sectors of the net-zero economy.
2 - Manufacturing	A <i>National Retooling Initiative</i> to support manufacturers in retooling and upgrading their facilities so they can produce products related to the net-zero economy.
3 - Business	A <i>National Repositioning Initiative</i> to support fossil fuel industry and Indigenous organizations to build the capability to implement zero-emission and climate mitigation projects.
4 - Infrastructure	A <i>National Retrofitting and Repurposing Initiative</i> to retrofit or augment existing infrastructure to reduce carbon intensity and to repurpose existing fossil fuel industry assets and infrastructure in new contexts that support low carbon and zero-emission technologies.

#1: A NATIONAL **UPSKILLING** INITIATIVE



INITIATIVE SUMMARY

A National Upskilling Initiative should offer training that enhances the skills of direct and indirect workers in the fossil fuel industry, with equal emphasis on Indigenous workers and marginalized groups. Upskilling should be directed toward building new skills either in the zero-emissions sector or on technology focused on the reduction of carbon intensity in existing industries. Upskilling is one component of a broad initiative to create durable jobs in decarbonization, climate resilience and adaptation.

A National Upskilling Initiative needs buy-in from all sectors—existing industries embracing technologies and practices for decarbonization, renewable energy companies, and companies active across the zero-emissions value chain - all will be called upon to create the ‘pull’ to facilitate the transition of skilled fossil fuel industry workers into new fields that are aligned with their abilities. Studies have pointed to the benefits of short, targeted training modules that enable workers to tailor their transition, creating waypoints in their personal journey.

The National Upskilling Initiative must also take account of the change in the geographical context of job creation and in particular the reality that job distribution will change as particular industries diminish. Consider the demise of coal mining areas where the presence of coal was often the sole reason for the location of a town. Therefore, an additional challenge will be to introduce new vibrancy to existing communities through community energy projects and localization of services. It will be important to predict geographical growth areas and identify communities that are particularly at risk in the new economy.

IMPLEMENTATION

Map job sectors that will expand, contract or which are forecast to emerge between 2020 and 2050 as the nation pursues decarbonization and resilience objectives (across the range of supply, delivery and operating value chains).

Identify skill sets in the fossil fuel industry that are transferable to these new jobs and skill classifications that will be created in existing industries.

Develop and deliver short-duration upskilling programs to support fossil fuel industry and Indigenous workers to prepare for roles in climate mitigation.

CASE STUDY

The Oil and Gas Training Transition Fund

The Oil and Gas Training Transition Fund out of Scotland provides an example of how a National Upskilling Initiative could be designed and implemented in most nations. Over a three year period, £12m (C\$20m) was provided in the form of grants to unemployed oil and gas workers to upskill into new areas linked to realistic job opportunities. Workers were required to verify with prospective employers that proposed training would be recognized thus ensuring a broader support and endorsement for new initiatives. This program resulted in 70% of the 3,592 participants securing jobs or additional training¹.

#2: A NATIONAL RETOOLING INITIATIVE



¹ https://transitiontrainingfund.co.uk/images/TTF_Review_Summary_Final.pdf

INITIATIVE SUMMARY

A National Retooling Initiative would aim to support manufacturers in retooling and upgrading their facilities to extend production capability into the renewable energy, zero-emissions and climate mitigation markets. Retooling and manufacturing strategies are complex and contingent on how the market evolves in terms of pace and volume.

To de-risk market entry there needs to be a controlled strategy that materially supports manufacturing for new sectors until new and reliable supply chain connections are established. Re-tooling and manufacturing within the climate mitigation sector therefore needs to be part of a larger coordinated effort that projects market growth and underpins initiatives to transform core manufacturing.

The caution in manufacturing is to achieve growth with a minimum footprint. Rather than replacing one market-driven growth model with another, retooling support to the manufacturing sector must be rooted in a broader vision of how we manufacture in an intelligent way that fosters circularity i.e the retooling of business needs to be connected with considerations of sustainable sourcing, end-use and re-use.

IMPLEMENTATION

Identify projected growth areas in manufacturing between 2020 and 2050. Define the emerging supply chain in detail including projected growth in demand and sectors identified for strategic production to achieve national resilience.

Identify the specific manufacturing capabilities required to migrate effectively into emerging renewable energy and climate mitigation markets, determining sectors that are locally competitive. Identify manufacturers with existing capabilities in terms of technology, equipment and infrastructure that is either 'transition ready' or able to respond to the emerging market through different degrees of retooling and upgrading.

Work with manufacturers to identify equipment and technology upgrades required to compete locally and globally in new manufacturing sectors. Develop retooling support initiatives to foster planned development.

Establish policy incentives, retooling grants and financing programs for manufacturing companies who are committed to transitioning into the renewables and climate resilience sector.

CASE STUDY

COVID-19 Retooling

Migration into new markets is a constant within the manufacturing sector as opportunities emerge to redirect existing technologies and manufacturing processes to novel applications. In a market driven by both the imperative of decarbonization and the progressive decline of the oil & gas industry, there will be an accelerated time frame for transition which is less organic and more coordinated.

Recent cases of dramatic and urgent retooling are exemplified by the inspiring response to the COVID pandemic in which manufacturers turned their 3D printing technologies toward making protective visors and distillers rapidly evolved their processes to produce hand sanitizer. A national inventory of manufacturing capability will identify and classify which sectors are transition-ready and which will require greater support to realign with rapidly emerging markets.

#3: A NATIONAL REPOSITIONING INITIATIVE



INITIATIVE SUMMARY

A National Repositioning Initiative is intended to support contractors, consultants and service providers to position themselves competitively in the zero emissions economy. A major challenge is in identifying service industry sectors that are capable of pivoting to a new service model assuming that there is a sufficiently robust and early demand for those services. One transition scenario envisions existing service companies assigning a segment of their business to new marketplaces to test and evolve their business plan.

Given the pace of the emerging market and the anticipated decline of the oil & gas sector, this requires transitional support including policy creation and coordination on a market-wide scale. Stakeholders cannot confidently redirect services, whether partially or wholly, into new markets if growth in demand is uncertain. Therefore a national strategy is required that coordinates and cross-connects commitments on renewable energy growth, including development of new sectors of the economy that address climate mitigation and adaptation.

IMPLEMENTATION

Identify service sectors that will emerge to prominence between 2020 and 2050 and map probable trajectories for the various sectors.

Identify stakeholder mix that will service the needs of an emerging market and **identify fossil fuel industry and Indigenous organizations** that have expertise compatible with the needs of the market.

Develop and provide support programs that will help these stakeholders incorporate climate mitigation into their scope of work (e.g. an engineering firm previously focused on oil and gas projects could be supported to find clients and provide services for climate mitigation projects).

CASE STUDY

Ørsted

Ørsted, formerly named 'Danish Oil & Natural Gas' made a commitment in 2006 to undertake a comprehensive transition to renewable energies. Since developing their first offshore wind farm in 1991, offshore wind has evolved from niche technology to mainstream utility - the fastest growing renewable energy technology in Europe. The company divested its remaining oil and gas stakes in 2016 and has reduced carbon intensity by greater than 80% since 2006, with a target of 98% by 2023. Employing more than 6,500, its wind turbines presently power 12 million people, with an achievable target of 30 million by 2025. Ørsted turned a loss-making oil & gas company into a renewable energy leader in little more than ten years and, in effecting their own transformation, Ørsted worked with existing and new service providers to create an entirely new supply and contracting ecosystem.

#4: A NATIONAL RETROFITTING & REPURPOSING INITIATIVE

INITIATIVE SUMMARY

A National Retrofitting & Repurposing Initiative envisions creating the conditions to advance near and mid-term goals for the energy transition by building on existing infrastructure, either to reduce the emissions footprint of operational assets or to put redundant or at risk assets into the service of the net-zero economy. This will ensure that every feasible piece of infrastructure is adapted or re-utilized towards our 2050 net-zero target. This includes 1) retrofitting all existing infrastructure to minimize greenhouse gas emissions and 2) repurposing underutilized or abandoned infrastructure for new net-zero projects.

RETROFITTING

RETROFITTING SUMMARY



The journey to net-zero is a decades-long initiative that will require the oil & gas industry to provide a significant part of the energy and petro-chemical mix for some considerable time to come. The drive to net-zero in this sector requires comprehensive initiatives to rapidly decrease carbon intensity. This is an ongoing initiative which has been successful to varying degrees in many countries but efforts to drive down carbon intensity must be redoubled.

One pathway to significant carbon reduction is to incorporate sustainable energy technologies into the operational mix of oil & gas operators and contractors. A National Retrofitting Initiative would create mandates to introduce supplementary zero-emissions technology and proactively implement changeout of technology based on agreed targets. Supplementary technologies such as the introduction of solar arrays to augment operating facilities are key elements in the transition since they offer exposure to workers to train in new technologies, expanding their skillbase while maintaining their roles. Staged retrofitting and augmentation also enable testing of technologies and the opportunity for companies to match emerging technologies to their business strategies going forward.

RETROFITTING IMPLEMENTATION

Develop policies and programs to streamline retrofits of carbon intensive infrastructure and work with industry to implement retrofits on as much infrastructure as possible within the shortest amount of time possible.

RETROFITTING CASE STUDIES

Shell's Rheinland Refinery (zero-emission feedstock)

Shell's Rheinland Refinery in Wesseling, Germany utilises around 180,000 tonnes of hydrogen annually for processing and upgrading of refined products. Hydrogen is presently derived from steam reforming of methane, a carbon intensive process producing so-called 'grey hydrogen'. Although carbon sequestration is a potential step for decarbonization, Shell has taken the initiative to reduce carbon intensity with 'green hydrogen', generated from a 10 MW PEM (Polymer Electrolyte Membrane) electrolyzer.

This first phase will produce 1300 tonnes of green hydrogen annually, demonstrating hydrogen's potential in the energy transformation, establishing a 'hydrogen model region' to test technology and explore applications. This 'sectoral integration' of hydrogen with carbon intensive industries is a powerful opportunity for retrofitting.

As power from renewables expands, ventures such as this will offer flexibility to stabilize the power grid during demand fluctuation and will also promote training of personnel in the operation of electrolyzers, hydrogen storage and fuel cells for future business development.

ULEMCO (Fuel cell retrofits for existing diesel fleets)

The quest to reduce carbon intensity cuts across all sectors of industry. In the transportation sector, migration towards zero-emission vehicles for mid-sized trucks is still in early stages, introducing high costs that impact competitiveness. Using proprietary hydrogen combustion technology, companies like ULEMCO are helping fleet owners take the middle road between diesel and electric. ULEMCO technology enables the conversion of commercial vehicles to run on dual fuel - creating diesel hydrogen hybrids. This enables fleet managers to reduce their GHG emissions to 'ultra-low levels' without investing in an entirely new fleet of vehicles. These first steps enable early commitment to carbon intensity reduction and foster gradual growth of the hydrogen supply chain.

REPURPOSING

REPURPOSING SUMMARY



Repurposing is a high priority given increased concerns over the potential for stranded assets as the world transitions away from fossil fuels. It is important to identify asset classes that can help achieve early wins in terms of repurposing since these will also identify transitional pathways for direct employment or within the supply chain.

Existing pipeline networks are examples of potential early-stage repurposing. These pipelines can be used for transporting hydrogen to truck refueling nodes. Other examples include the use of abandoned well pads for the positioning of solar modules thereby enabling the use of otherwise fallow land and bringing focus to the remediation of orphan wells. As the gradual decline of the oil & gas industry unfolds, focus on reclaiming assets for the emerging renewables market also means focus on jobs and the reduction in economic losses due to unproductive assets.

REPURPOSING IMPLEMENTATION

Identify climate mitigation projects that are likely to be developed as nations pursue their net-zero emissions targets.

Determine what existing fossil fuel industry infrastructure could be used for these projects (e.g. using abandoned oil well sites or decommissioned mines for renewable energy projects).

Develop policies and programs to streamline utilization of existing fossil fuel infrastructure for climate mitigation projects and **work with project developers to utilize the most suitable fossil fuel infrastructure** for climate mitigation projects where possible.

REPURPOSING CASE STUDIES

RenuWell (Utilizing oil well infrastructure for solar projects)

RenuWell's mission is to 'turn liabilities into assets' by repurposing oil & gas leases for the generation of renewable energy. This is beneficial on multiple fronts, re-utilizing existing power lines and road infrastructure to reduce costs for both well abandonment and renewable energy projects, accelerating the growth of rural renewable energy capacity and introducing technology transfer and training opportunities to areas that have been substantially affected by the declining oil & gas market.

CESAR (Hydrogen fuel cell powered freight transportation)

The CESAR initiative (Canadian Energy Systems Analysis, Research) launched an 'Alternatives to Diesel' program in 2017 as an extension of the Future of Freight study. The objective of this is to create 'credible, compelling and competitive' pathways to transformative change in order to meet Canada's Paris commitments. Emerging technology in hydrogen fuel cell electric vehicles (FCEVs) is key to addressing sectoral challenges of GHG and air pollution in heavy transportation, while offering rapid fuelling and longer range than battery electric equivalents. The study found that although lack of infrastructure was a major barrier, it is feasible to start the journey towards a hydrogen economy using 'off the shelf' technology and existing pipeline networks to create corridors of effective hydrogen supply. Utilising blue hydrogen (with sequestered CO₂) derived at low cost from existing plants creates opportunity to accelerate development and open new technology pathways, including a new hydrogen export market to replace diesel.