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# Clean Energy Finance Program at IBank

Teveia R. Barnes, Executive Director

Ruben Rojas, Deputy Executive Director

Table of Contents

**EXECUTIVE SUMMARY ..... 2**

INTRODUCTION..... 2

- *Design Concepts*.....3

GREEN BONDS ..... 4

THERE ARE 3 TYPES OF NON-RECOURSE GREEN BONDS THAT IBANK WOULD CONSIDER ISSUING TO FUND THE CEFPP TO PROVIDE PROCEEDS TO FINANCE CLEAN ENERGY PROJECTS: ..... 4

- *Economic Rules of Thumb*.....4

PROJECT OPPORTUNITIES..... 5

- *Renewable Energy Sector*.....5
- *Storage Technology* .....5
- *Water Sector* .....6
- *Alternative Technologies*.....6
- *Hydrogen production* .....6
- *Alternative fuels*.....6
- *Transportation*.....6
- *Energy efficiency resources*.....7
- *Industrial process efficiency improvements, including:*.....7
- *Residential - projects include comprehensive energy efficiency improvement projects in existing residential buildings, such as:*.....7

BACKGROUND ..... 8

THREE PERTINENT ISSUES FACE CLEAN ENERGY INVESTMENT ..... 9

CALIFORNIA’S MARKET OPPORTUNITIES FOR CLEAN ENERGY PROJECTS..... 10

- *Employment Snapshot*..... 11

**CONCLUSION..... 11**

## Executive Summary

California has long been a leader in developing and installing clean, low-carbon technologies, in large part due to its supportive public policies. In 2006, California affirmed its support for climate change mitigation by passing the California Global Warming Solutions Act (AB32). AB32 established the goal to reduce the State's greenhouse gas emissions to 1990 levels by 2020 and to 80% below 1990 levels by 2050. In recent months the IBank Staff and other representatives have been engaged in numerous discussions with environmental leaders, state agencies, legislators, financial advisors, investors, underwriters, universities and other stakeholders regarding capital-raising and investment vehicles for infrastructure and economic development projects with significant benefits for conserving the environment and reversing climate change. IBank is in the process of evaluating several renewable energy, energy efficiency and clean water proposals aimed specifically at significantly contributing to the goals of AB32. Furthermore, IBank Staff is in the process of examining options to expand the clean technology industry through direct financings, credit enhancement tools and investment capital for clean energy technologies and projects.

IBank is uniquely positioned to consider these proposals, because it is the State of California's only general purpose financing authority and has extremely broad statutory powers under the Bergeson-Peace Infrastructure and Economic Development Bank Act (IBank Act) to issue bonds and incur other indebtedness, make loans, provide guarantees and other credit enhancements for a wide variety of projects, including environmental and clean energy projects. The clean energy projects under consideration include generation, distribution, transmission and storage of electrical energy, energy conservations measures, environmental mitigation measures, and water treatment and distribution. Currently, Staff is considering these projects in the contexts of IBank's infrastructure state revolving fund program (ISRF). IBank's programs could be expanded to encompass clean energy projects under a new clean energy finance program parallel to ISRF. The proposed program would have the capacity to consider much larger projects (utility scale) and encourage private investment.

## Introduction

IBank has the authority today to establish, with the approval of its Board of Directors, the Clean Energy Finance Program (CEFP), which would encourage concerted public and private investments, utilize the State's access to capital markets more effectively, create financing pools to access national capital markets, and facilitate credit enhancements for selected public and private clean energy and energy efficiency projects. The CEFP would provide opportunities for public pension funds and other institutional investors to play a larger role in the State's economic development as envisioned by IBank's enabling legislation. Moreover, the CEFP would use public funds to lower the cost of technology and remove financial or structural barriers to projects necessary to meet the goals of the Global Warming Solutions Act.

For California, the goal is simple:

- A) Drive down the cost of clean energy and energy efficiency projects via the implementation of financing mechanisms that lower the cost of projects.
- B) Leverage existing public programs and funds to attract private sector investment.
- C) Encourage private investment by reducing the overall risk of clean energy projects.

IBank can act as both a central clearinghouse for energy related project funding and clean energy projects and capitalize on collaborating with the private sector. Moreover, IBank can establish eligibility requirements that would position the State to retain business within the State, create green tech jobs within the State and significantly contribute to the full development of the energy sector within the State.

### Design Concepts

Best practices indicate that a clean energy finance program at IBank would be designed to:

#### **Consider opportunities across all sectors**

- California leads the nation in generation capacity from geothermal, biomass, solar PV, and solar thermal electric projects, while placing second in wind and hydropower generation capacity.
- California's rich resource base and its early, sustained support for the renewable energy industry has been successful in attracting and incubating leading renewable energy companies that have created many high-quality jobs.

#### **Address market barriers to deploying clean technologies**

- Funds are strategically used to lever greater private sector investment in clean energy and energy efficiency, effectively multiplying the impact of public dollars.
- IBank could leverage the innovation and investment expertise in California to manage the risks of financing innovative energy technology projects at scale.
- A financing or risk sharing mechanism, such as loan guarantees could be sufficient to bring private sector capital to the table.

- IBank could leverage California's innovation advantage into facilities and jobs in California.

### **Improve access to low-carbon technologies, particularly in disadvantaged communities.**

- IBank could offer solar and energy efficiency developers' credit enhancements that allow them to extend their programs to homeowners who have lower credit scores.

### **Green Bonds**

There are 3 types of non-recourse green bonds that IBank would consider issuing to fund the CEFPP to provide proceeds to finance clean energy projects:

- **Green Revenue Bonds:** a non-recourse-to-the-issuer debt obligation. These are the types of bonds that IBank currently issues to fund ISRF for infrastructure and economic expansion projects. The cash flow from the clean energy project loans made from the proceeds of the revenue bonds would be pledged to the bondholders to repay the bonds. There would be no recourse to IBank, as issuer.
- **Green Project Bonds:** a project bond for a single or multiple clean energy projects. The investors have direct exposure to the risks associated with the project. The investors would not have recourse to IBank, as issuer. Project bonds may be the best financing vehicle available to fund an extremely large clean energy project or series of projects in a region.
- **Green Securitized Bonds:** green project bonds collateralized by a pool of specific clean energy projects. Like the Green Revenue Bonds, the source of repayment is the cash flow from the clean energy project loans. Examples include asset-backed securitizations of rooftop solar PV and energy efficiency projects.<sup>1</sup>

### **Economic Rules of Thumb**

- 1) Under the CEFPP, IBank would seek to fund projects that benefit both the economy and the environment. The ratio of environmental to economic benefits varies across projects. Thus, when making a financing decision, IBank would have to decide between funding projects that offer relatively greater environmental benefits or relatively greater economic benefits. A best practice would be to fund projects that provide an economic benefit to energy consumers. Thus, a clean project that increases the net cost of power to consumers, or an efficiency measure that will not pay for itself in energy savings within its lifetime, is not likely to receive support from IBank.

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<sup>1</sup> Green Bond Principles, January 13, 2014

- 2) Adequate financing to transform the entire energy sector in California will require investment in the range of billions of dollars. Funding through IBank would require strategically maximizing the private sector's role in offering investment opportunities for clean energy and energy efficiency projects

### Project Opportunities

By using financial tools such as long-term, low interest rate loans, revolving loan funds, insurance products (such as loan guarantees or loan-loss reserves), and low-cost public investments, IBank could secure private financing for low-carbon technologies. Key opportunities include: distributed and large-scale clean energy generation, clean transportation vehicles and infrastructure, as well as water and energy efficiency measures at the utility scale, commercial scale and residential scale. The following is a non-comprehensive list of technologies and eligible projects for funding. Other existing and future technologies that demonstrate a potential for increased utilization of energy efficiency or renewable energy and/or a potential for greenhouse reduction should also be included.

### Renewable Energy Sector

- Solar photovoltaic (no minimum/maximum capacity)
  - Includes concentrated solar and thin film
  - Geographic: throughout California
- Distribution technologies
  - Geographic: throughout California
- Solar thermal (no minimum/maximum capacity)
  - Harnessing solar energy for thermal (heat) requirements in industry and commercial sectors
- Geothermal energy
  - Heat extraction from the earth used to produce electricity/heat
  - Over 80% of U.S. power capacity is in California
  - Geographic: Imperial Valley, Central Valley
- Thermal storage systems
  - Allows excess thermal energy to be collected for later use, hours, days or many months later, at individual building, multiuser building, district, town or even regional scale depending on the specific technology
- Onshore and offshore wind (no minimum/maximum capacity)

### Storage Technology

- Fuel cells (continuous duty) – natural gas fuel or hydrogen

- Thermal storage
- Storage technologies

#### Water Sector

- Hydroelectric / Hydropower
  - Waste heat recovery systems
  - Upgrades and/or repowering
  - New low-impact run-of-facility (30 MW or less with no new storage impoundment)
- Ocean thermal energy
- Wave or tidal energy

#### Alternative Technologies

- Biomass (from eligible biomass feedstock)
- Biomass direct combustion
- Combined heat and power (CHP)
- Co-fire with existing fossil fuel (only biomass feedstock portion is eligible)
- Biothermal energy
- Biomass conversion technologies
- Biogas
  - Landfill gas (methane)
  - Sewage gas (methane)
  - Manure digestion
  - Anaerobic digestion
  - Biomass thermo-chemical gasification (syngas from municipal solid waste)
  - Biogas (from eligible biomass feedstock) combined heat & power
  - Biogas (from eligible biomass feedstock) co-fired with existing fossil fuel combustion
  - Liquid biofuels

#### Hydrogen production

- Hydrogen conversion technologies

#### Alternative fuels

- Ethanol, biodiesel, methanol, bio-oil, and eligible biomass feedstock

#### Transportation

- Infrastructure refueling stations (electric, gas, hydrogen)
- Electric Vehicles
- Hybrid electric vehicles
- Alternative fuel vehicles

### Energy efficiency resources

Commercial & Industrial - projects include comprehensive efficiency improvements to new and existing facilities that save energy, such as those listed below.

#### Industrial process efficiency improvements, including:

- Advanced metering systems to support conversion of master-metered buildings to sub-metering
- Data center, information technology, communications
- Energy management and/or control systems, including continuous commissioning
- Demand response programs
- Water/wastewater, pipeline, mining/extraction, and similar end-use processes, facilities, buildings, and infrastructure
- Lighting and control systems
- Heating, ventilation and air conditioning systems (HVAC)
- Building envelope
- Occupant plug load management systems
- Load Reduction
- Thermal and electric energy storage

#### Residential - projects include comprehensive energy efficiency improvement projects in existing residential buildings, such as:

- Primary heating and cooling systems: furnaces, boilers, duct sealing, pipe insulation, central air conditioners, heat pumps (including air-source and geothermal) water heaters, and programmable thermostats
- Building envelope: insulation, air sealing, windows and doors
- Other required health and safety measures and related accessories

Multifamily housing - comprehensive improvement projects to multifamily housing facilities, such as systems that affect the entire building, the common area, and/or the resident spaces and the following potential measures:

- Lighting and control systems, including exterior, security, and safety lighting systems

- Heating, ventilation and air conditioning systems (HVAC), including boilers (hydronic and steam), furnaces, chillers, room air conditioners, supporting pumps, fans, motors and other auxiliary systems
- Building envelope, including air sealing, weather-stripping, and insulation
- Energy management and/or control systems, including continuous commissioning
- Resident plug load management systems, including home energy monitors and smart strips
- Domestic hot water systems, including generation and distribution
- Fuel conversion projects that include upgrades to system energy efficiency
- Water clean energy improvements

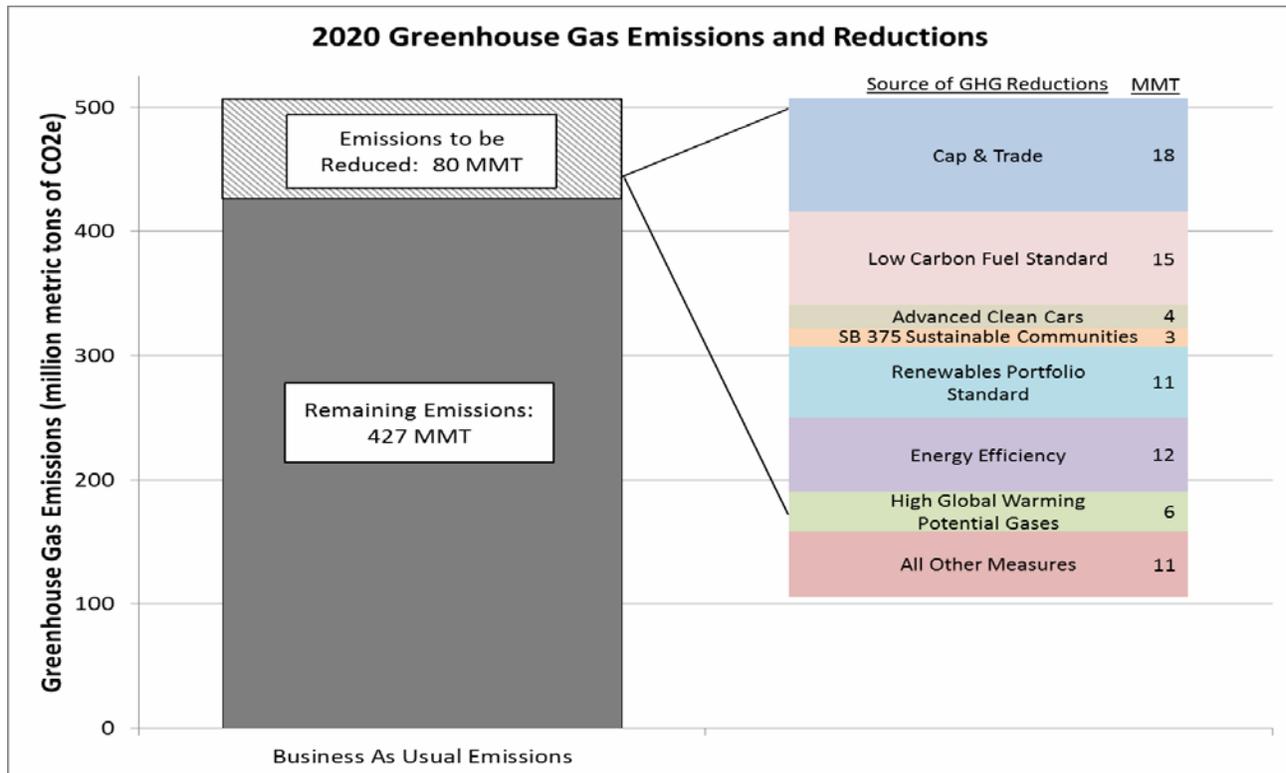
## Background

Despite the call for action through the passing of AB32, the lack of private sector investment in new technology development poses a substantial impediment to the statewide reduction of greenhouse gas emissions (Vogel & Korber, 2012). Many industry experts deem dedicated support for clean technology development and expansion as essential and critical.

The clean energy industry faces a lack of sufficient private capital to support innovation and implementation of technologies at a scale that would reduce greenhouse gas emissions to 1990 levels by 2020. Specifically, “a significant barrier exists to the deployment of potentially transformational technologies, resulting from a breakdown in the private-sector funding process that is typically relied upon to support innovation. This funding gap occurs when expensive new energy infrastructure exhausts the capacities of high-risk venture capital (VC), but cannot yet satisfy the stringent reliability requirements of traditional debt providers” (Jamison, 2010).

As traditional public financing at the state and federal levels dissipates due to budgetary and political constraints, new mechanisms for funding are necessary to support bridging this gap and continued clean energy growth.

*Mandated Emissions Reduction by 2020 (Cal ARB, 2013)*



The current lack of extensive public and private financing of sufficient scope and scale in California, coupled with the legislative mandate to comply with AB32, creates a scenario in which innovative financing solutions are essential.

**Three pertinent issues face clean energy investment**

1. Federal funding for clean energy projects has fallen precipitously since the American Reinvestment and Recovery Act (ARRA), and too little government funding is available to bring innovative clean energy projects to market (Berlin, Hundt, Muro, & Saha, 2012).
2. Private investors view emerging clean energy technologies as too risky and therefore provide a sum of capital too low to support the development and sustainability of the industry, particularly in the pre-commercialization stages of development (Kauffman, 2010).
3. Existing financial mechanisms to leverage public-private interests are too few in number and too small in scope and scale to address meaningful investment at the state level (Adler, 2014).

With the fate of the Department of Energy’s Federal Loan Guarantee program uncertain at best, neither state nor federal energy funding programs currently bridge the ‘valley of death’ between technology demonstration and commercialization at scale. Since 2009, the

federal government has provided \$150 billion for green energy projects nationwide, largely as part of the American Reinvestment and Recovery Act (ARRA) (Berlin et al., 2012). Due to budgetary and political constraints, many ARRA clean energy funding programs, as well as federal tax breaks, subsidies and grants for green energy products, are diminishing or expiring.

Existing California innovation support programs principally include the following:

- *Electric Program Investment Charge (EPIC)*: Currently funded at \$162 million per year through 2020, this program is managed by the California Public Utilities Commission (CPUC) and jointly administered by the California Energy Commission (CEC) and Pacific Gas and Electric Company, San Diego Gas & Electric Company, and Southern California Edison, the three large investor-owned utilities (IOUs). Its goal is to “fund public interest investments in applied research and development, technology demonstration and deployment, market support, and market facilitation of clean energy technologies and approaches for the benefit of electricity ratepayers” of the state’s IOUs<sup>2</sup>.
- *Alternative and Renewable Fuel and Vehicle Technology Program (ARFVT, also AB118)*: Administered by the CEC, this program seeks to “develop and deploy innovative technologies that transform California’s fuel and vehicle types to help attain the state’s climate change policies.” The program is funded with approximately \$100 million annually, while a companion program administered by the California Air Resources Board allocates approximately \$50 million annually.
- *Self-Generation Incentive Program (SGIP)*: Currently funded at \$83 million annually, this CPUC and IOU program provides buy-down incentives for distributed generation, for example energy storage and fuel cells.

Regardless of whether these programs receive increased funding from the AB32 GHG auction process, it is opportune, if not imperative, that their effectiveness be optimized in view of the State’s aggressive policy goals. Working with the CEFP at IBank, these innovation support programs could experience a revitalization that enhances California’s efforts to meet the clean energy needs in the State.

### California’s Market Opportunities for Clean Energy Projects

California leads the nation in generation capacity from geothermal, biomass, solar PV, and solar thermal electric projects, while placing second in wind and hydropower generation capacity. California’s rich resource base and its early, sustained support for the renewable energy industry has been successful in attracting and incubating leading renewable energy companies which, in turn, have created many high-quality jobs.

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<sup>2</sup> CPUC Proposed Decision in A.12-11-001 of Oct. 15, 2013 at p.5

## Employment Snapshot

- The nonprofit Solar Foundation, a research and education group, estimates that there are nearly 26,00 direct solar industry jobs in the State, with the sector adding jobs faster than the overall economy.
- The Solar Energy Industries Association, a national trade association, lists 270 solar related manufacturers in California.
- California ranks third nationally in terms of overall wind installation. Over 3 percent of California’s electricity is generated by wind, according to the American Wind Energy Association.
- The wind industry supported over 5,000 California jobs in 2012.
- Only 4 companies manufacture stationary fuel cells in the State; combined, this represents over 1000 California jobs.

Installed Renewable Energy Capacity			
<b>Wind Power</b>	5,544 MW	<b>Marine Power</b>	0 MW
<b>Solar Photovoltaic</b>	2,559.3 MW	<b>Biomass Power</b>	1,416.8 MW
<b>Solar Thermal Electric</b>	393.2 MW	<b>Ethanol</b>	223 mGy
<b>Geothermal Power</b>	2,732.2 MW	<b>Biodiesel</b>	78 mGy
<b>Hydropower</b>	10,053.6 MW	<b>Totals</b>	22,699 MW; 301 mGy

## Conclusion

With appropriate funding through green bonds, public/private investments and appropriations, IBank could establish and administer, under the current authority of the Bergeson-Peace Act, the CEFPP. California’s new clean energy finance program would benefit from IBank’s, infrastructure financing and investment experiences, relationships with private investors, and collaborations with State energy agencies, environmental advocates and other stakeholders to move closer to achieving the primary goal of the California Global Warming Solutions Act which is to reduce the State’s greenhouse gas emissions to 1990 levels by 2020, and to 80% below 1990 levels by 2050.