Financing the Clean Economy

The clean economy is emerging as the world's next major high-growth opportunity area. Recent projections suggest that on a global scale, the clean energy market could have a compound annual growth rate (CAGR) of 11% during the period 2010 - 2020.¹ In dollar terms, this translates to growth from \$500 billion in 2010 to more than \$2.3 trillion in 2020.

Businesses large and small throughout the West Coast region are already seeing positive contributions from the clean economy to their bottom lines. This is further exemplified by the additional \$147 to 192 billion in potential new investment capital within the region by 2020, as described in Section 4.

Traditional resistance to the clean economy by "businessas-usual" interests is slowly dwindling as more and more, the positive benefits are recognized. A report on the green economy by the United Nations Environment Programme (UNEP) reveals that while clean technology investments may involve higher upfront costs, they often lead to significant energy savings, longer durability, and greater resiliency to price shocks, all of which translate into lower operating costs and faster returns on investment.²

² UNEP, 2011, Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication - A Synthesis for Policy Makers. See: www.unep. org/greeneconomy



¹ HSBC, Sizing the Climate Economy, 2010

The UNEP report also notes that on a global basis, green investments as low as 2% of global GDP would deliver long-term GDP and employment growth over the 2011-2050 period that is at least as high as the most optimistic business-as-usual (BAU) case. In other words, the costs of transitioning toward a cleaner economy is no more expensive than BAU spending. In fact, the transition costs can be considerably lower than BAU when coupled with measures that level the playing field, such as:

- · Phasing out antiquated subsidies;
- Reforming policies that limit innovation;
- Providing new incentives for research and development;
- Strengthening market-based pricing mechanisms that reflect the true costs of carbon-intensive industries;
- Redirecting public investments to promote energy efficiency, and
- Greening the public procurement process. ³

The Competitive Landscape – West Coast jurisdictions have long played a leading role in establishing a competitive market landscape for clean technology. Many West Coast renewable energy and clean technology companies have become successful in establishing footholds in highly competitive world markets.

Regional policy strategies that enable clean technology companies to compete globally are critically important, particularly given the enormous growth potential of the clean technology sector and its attractiveness for investors.⁴

As such, the West Coast region can offer investors even greater potential for positive returns on their investments, which is a significant comparative advantage relative to other competing locations such as Germany, China, and India. **The Importance of Full Carbon Costing** – While clean energy has a high potential for reshaping the global energy markets, current energy costing structures often do not take into account the high costs of negative externalities such as GHG emissions, air and water pollution, and ecosystem destruction. The failure to account for the true costs of negative externalities, in particular to costs of GHG emissions, creates distortions in the energy marketplace and fosters cost-price disparities between clean technology and conventional fossil fuel-based energy offerings.⁵

Taking into account the full cost of carbon is key to driving clean energy innovation and to establishing parity between clean and conventional energy sources.

A case in point is Kruger Products Ltd., a major Canadian pulp and paper company in BC that commissioned a new biomass gasification system. The facility is expected to reduce CO_2 emissions by 20,000 tonnes per year, which translates into CAD \$600,000 in annual carbon tax savings. This incremental savings, combined with the profits of selling carbon credits, will generate a positive net present value of CAD \$4 million for the company.⁶

Full carbon costing would allow the West Coast region to utilize its abundant natural resources for clean energy generation. This would enable the region to become more self-reliant in meeting its regional energy demands and increasing its resiliency to global economic turbulence caused by energy security concerns. It also provides a unique opportunity to strengthen the region's competitive position as a global clean energy leader.

Public and private sector involvement is essential to enhancing the region's competitive advantages and for driving growth and expansion of the clean economy. The following pages outline financial mechanisms and regional collaboration initiatives that can help increase the region's competitiveness and attractiveness to private capital.

³ A recent report by Navigant addresses the common misconception that aggressive climate change mitigation will result in economic losses, and that renewable energy is an expensive option for mitigation. To the contrary the economic analysis says a compelling case exists for energy system decarbonization, for its climate change mitigation benefits and the associated reduction in climate change adaptation and damages costs and fossil fuel dependence costs. Climate Change Adaptation, Damages and Fossil Fuel Dependence An RETD Position Paper on the Costs of Inaction, July 15, 2011

⁴ Mossadiq, U. (2005), A Vision for Growing a World-Class Power Technology Cluster in Smart, Sustainable B.C.

⁵ Clean Edge (2011), Clean Energy Trends 2011

 $^{6\,}$ Sustainable Prosperity (2010), Carbon Pricing, Investment, and the Low Carbon Economy

Public Policy Financial Mechanisms that Spur Innovation

– Public policy interventions in the clean economy can be broken into two main categories: technology-push and market-pull mechanisms. Technology-push mechanisms (e.g., state-level tax incentives, government venture capital assistance, etc.) help to move innovative clean technologies from the research and development phase through to the early commercialization stage. Market-pull type mechanisms (e.g., early adopter financing, feed-in-tariffs, pooled loan programs, etc.) are also useful in the early stages of market development (see Figure 12).

Public sector leadership through the early adoption of clean technologies can create a positive environment for enterprise development. It also motivates the private sector through market-based mechanisms to properly validate and/or incubate clean technologies, transforming them into robust and viable business opportunities.

A study by energy policy researchers Burer and Wustenhagen on clean technology venture capital investor preferences found that funding technology demonstration projects is preferred to all other forms of direct public policy interventions.⁷ This is because demonstration projects allow clean technologies to prove their performance potential and to test business model strategies in real market settings.

Through public demonstration projects, private investors are better able to evaluate potential returns on investment and to carry out longer-term assessments of the business opportunities.

A region-wide strategic approach to foster demonstration projects could allow innovative technologies to be tested on a larger scale thereby strengthening the region's economic power and knowledge base in any and all market segments. Public sponsored loan financing is another example of a progressive market-push policy, one that has the potential to accelerate growth in energy efficiency markets through increased sales and broader consumer acceptance.

7 Burer and Wustenhagen, "Which renewable energy policy is a venture capitalist's best friend? Empirical evidence from a survey of international cleantech investors." Energy Policy (37) 2009.



Hydrogen Highway Demonstration Initiative

In BC, the Hydrogen Highway Demonstration Initiative has already attracted Mercedes-Benz to invest CAD \$50 million in BC fuel cell technologies by establishing a fuel cell stacks production facility in 2012.

Source: BC Government, 2011

In British Columbia, recent changes to the province's Clean Energy Act paved the way to enabling utilities to offer on-bill financing for energy efficient upgrades with loans repayable through monthly utility bills. A recent administrative ruling in California has led to the development of larger public energy efficiency financing programs which include investor-owned rate-payer and private capital funds. Drawing on private capital sources to support public initiatives could allow rebate funds to shift into loan financing tools that, in turn, would enable downstream investment multipliers of energy efficient projects.

Large, capital-intensive public green infrastructure projects such as public mass transit, community energy systems, and environmental protection related infrastructure can also raise capital through existing tools such as the issuance of state debentures or bonds.

For example, California's high-speed rail project is being partially financed by the issuance of state bonds as established through Proposition 1A (AB 3034). This proposition guarantees \$9.95 billion in state bond financing for the first phase of this 800-mile interstate public transportation project. ⁸

State and provinces have the ability through existing legislative frameworks to establish green bond mechanisms to enable private investors to help finance projects with risk assurances from the issuing government. This would allow both individual and institutional investors to become involved in driving progressive, large-scale projects forward.

⁸ See: http://www.cahighspeedrail.ca.gov/prop1A.aspx

Figure 12: Technology-push and market-pull financial mechanisms for the key market opportunity sectors.

Key Market Sectors	Energy Efficiency & Green Building	Clean Energy Supply		Clean Transportation		Environmental Protection & Resource Management	Knowledge & Support
Policy Action Areas	Zero-emission New Building and Whole Building Retrofits	Distributed Energy Generation, Combined Heat and Power (CHP) and Biomass-to- Energy	Electricity Transmission and Grid Integration, Smart Grid, Improved Distribution and Metering	Promoting Electric/Plug-in Electric Vehicles and Transit Use	Intercity Initiatives to Reduce Vehicle Miles Traveled, and Mode Shifting	Waste Generation Reduction Industrial Waste Recycling, MSW Landfill Gas Management	Job Creation, Export Trade Promotion, Creation of Viable Business Entities
			T	1		3	
Technology Push Financial Mechanisms	Public-Private Partnerships (P3s) Demonstration Projects & Grants Grants for Small Medium Enterprise (SME) Investments Subsidies Tax Breaks (Deductions, Credits, etc.) for Innovators and Entrepreneurs Tax Breaks (Deductions, Credits, etc.) for Investors Accelerated Asset Depreciation Innovation and Incubator Funds Public Investment in Venture Capital (VC) Government VC Funds						
Market-Pull Financial Mechanisms	Energy-efficient mortgages Municipal-level property tax incentives Credit enhanced loans Energy performance contracts Property assessment programs Public benefit funds	State-level tax incentives Pooled loan programs Credit enhancement Energy performance contracts Power purchase agreements Feed-in tariff/reverse auctions for renewable energy	Provide federal backstop guarantees Regional/ federal trunk line policies and programs Regional finance authorities Harmonizing of existing state-level incentives Legal frameworks Pooled capital loan facilities	Utility-level or property tax incentives for vehicle charging facilities Pooled Ioan programs, energy performance contracts Base rate calculations incentives Smart growth financing policies Tax increment Special district taxing for Transit Oriented Development Location efficient mortgages	Pooled Ioan programs Parking fees and congestion pricing Asisted financiang of lower carbon fuels transitioning Regional financing of clean enery refueling networks	Packaging fees Advance disposal fees and surcharges Advance recovery fees Sales of recyclables Third-party ownership/ leases Solid waste fees	Early adopter financing programs Use of state-and municipal-level purchasing power to finance adoption of locally produced products and technologies Region-wide business opportunity programs Public sector supported risk minimization programs for clean energy investments

Source: GLOBE and CCS, 2011

Public-Private Partnerships – Public-private partnerships (P3s), such as the Pacific Northwest Smart Grid Demonstration Project, are another win-win mechanism for drawing in private sector investment capital and placing less strain on public treasuries. As noted earlier, risks can also be shared and certain P3 models can allow private sector partners to achieve significant economies of scale.

More specifically, a public-private approach to risk management, such as public-backed private insurance, would allow for greater involvement of private industry to share in early stage investor financial risks. This would also allow regional governments to leverage existing private insurance risk transfer frameworks to lower the risk perception of the clean economy.

Recognizing tight government budgets, P3 approaches to financing could also strengthen existing public sector commitments to becoming carbon neutral.

For example, by partnering with financial institutions and other private sector firms, governments could help reduce financial pressures from major infrastructure projects or public building retrofits/upgrades and allow their private partners to operate in their respective areas of expertise. This could, in turn, lead to an enhancement of green building standards within the public sector while remaining fiscally responsible to taxpayers.

Private Sector Investment for Sustained Growth

– Venture capital (VC) and private equity investors are essential to shaping technological innovation and accelerating cash flow throughout the investment cycle. Between 2009- 2010, global VC and private equity investment growth of 19% in renewable energy was observed.⁹ This growth continued into 2011, seeing a 12% increase in capital raised between the second and third quarters.¹⁰

Financial market and venture capital activity in both Canada and the US demonstrates a positive appetite among investors to embrace the clean economy. Since 2000, more than 67% of the world's clean technology venture and expansion capital has been invested into North American companies.¹¹



Southeast False Creek (SEFC) – Neighborhood Energy Utility

The SEFC Neighborhood Energy Utility project in Vancouver, BC, is North America's first and only low carbon district heating system using sewer heat recovery technology. This system provides space heating and domestic hot water to all new buildings within the SEFC neighborhood with utility rates competitive with traditional forms of heating.

Recognizing the significant up-front capital cost of CAD \$33.8 million¹, the project was financed through contributions from the federal, provincial, and municipal governments. The City of Vancouver will be financing CAD \$16 Million of their contribution through the issuance of 10 or 25-year bonds.

Source: City of Vancouver and Quest Business Case, 2012 Southeast False Creek (SEFC) – Neighborhood Energy Utility.

Photo credit: Ausenco

1 As of 2011, with the cumulative cost of the project is continually growing with project upgrades and expansions.

⁹ Bloomberg New Energy Finance (2011), Global Trends in Renewable Energy Investments 2011.

 $^{10 \}hspace{0.1 cm} See: \hspace{0.1 cm} http://www.cleantech.com/2011/10/05/3q-2011-global-cleantech-venture-investment-up-12-percent-from-previous-quarter}$

¹¹ SAM, Clean Tech Private Equity: Past, Present and Future, 2011



The Pacific Northwest Smart Grid Demonstration Project

The \$178 million public-private partnership for the Pacific Northwest Smart Grid Demonstration project (including Oregon and Washington) will allow for the validation of new smart grid technologies and act as a showcase to potential investors of the potential returns on their investments.

Source: PNW Smart Grid Demonstration

British Columbia, Washington, Oregon, and California all ranked in the top 20 jurisdictions in North America for attracting VC in 2010, much of which was invested in clean technology. (see Figure 13).¹²

Research undertaken for this report suggests there is no lack of interest in private equity investments in clean technology, which is helping to drive rapid growth in the clean economy. However, there is a need for long-term public policy frameworks that provide the predictable and stable investment climates needed to attract high-level investments from both local and international sources.^{13,14}

For example, public procurement policies by regional governments to use their considerable purchasing powers to help launch clean technology enterprises could accelerate their growth and encourage downstream expansion capital.

While regional policy incentives have created an ideal landscape for clean technology innovation, these same policies also need to address the needs of long-term industry development. It is critical to recognize that VC support is generally limited to initial stage financing within the investment cycle, and longer term investment vehicles such as loan financing, bonds, private placements, and capital markets are equally as important in developing the clean economy.

In Canada, the federal government's Sustainable Development Technology (SDTC) funding program supports clean technology development without taking ownership of intellectual property or demanding the repayment of funds provided. The program criteria however, require proof that these technologies have the potential to meet a market demand. As a result, those technologies that are supported have a high potential for attracting downstream financing from private investors and loan/debt from equity issuers and financial institutions.¹⁵ Similar models can be integrated in existing West Coast innovation and public funding programs.

Regional Collaboration in Financing the Clean

Economy – The biggest argument for region-wide financing mechanisms center on the potential competitive advantage it would offer in attracting and leveraging capital from the private capital markets and spreading risk factors across a broader economic landscape.

Region-wide clean energy financing mechanisms could allow for the aggregation or bundling of modest investment contributions from a large number of users, thereby leveraging those funds through scalable loans or incentive programs. Such mechanisms can potentially enable significant leveraging of funds from other sources while reducing the risks often associated with isolated incentive programs. They also serve to spread credit risks across a wider range of participating jurisdictions, and allow for certain economies of scale in administrative costs.

¹² Thomson Reuters (2011), Canada's Venture Capital Market in Q1, 2011

¹³ Burer and Wustenhagen, "Which renewable energy policy is a venture capitalists best friend? Empirical evidence from a survey of international cleantech investors." Energy Policy (37) 2009.

¹⁴ Evaluation of private equity investment into renewable energies after the 2008 global financial crisis identifies that well-defined long-term policies are essential to reduce investor uncertainty. Hofman, D and Huisman, H. "Did the Financial Crisis lead to Changes in Private Equity Investor Preferences Regarding Renewable Energy Policies?" 2011.

¹⁵ See: http://www.sdtc.ca/index.php?page=sdtech-funding-niche&hl=en_CA



Figure 13: Venture capital disbursements per capita by West Coast jurisdiction (US\$).

Source: Thompson Reuters, 2011

A 2012 Brookings-Rockefeller report reveals that state-based clean energy funds (CEFs) alone cannot spur economic development; but leveraging these funds to encourage both federal and private sector investment can help to integrate innovation into existing value chains.¹⁶ It notes that while CEFs have incubated technologies and make equity investments into clean energy, these funds also have the potential to support industry development along entire clean industry supply chains. This is exemplified through California's CEF funding for its Clean Energy Workforce Training Program.

The Brookings-Rockefeller study further suggests that regional collaboration could allow for the joint study of conventional infrastructure and associated financial mechanisms such as bonds, tax increment finance districts, and new market tax credits which can also be tailored for the clean economy.

For example, modifications of traditional business tax incentives and government business development programs could be used to promote a regional market for recyclables and deconstruction materials. This could also stimulate market development on par with other economic growth areas.

With respect to climate resiliency and adaptation issues, a regional financial strategy could help to improve efficiencies in program delivery. For example, establishing a Natural Capital Index financed through a regional "climate resiliency and adaptation fund" could help inventory the regions abundant natural resources. Not only would this deliver positive synergies by reducing individual jurisdictional costs, it would also publicly showcase the region's progressive approach in managing its collective interests in a transparent and effective manner.

Region-wide financing mechanisms could offer advantages over single jurisdiction efforts in attracting capital from outside the region.

¹⁶ Milford, L., et al. Leveraging State Clean Energy Funds for Economic Development. Brookings-Rockefeller. 2012.



Clean economy "project exchanges", for example, could help smaller communities to partner on major project developments and to gain access to high caliber financial expertise at lower costs. In that vein, active development of a West Coast infrastructure exchange has recently begun to take shape.¹⁷

A region-wide commitment to financing initiatives would also send a strong message to the world that the West Coast region is committed to maximizing its position as a clean economic powerhouse and could serve to attract the qualified workforce.

Private investors have long recognized the region's comparatively optimal investment climate. However, continual growth of the region's clean economy requires that private sector investment sources, albeit with public policy support, continue to lead in building a robust and vibrant clean economy.

While the West Coast region has demonstrated significant leadership in recognizing the growth potential of the clean economy and has attracted considerable investment to enhance the region's competitiveness, this analysis reveals that even greater investment opportunities exist in the clean economy that have yet to be exploited. This is particularly evident in the development of the region's abundant natural resources and clean energy potential.

It is important to note that many of the financial mechanisms discussed in this report are not new. To varying degrees, many have been tried or are in place throughout the West Coast region. However, many are often sporadic in nature or short term in duration (often tied to political priorities) and fail to provide the required long-term policy frameworks needed to instill investor confidence.

The following table provides a few examples of public policies and programs that have had a significant and positive impact in developing the West Coast region's clean economy.

¹⁷ See: http://www.bizjournals.com/portland/print-edition/2012/01/27/state-explores-private-equity.html

EXAMPLES OF PCC MEMBER POLICY INITIATIVES AND FINANCIAL MECHANISMS

ZERO EMISSION NEW BUILDINGS AND WHOLE BUILDING RETROFITS

BC Hydro Power Smart "New Construction Program" – The program encourages energy savings of more than 50,000 KWh in new commercial constructions through energy modeling study reimbursements and tiered capital incentives (up to \$30,000 per 100,000kWh saved) for actual energy savings.

Clean Energy Works Oregon – Available in more than 17 communities across Oregon, this program aimed to encourage renovations and retrofits by providing up to \$2,000 in instant rebates of low-interest financing and free home energy assessments. This program was established with \$20 million in federal stimulus funding and is anticipated to retrofit 6,000 homes and stimulate \$100 million in economic activity over three years.

California AB 758 – Requires the Energy Commission to develop and implement a comprehensive program to achieve greater energy savings in California's existing residential and nonresidential building stock, including energy assessments, building benchmarking, building energy use ratings and labeling, public and private sector energy efficiency financing, workforce training, and public outreach and education.

Energy Upgrade California – A whole-house efficiency retrofit program launched on a pilot basis in 2010 that combines \$100 million of utility energy efficiency funds with additional American Recovery and Reinvestment Act (ARRA) stimulus funds from the State Energy Program (via CEC). Together with supplemental funds from participating local governments, the program offers assistance in finding contractors and lenders, home energy analyses, whole house retrofits achieving a minimum of 10-15% savings, and tiered incentives that reward achieving far higher savings levels.

DISTRIBUTED ENERGY GENERATION, COMBINED HEAT & POWER (CHP) & BIOMASS-TO-ENERGY

California Solar Initiative – The state has committed more than \$3.2 billion between 2007-2016 to install 3,000 MW of new solar generation capacity. The program provides cash rebates to encourage individuals and businesses to install solar energy equipment on residential and/or commercial properties.

BC Bioenergy Network – As part of the BC Bioenergy Strategy, this network was established with a \$25 million grant in 2008 to promote and fund bioenergy projects across the province. To date, 21 projects demonstrating and supporting CHP and biomass to energy are being funded by this initiative.

Oregon Pilot Solar Volumetric Incentive Rates & Payments Program – Available to Portland General Electric, PacifiCorp, and Idaho Power customers, payments are offered for kilowatt hours (kWh) generated over a 15 year period, at a rate set at the time a system is initially enrolled in the program. The volumetric incentive rates range from \$0.317/ kWh to \$0.374/kWh.

ELECTRICITY TRANSMISSION & GRID INTEGRATION, SMART GRID, IMPROVED DISTRIBUTION & METERING

BC Hydro Smart Meter Infrastructure – As part of BC Hydro's Smart grid roadmap, smart meters are being installed across the province to better manage energy resources with improvements to safety, reliability and customer service. The program is anticipated to pay for itself by delivering \$1.6 billion in benefits over the next 20 years.

Washington Snohomish County Public Utility District No. 1 – In 2009, the utility secured \$15.3 million in federal stimulus finding to modernize its existing grid. In 2012, with basic infrastructure projects completed, the utility will complete installation of a distribution automation demonstration project in the Tulalip/ Warm Beach community. This system will allow the integration of renewables into the existing grid framework.

ELECTRIC PLUG-IN ELECTRIC VEHICLE AND TRANSIT USE

LiveSmart BC Clean Energy Scrap- It Program – BC residents are eligible for up to \$5,000 in point-of-sales incentives for qualifying electric clean energy vehicles and a wide selection of cash public transit incentives for recycling their old vehicles. A \$500 rebate for residential electric vehicle charging station installation is also available.

California Alternative & Renewable Fuel & Vehicle Technology Program (AB118 Nunez) – With a budget of \$100 million, the program provides grants, loans, loan guarantees, revolving loans, or other appropriate measures to develop and deploy innovative technologies that transform California's fuel and vehicle types to help attain the state's climate change policies.

West Coast Green Highway – Upgrades along the BC 99/ Interstate I-5 highway will accommodate quick charge stations every 40-60 miles. With completed and ongoing work, Washington and Oregon will have the most extensive multi-state network of EV charging stations in North America.

INTERCITY INITIATIVES TO REDUCE VEHICLE MILES TRAVELED, MODE SHIFTING

California High Speed Rail – Inspired by other highly successful high-speed train systems around the world, this intercity transit system will initially run from San Francisco to Los Angeles/Anaheim and later to Sacramento and San Diego. This multibillion-dollar project financed through state bonds and federal support is expected to generate 100,000 direct and indirect jobs over five years with social and economic benefits for all Californians.

WASTE GENERATION REDUCTION, INDUSTRIAL WASTE RECYCLING, MSW LANDFILL GAS MANAGEMENT

Washington Environmental Results Program (Auto Body Pilot Project) – This is an innovative compliance model that offers specialized technical assistance, incentives and opportunities for certification under the EnviroStar Program. This voluntary program helps auto body shops to move beyond compliance to become environmental leaders.

California Household Hazardous Waste Discretionary Grant Program – Provides financial support to municipalities and jurisdiction within the state to take on enhanced household hazardous waste collection. Initiatives through this grant, such as the Used Oil Recycling Program, have successfully pushed for more increased public participation in environmentally beneficial behaviors.

JOB CREATION, EXPORT TRADE PROMOTION, CREATION OF VIABLE BUSINESS ENTITIES

BC Innovative Clean Energy (ICE) Fund* – Established under the BC Energy Plan, this fund is aimed to develop and showcase BC clean sources of clean energy and technologies. Since 2008, more than \$72 million has been invested into 56 projects. *The BC government is currently reviewing the source of funding for this initiative.

Oregon's Business Energy Tax Credit (BETC) – Enacted in July 2007, the state offers business tax credits to those who invest in energy conservation, recycling, renewable energy resources, and less-polluting transportation fuels.