SAARC Workshop, Dambulla, Sri Lanka, Aug 29-30, 2019

Specific Energy Markets And Financing Landscapes For Private Sector

"Program for Rural Electricity for Poverty Alleviation"

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Prepared by;
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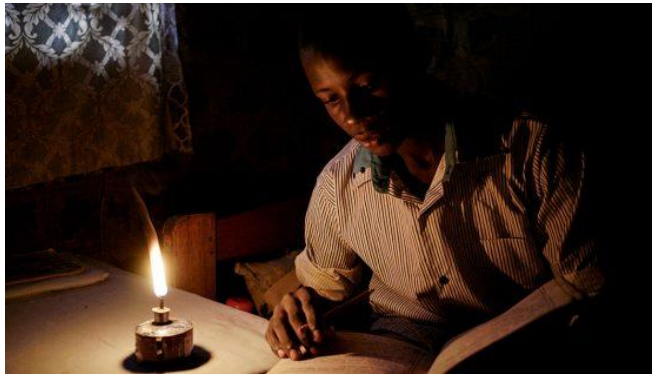
With a focus on:

“Reducing Energy Poverty”

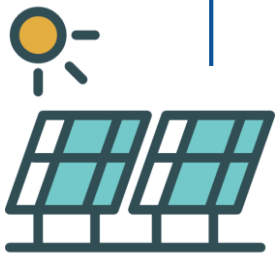
more prevalent in rural areas

Since, 87% of the one billion people; with no energy access, live in remote, rural areas far from electricity grids, in what is often called ‘the last mile’.

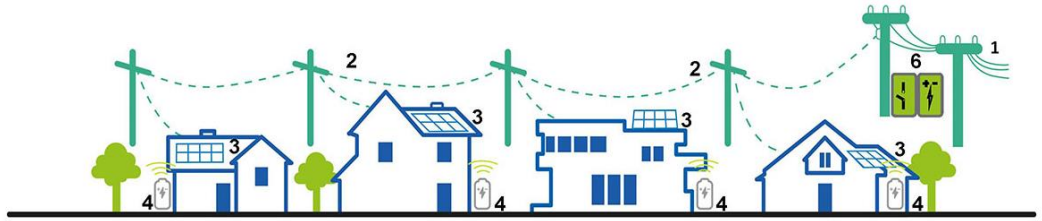
World Energy Outlook 2018



Renewable Energy Market Financing



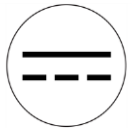
Grid Off Take



Distributed Generation/Community Power

Household

Alternating Current (AC)



Direct Current (DC)

Prevalent Worldwide

Mostly Africa

Household Solutions
(Grid Quality Access)

Household
Products

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Types of Financing in Renewable Energy

Equity Finance

Project Development Capital

Debt Finance

Off-balance sheet project financing

Corporate finance (small projects; less than $15 million)

On-balance sheet corporate finance

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The Range Of Financial Instruments

Increasing Leverage

Increasing Risk

	Financial Instrument Addresses		
	Financing Barriers	Both Barriers & Risks	Project Risks
Project/Programme Financing			
Grants	-	-	Capital Grants
Equity	Equity (Venture Capital)	-	-
Debt	Senior Debt (Credit Line)	Subordinated Debt	Senior Debt (Project Loan)
Asset-Backed	Asset-Backed Securities	-	-
Guarantees & Insurance	Liquidity Guarantee	Pari-Passu/Subordinated Guarantees	Political Risk Insurance/Partial Risk Guarantee
		Wind/Solar Insurance	
		Contingent Resource Insurance	
Targeted Instruments			
Result-Based Financing	-	Contingent Project Development Grants	OBA/OBD/AMC/PES
Carbon Financing	-	-	Carbon Delivery Guarantees
			Advance Sales of CERs
Small-Scale Project Financing	Microfinancing for Customers	Portfolio Guarantees/Loss Reserves	-
	Aggregation		

World Bank, 2012

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Financing and associated risks taken….

Type:	Venture Capital	Private Equity	Infrastructure Funds	Pension Funds	Bank Mezzanine Debt	Bank Senior Debt
Risk Taken:	Start ups, new technology, prototypes	Pre IPO Companies, demonstrator technology	Proven technology, private companies	Proven technology	Demonstrator/ proven technology, new companies	Proven technology, established companies
Approximate level of return, or margin	>50% IRR	35% IRR	15% IRR	15% IRR	LIBOR + 700bps	LIBOR + 300 bps

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Grid Offtake Projects

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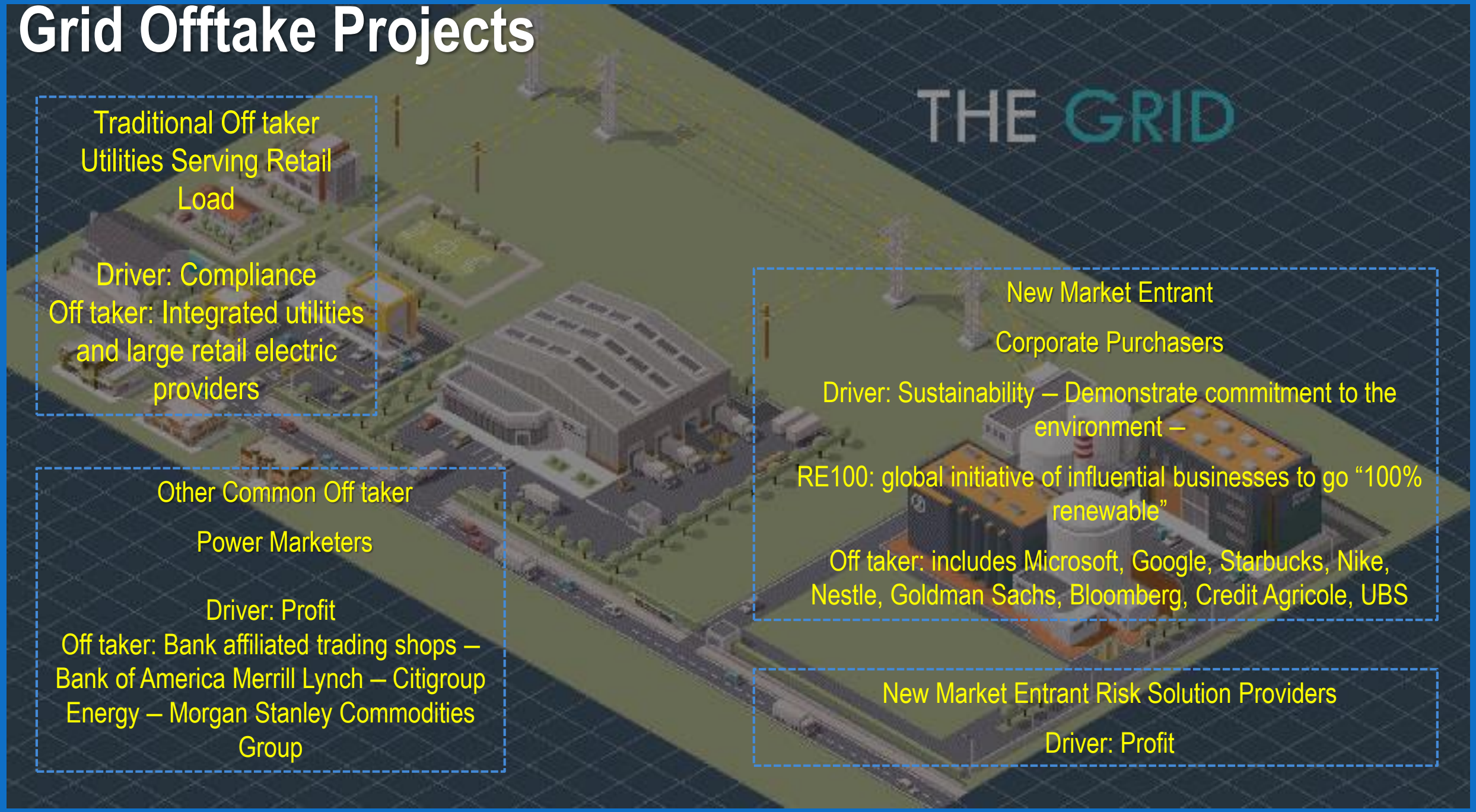
Grid Offtake Projects



Traditional Off taker
Utilities Serving Retail Load

Driver: Compliance
Off taker: Integrated utilities and large retail electric providers

Other Common Off taker

Power Marketers

Driver: Profit
Off taker: Bank affiliated trading shops – Bank of America Merrill Lynch – Citigroup Energy – Morgan Stanley Commodities Group

New Market Entrant

Corporate Purchasers

Driver: Sustainability – Demonstrate commitment to the environment –

RE100: global initiative of influential businesses to go “100% renewable”

Off taker: includes Microsoft, Google, Starbucks, Nike, Nestle, Goldman Sachs, Bloomberg, Credit Agricole, UBS

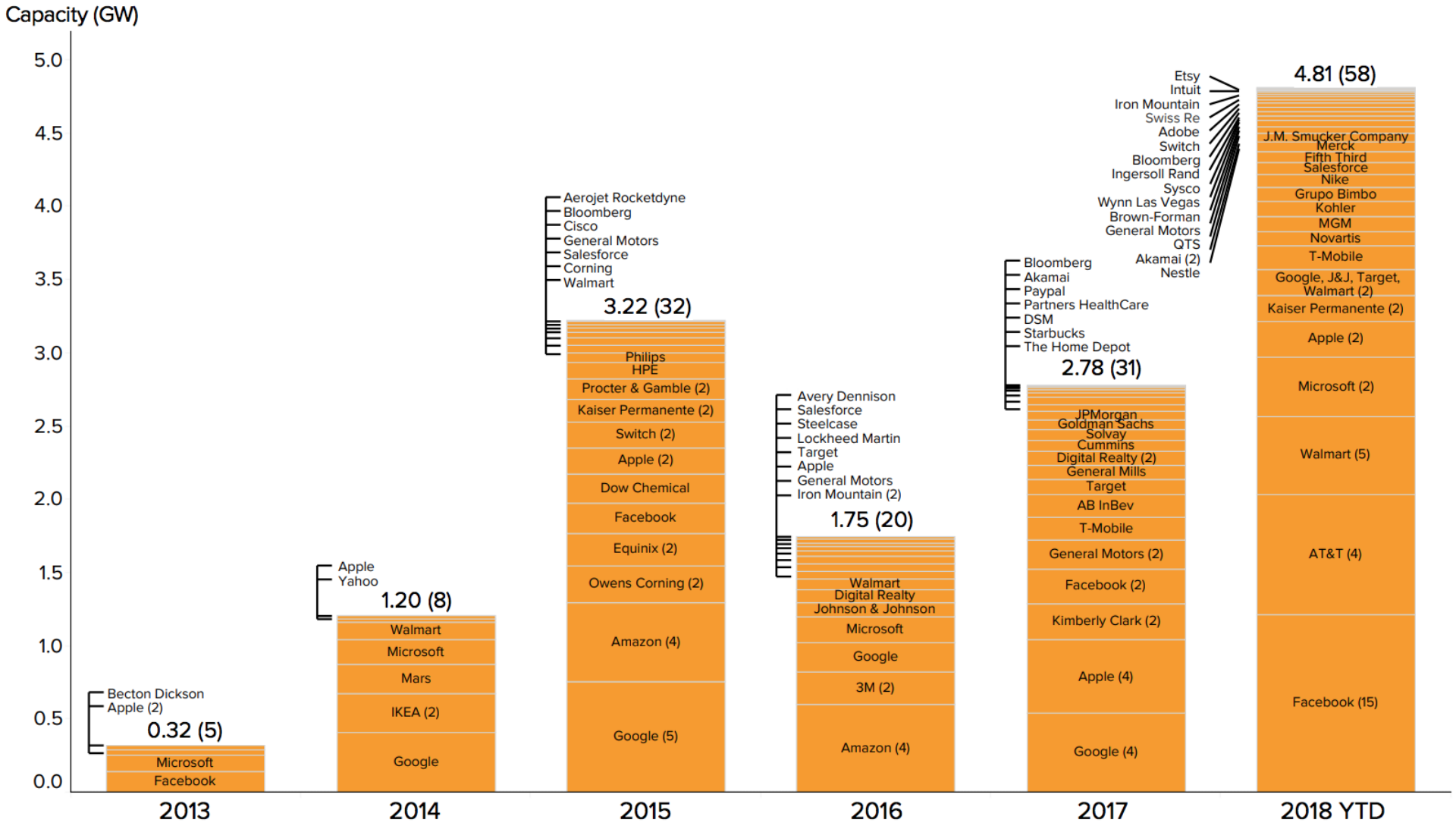
New Market Entrant Risk Solution Providers

Driver: Profit

Off-Take Structures

- Traditional Power Purchase Agreement
- Hedge (Physical and Financial)
- Synthetic Power Purchase Agreement
- Other Structures and Trends

Overview of Corporate Power Purchase Agreements in the US (2013 – 2018)
Driver: sustainability – demonstrate commitment to the environment

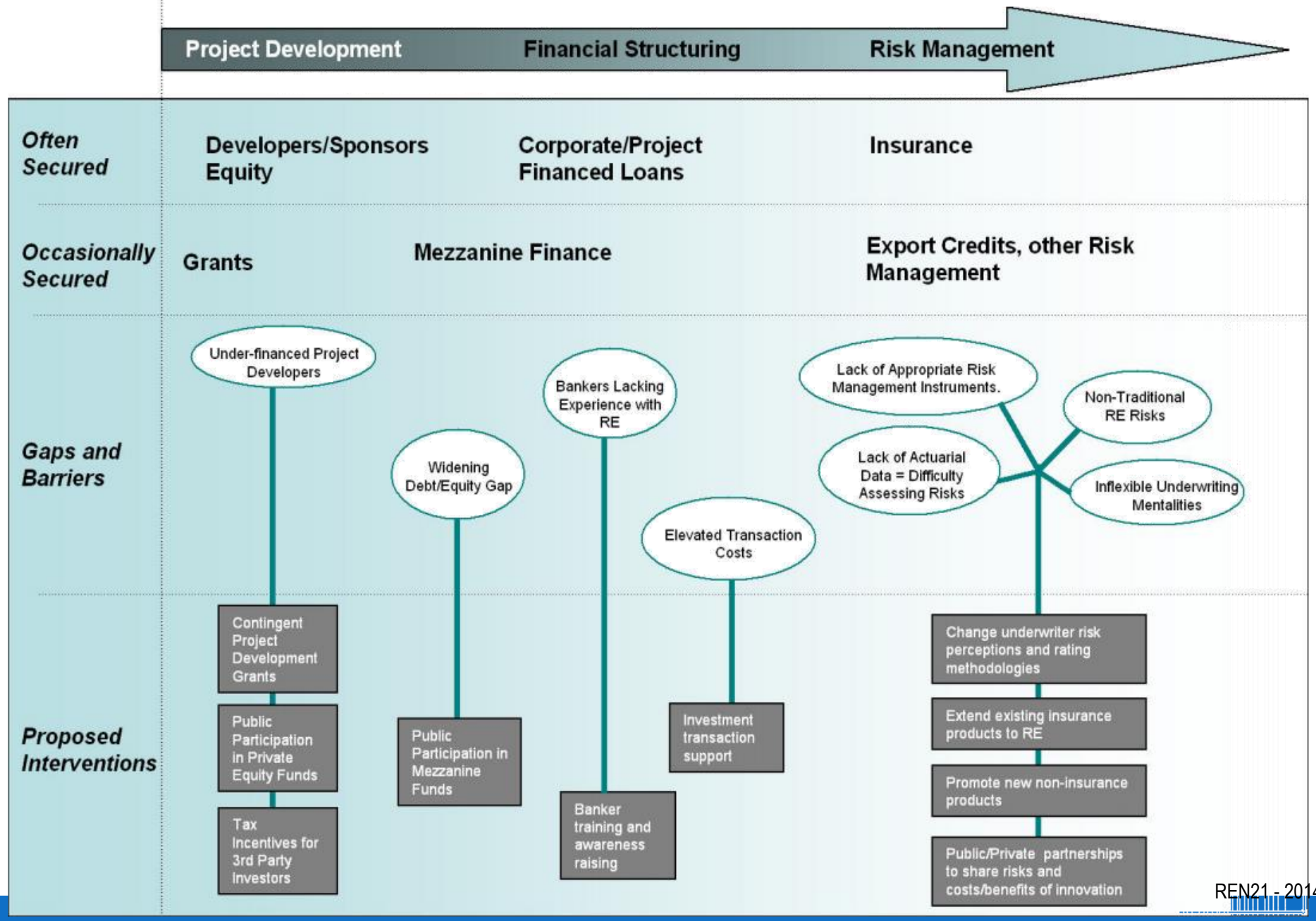


REBA

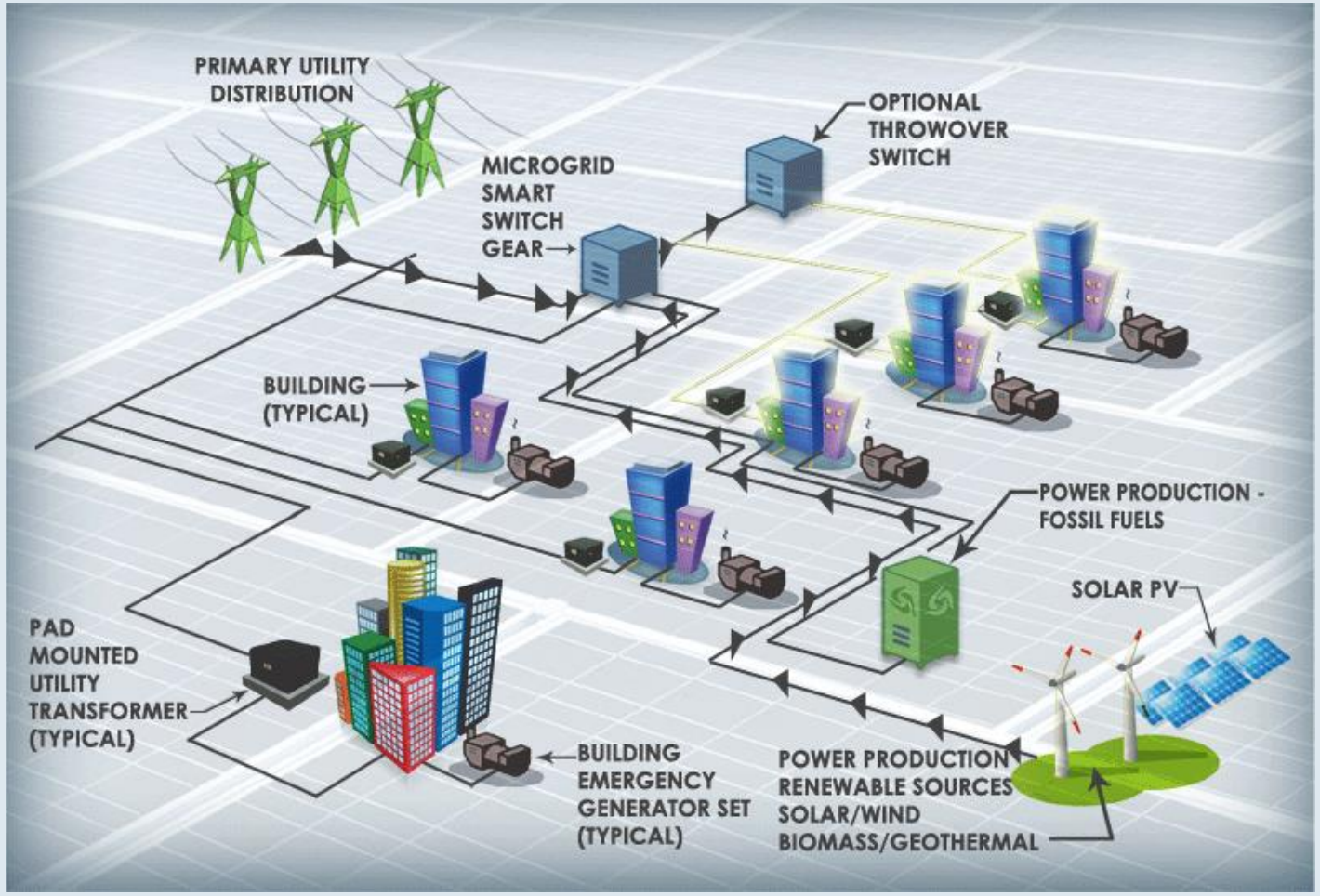
As of October 16, 2018. Publicly announced contracted capacity of corporate Power Purchase Agreements, Green Power Purchases, Green Tariffs, and Outright Project Ownership in the US, 2013 – 2018 YTD. Excludes on-site generation (e.g., rooftop solar PV) and deals with operating plants. (#) indicates number of deals each year by individual companies.

#REBA18

The On-Grid Finance Continuum



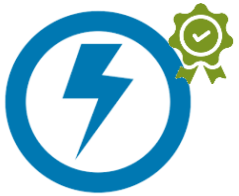
Distributed Generation



Mini-grid Business Model Components..

Demand Management

Promoting Income-Generating End Uses



Quality of Electricity Service

Tariff Design

Revenue Collection

End User Finance

Securing financing for mini-grid development is challenging, partly because of the inherent weaknesses of mini-grid financial models and partly because of risk perceptions

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Current Distributed Generation Financing…

Grants and Subsidies

- ✓ International development agencies
- ✓ Local government agencies
- ✓ Trusts and foundations, Private individuals and others.

Equity Investors

- ✓ Early stage seed capital
- ✓ Expansion capital
- ✓ Impact investors
- ✓ Development financing institutions (DFIs)

Loans

- ✓ DFIs – Short term/concessional loan providers
- ✓ Commercial banks - only in case of proven business models mitigated project risks.
- ✓ International lenders – usually concerned about foreign exchange risks

Guarantees

- ✓ Loan guarantees
- ✓ Risk guarantees

Foreign Exchange Risk

Case Study: Sub Saharan Africa

Capital Cost: hard Currency
Revenues: local currency

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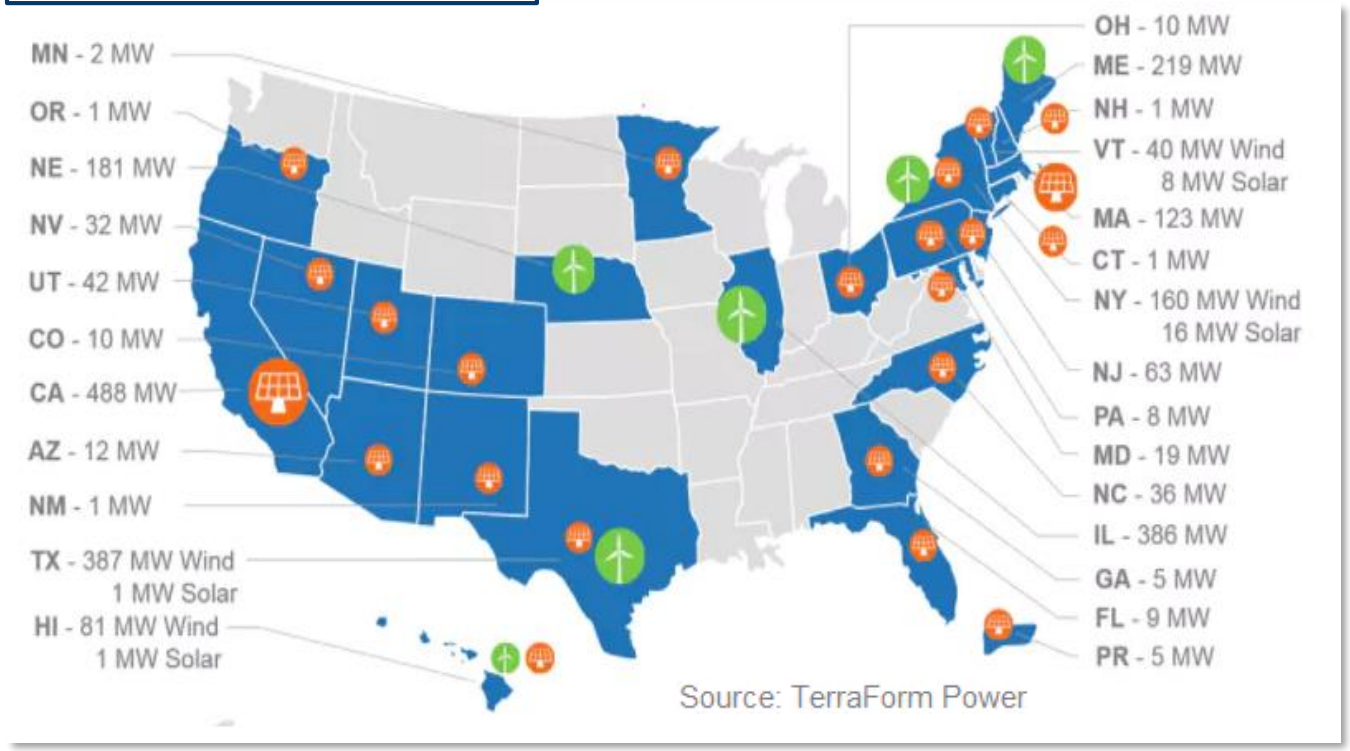
Institutional equity: the yieldco model

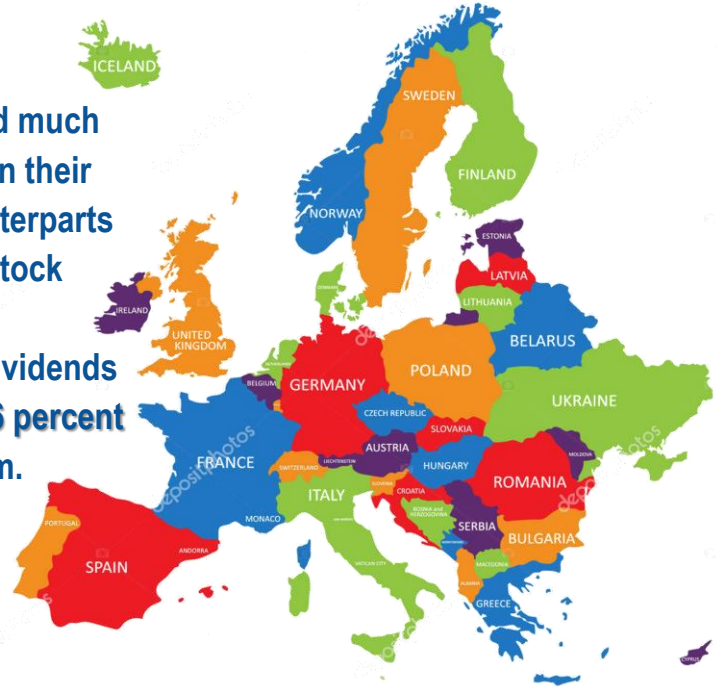
A yieldco is a dividend-paying company created for the long-term ownership of assets.

The American Experience:



The European Experience:

- ✓ performed much better than their U.S. counterparts
- ✓ minimal stock growth
- ✓ reliable dividends of about **6 percent** per annum.



Restructuring In The Yieldco Space:
Improvements required to the corporate governance structure, project valuation methods, and "end game" strategy of YieldCos

Institutional debt: $1 billion-plus in solar securitizations

ASSET-BACKED SECURITIZATION (ABS)/ INSTITUTIONAL BOND OFFERINGS:

In a securitization, the issuer creates a large enough pool of similar assets such that no single asset should affect debt repayment. Investors purchase bonds or notes that are repaid through the cash flows of the underlying assets.

CHALLENGES

:

Collection, organization & communication of data

Achieving sufficient scale

Standardizing the underwriting process

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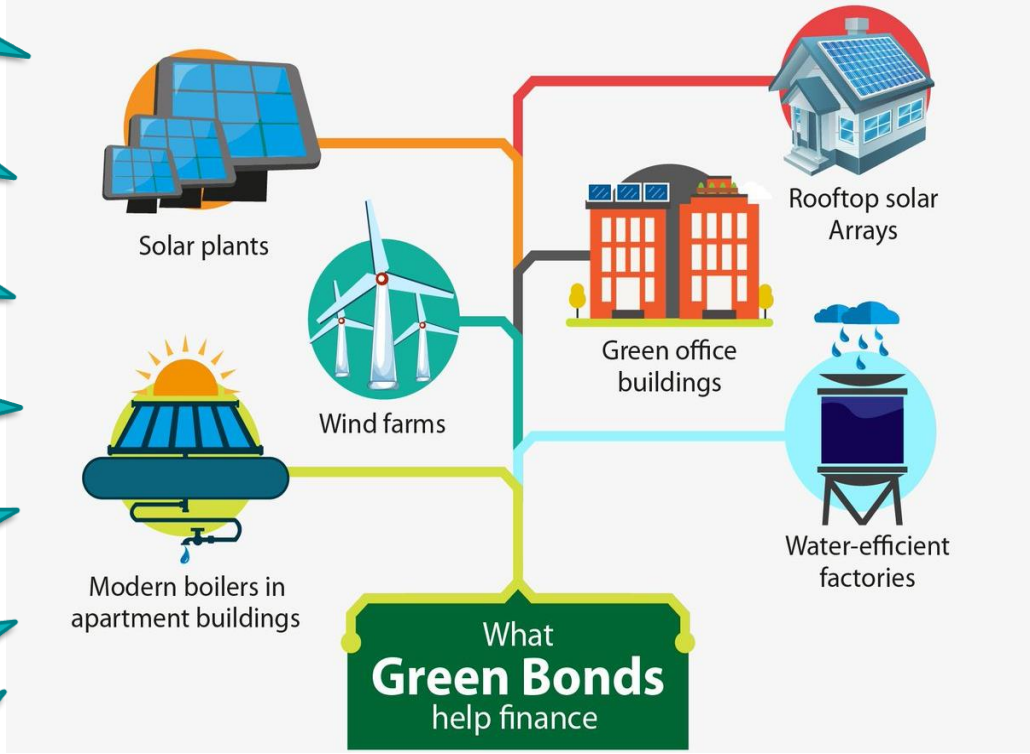
Green Bonds

Drivers for issuing Green Bonds…

- Attract environmentally-conscious investor
- Growing investor demand for green/sustainable financial instruments.
- Stakeholder demand for responsible business practices are growing
- Help project the company environmental-conscious organization thereby enhancing the brand
- Almost all green bonds issued in past have been oversubscribed
- competition from lending agencies that have issued green bonds
- Accessible and powerful instrument for financing a sustainable low carbon economy.
- Economical and convenient financial model by product developers



- ✓ **Debt instrument**
- ✓ **Offers fixed return**
- ✓ **European Investment Bank (EIB) First issuer of Green bond**

AC Energy
An Ayala Company
$410m USD

MidAmerican ENERGY

Alliant Energy

Dominion Energy
($362 million)

Navarre government (EUR 50 million (USD 56.7m)

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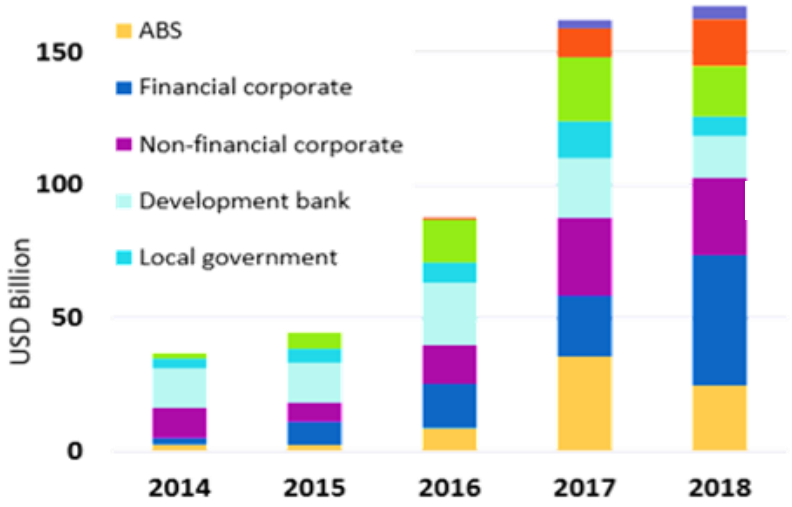
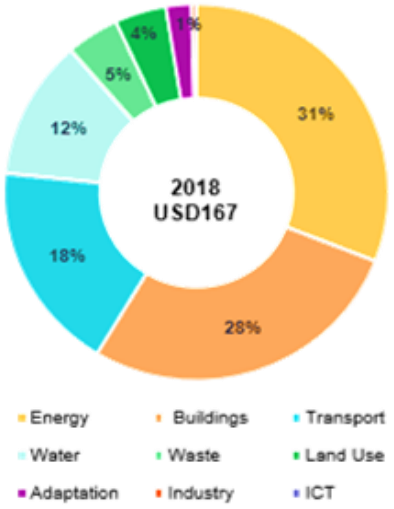
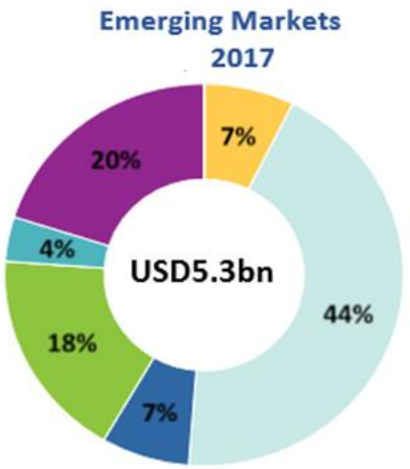
Green Bond – Investors Demand

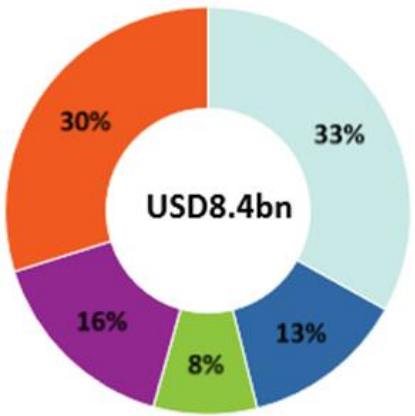




Use of green bond proceeds - 2018

Supply of Green Bonds





ABS
Development Bank
Financial Corporate
Government-Backed Entity
Loan
Local Government
Non-Financial Corporate
Sovereign

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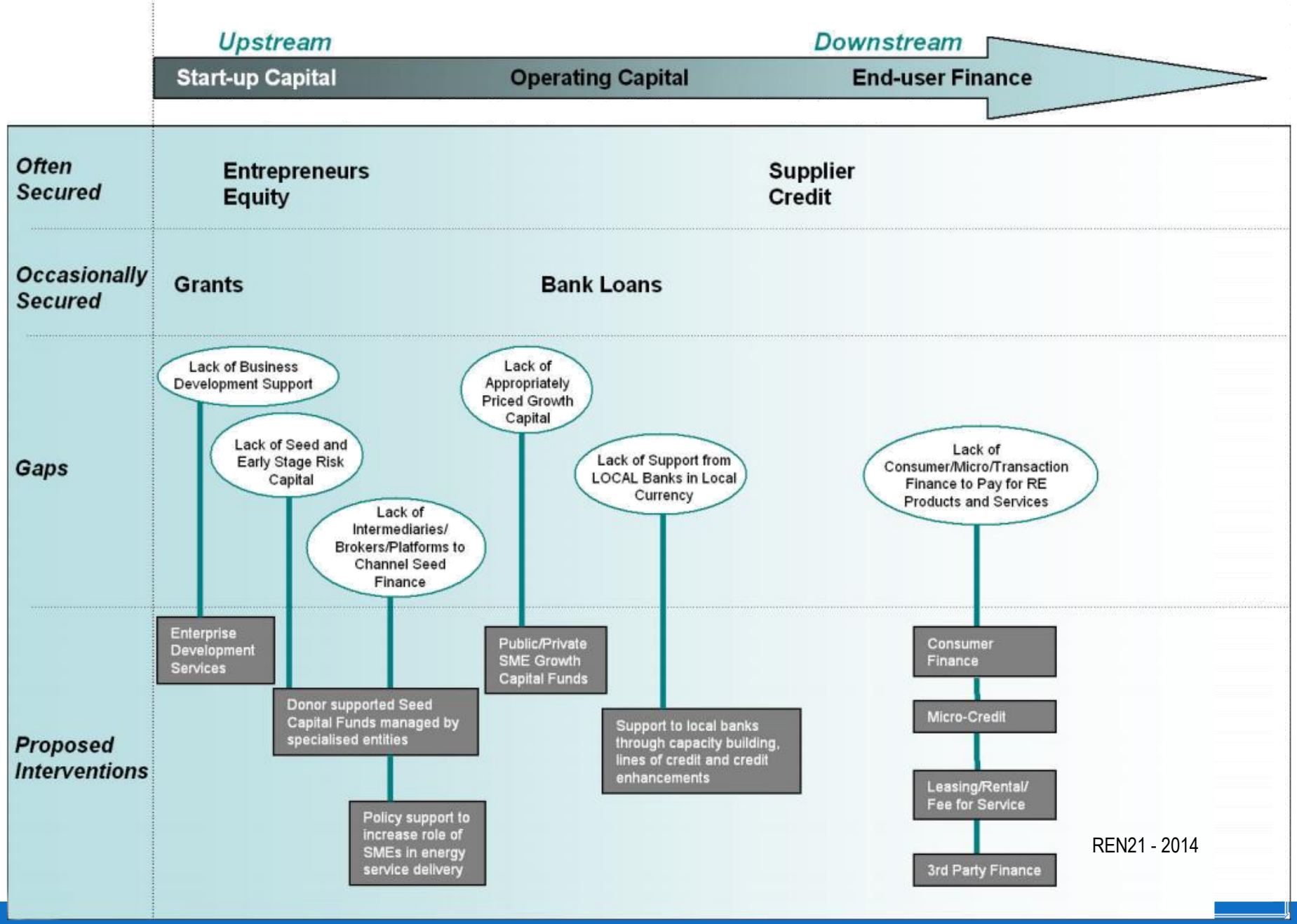
The Off-Grid Finance Continuum



REN21 - 2014

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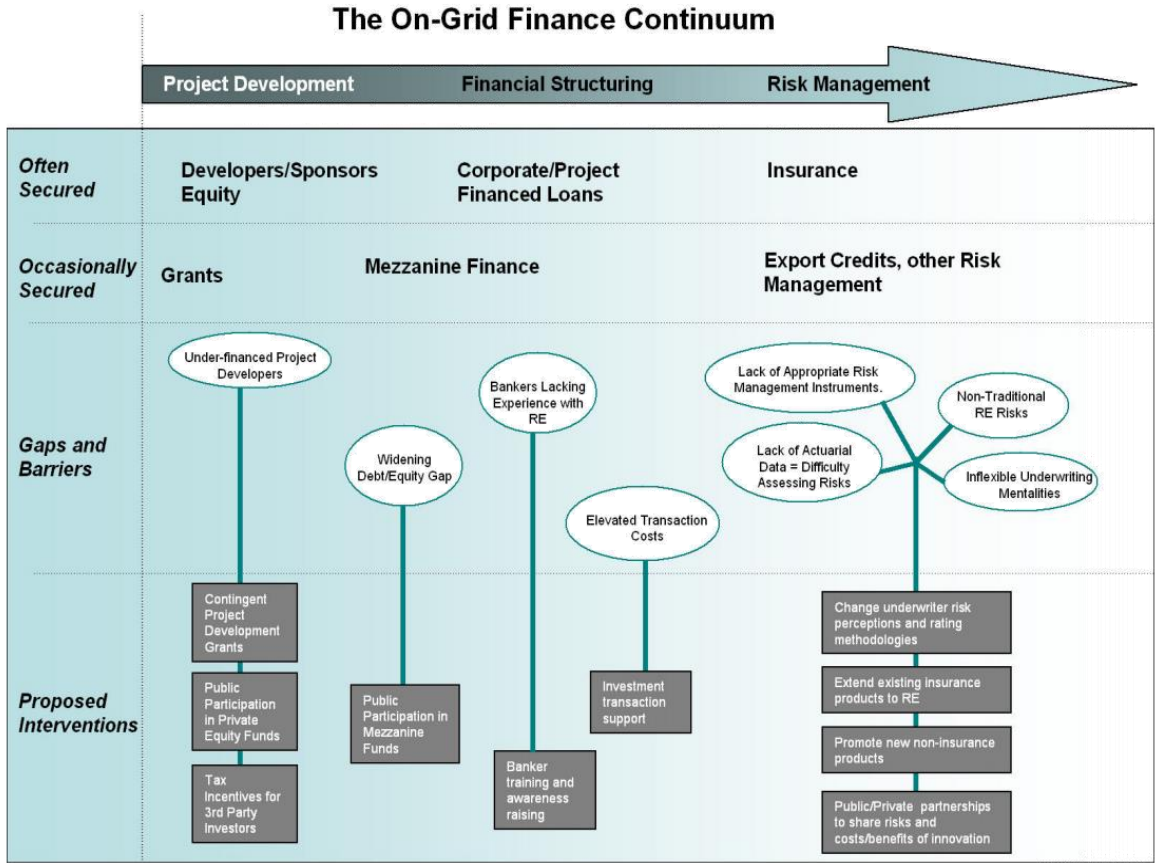
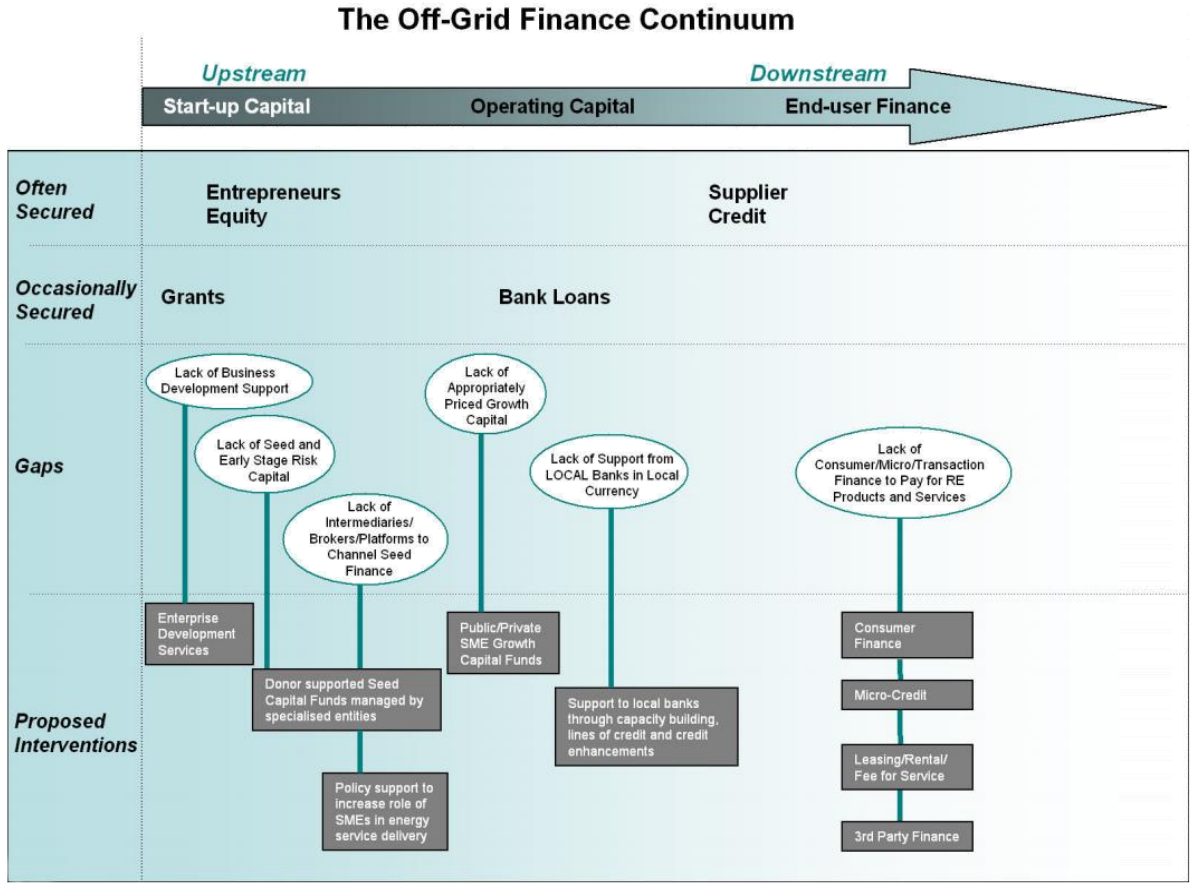
The On-Grid and Off-Grid Finance Continuum—A Comparison





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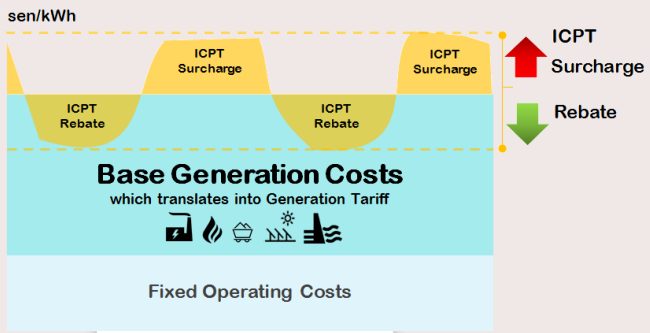
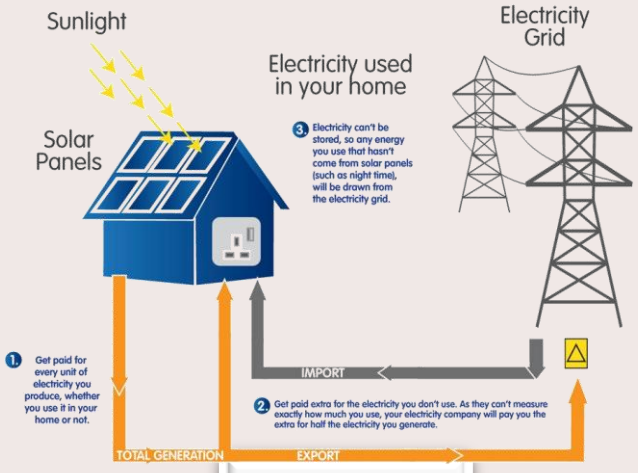
Overview of Renewable Energy Tariffs…

Tariffs for Grid Off-Take and Distribution Generation…

GRID OFF-TAKE

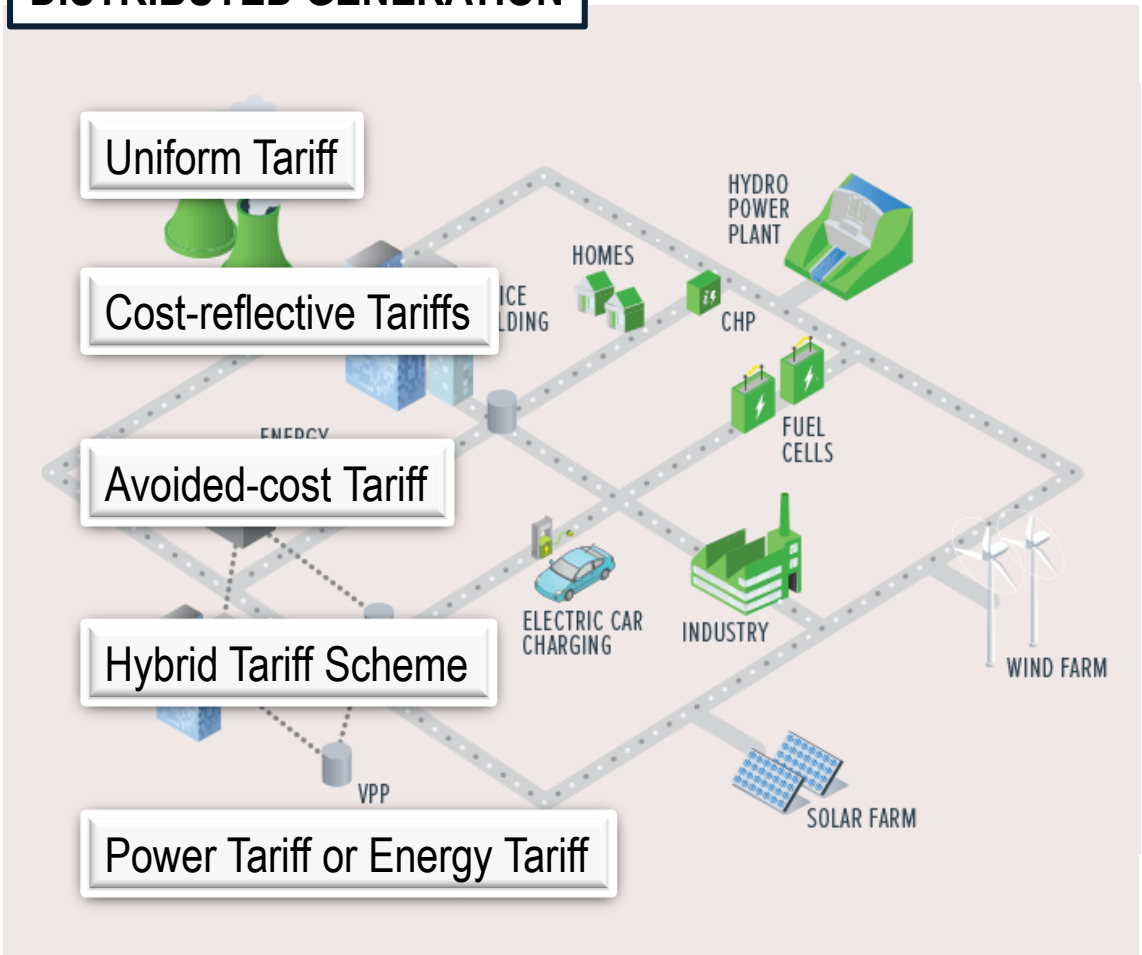


Generation Tariff



Feed-in tariffs

DISTRIBUTED GENERATION



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Tariffs and Billings Systems - Experience Matrix

- Which challenges have been identified?
- Which tariffs and billing systems have been successful?

Senegal/Mini-grids

System: flat rate with consumption limiter

Challenges: one tariff nationwide, not cost covering under all conditions

Indonesia / MHP /Micro Hydro Schemes

System: Communal-set tariffs

1. Flat rate (households)
2. Item based (e.g. # of bulbs)
3. Cluster metering

Challenges:

- Overloading
- Sanction management

Ethiopia / EnDev/ Micro Hydro Schemes

System: flat rate (no productive use) + mech. load limiter; only CLF, no social tariff

Challenges: 1. billing - recovery rate too low

2. monitoring of applied devices

3. Static system risk: pilot --> not cost covering

Pakistan

System: Item based (e.g. # of bulbs)

Republic South Africa / SHS

Challenges: Fee for service with pre-paid metering

1. complete financial failure
2. conceptual design resulted in no ownership and caused vandalism, theft,...

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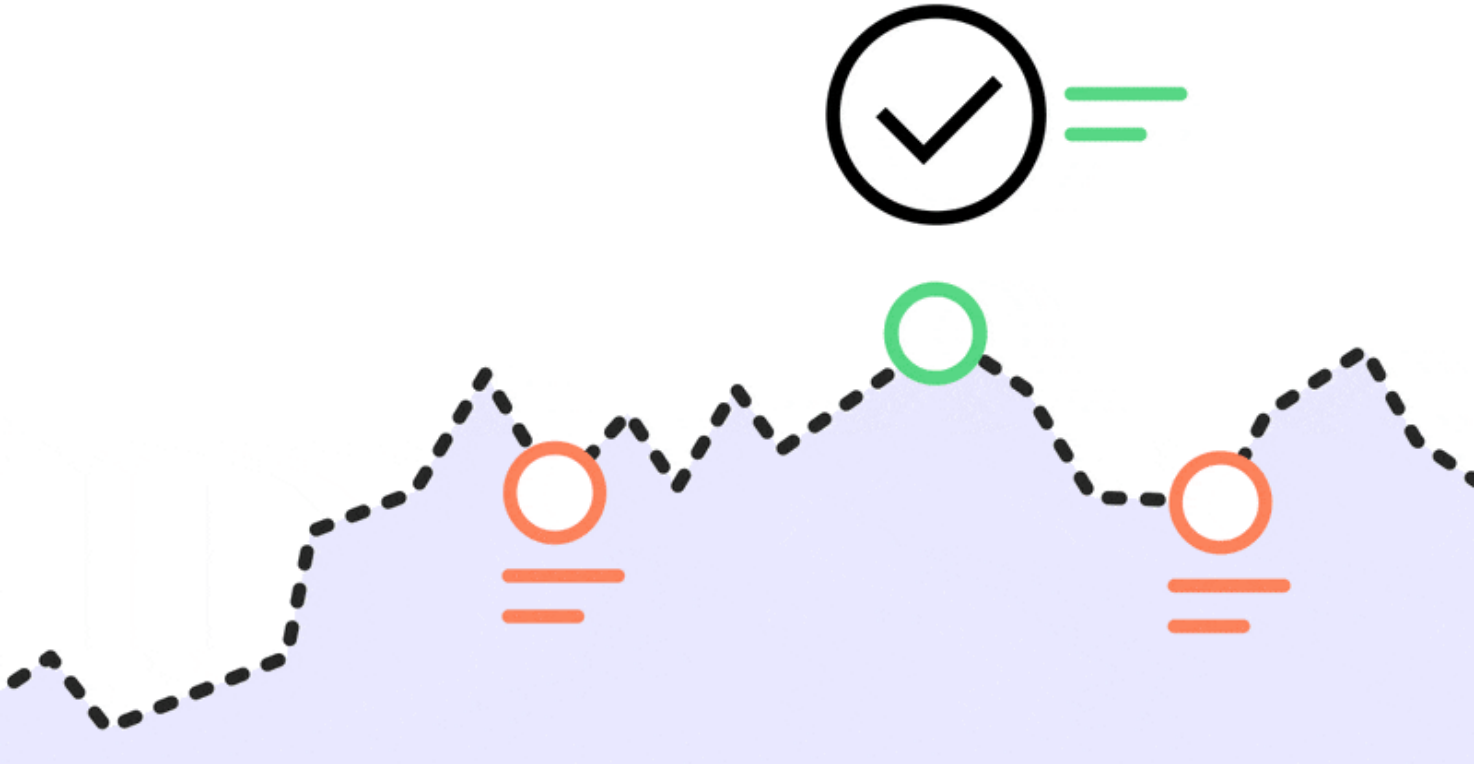
International Renewable Energy Financing Regimes



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Germany

Initiatives/Incentives	Description
Regulatory / Policy Level Initiatives	
Feed-in-tariff scheme	Government of Germany provides technology and capacity specific feed-in-tariffs for following renewable technologies for a period of 15-20 years: • Hydropower – ranges from 'Up to 500 kW' to 'Over 50 MW'; • Landfill gas – ranges from 'Up to 500 kW' to 'Up to 50 MW'; • Sewage gas – ranges from 'Up to 500 kW' to 'Up to 50 MW'; • Mine gas – ranges from 'Up to 1 MW' to 'Over 5 MW'; • Biomass – ranges from 'Up to 150 kW' to 'Up to 20 MW'; • Geothermal; Onshore & offshore wind; • and Solar energy.
Fiscal Incentives	
Capital Subsidies/Grants/Rebates	• Capital subsidies up to 40% of investments are provided to individuals and small and medium-sized businesses for installations of solar collectors under Market Simulation Program. • Non-repayable grants for research and development in the field of photovoltaic, wind power, geothermal, solar thermal power plants and low temperature solar thermal. • Soft loans and investment incentives by the market incentive programme for biomass combined heat and power (CHP), small hydro-power, photovoltaic (PV) in schools. • Several soft loans schemes indirectly support renewable energy technologies including the "DtA Umweltschutz-Bürgschaftsprogramm," the "KfW-Mittelstandsprogramm", the "KfW-Umweltprogramm", for enterprises, and the "KfW-Infrastrukturprogramm", for municipalities. Credit terms range from 10 to 20 years. The interest rates offered are 1% to 2% below market interest levels.
Investment Tax Credits	• Deductions and accelerated depreciation are provided for leased and owned buildings meeting green building requirements.

Germany

Programme	Targeted Group	Targeted Technology	Type of Funds
KfW Renewable Energies Programme – Standard	• Private individuals and not-for-profit organizations which feed the generated electricity/heat into the grid • Self-employed professionals farmers German & non-German enterprises majority-owned by private individuals • Enterprises in which local authorities, churches or charities hold an interest Investment funds	• Electricity from solar (PV), biomass, wind energy, hydro, geothermal energy • Electricity and heat from renewable energies, generated in combined heat and power stations	Up to 100% of investment costs eligible for financing, not more than EUR 25 million
KfW Renewable Energies Programme – Storage	• Private individuals • Not-for-profit organizations • Self-employed professionals, farmers • Enterprises	New installations of stationary battery storage systems combined with photovoltaic systems	Up to 100% of investment costs for the battery storage system and the photovoltaic system
KfW Renewable Energies Programme - Premium	• Private individuals and not-for-profit organizations which use the generated heat exclusively for their own needs • Self-employed professionals • Small and medium-sized enterprises (SMEs) • Enterprises that are majority-owned by municipalities and that do not meet the SME threshold values for turnover and number of employees • Large enterprises only if their solar thermal, deep geothermal, heat storage and heating network measures are particularly deserving of support • Municipalities, municipally owned enterprises and municipal special-purpose associations • Energy service providers	For large plants in which heat is generated from renewable energies	Up to 100% of the financeable costs of investment, not more than EUR 10 million

Germany

Programme	Targeted Group	Targeted Technology	Type of Funds
Variant-Deep geothermal energy		• For facilities to develop and use deep hydrothermal or petro-thermal energy with more than 400 m drilling depth.	Up to 80% of the financeable net investment costs, maximum of EUR 10 million
KfW Offshore Wind Energy Programme	• Project Developers	Establishment of wind farms off the German coast of the North and Baltic Sea	• Up to 70% of the total debt capital requirements, not more than EUR 700 million per project • Project financing in the form of direct loan/financing package
KfW - Environment and Energy Saving Program	• Private Companies	Development of renewable power projects	Credit term for between 10-20 years with a two to five year redemption holiday. Interest rate ~ 2% below market level and there is a 50% lending limit.

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Spain

Initiatives/Incentives	Description
Regulatory / Policy Level Initiatives	
Feed-in-tariff scheme	Government of Spain provided technology and capacity specific feed-in-tariffs for following renewable technologies under "Royal Decree 436/2004": • Self-producers using CHP associated with business activity other than electricity generation • Solar photovoltaic and Solar-thermal for electricity generation • Onshore and Offshore wind power • Geothermal power and ocean power • Hydroelectric with power ≤ 10 MW • Hydroelectric with power > 10 MW and ≤ 50 MW • Biomass/energy crops or wastes from agriculture and forestry • Biomass/biogas/sewage sludge/controlled landfill gases • Biomass/industrial installations in the agriculture and forestry sector • Municipal solid waste Currently, the FIT scheme has been replaced by a new scheme wherein renewable energy generators will receive a guaranteed return of 7.5% for the next six years.
Utility Purchase Obligation	• As per the Royal Decree RD 436/2004, electricity distributors are obligated to buy electricity produced and the National Commission of Energy looks at settlement of costs incurred by reimbursing distributors under rules laid down in RD 436/2004. • Solar obligations in Barcelona and Madrid in residential buildings, sport centers, hospitals and industrial buildings using hot water. • Under Technical Buildings Code (CTE), buildings have to meet 30-70% of the Domestic Hot Water (DHW) demand with solar thermal energy.
Fiscal Incentives	
Capital Subsidies/Grants/Rebates	Under the 'General Direction of the Institute for Energy Saving and Diversification', subsidies provided for supporting solar thermal energy as a part of "Promotion Plan for Renewable Energy" framework. This includes all investments in installations of solar thermal such as hot clean water applications, climatization of swimming pools, hot water process in industries, applications for heating and climatization. Maximum funding does not exceed 40% of the eligible costs and is provided to Beneficiaries to natural or legal persons, private or public, groups of non-profit local corporations in the renewable energy and solar thermal energy sector.
Investment Tax Credits	10% reductions in investment tax for investments in solar thermal and solar PV technologies under Law on Fiscal, Administrative and Social Measures

United Kingdom

Initiatives/Incentives	Description
Regulatory / Policy Level Initiatives	
Feed-in-tariff scheme	UK Government programme to promote uptake of power from small-scale renewable (> 5 MW) & low-carbon electricity generation technologies. A project under FIT scheme receives: • Generation tariff – Fixed rate paid by energy supplier for each kWh of electricity generated. • Export tariff - 3p/kWh from energy supplier for each unit exported back to the electricity grid. • Energy bill savings – Less energy bills • The FIT provided under this scheme is indexed linked and hence, increases / decreases with changes in inflation. Currently, the UK Government has proposed to lower down the FIT support for solar and onshore wind energy in order to increase the off-shore technology in the coming years
Renewable Heat Incentive	The Renewable Heat Incentive (RHI) scheme provides financial support to non-domestic (commercial, industrial, public, not-for-profit and community) renewable heat generators and bio-methane producers. Under RHI, continuous income stream for 20 years is provided to an organization installing an eligible renewable heating system to make renewable heat commercially attractive. This scheme is applicable for the following technologies: • Biomass boilers (Including CHP biomass boilers) • Solar Thermal • Ground Source Heat Pumps • Water Source Heat Pumps • On-Site Biogas combustion • Deep Geothermal • Energy from Municipal Solid Waste • Injection of bio-methane into the grid

United Kingdom

Initiatives/Incentives	Description
Regulatory / Policy Level Initiatives	
Utility Purchase Obligation	The Renewables Obligation (RO) was introduced in UK power sector for the first time in 2002 in order to provide incentives for the deployment of large-scale renewable electricity in the UK. Licensed UK electricity suppliers are obligated to source a specified proportion of electricity procured eligible renewable sources. There are three different types of RO in UK. These are: • The RO for England and Wales • The RO for Scotland – The Scottish Government) • The RO for Northern Ireland – The Department of Enterprise, Trade and Investment) Suppliers can meet their obligation by: • Presenting ROCs; or • Making a buy-out payment to Ofgem to cover any shortfall in ROCs requirement (set at £42.02 per ROC for 2013/14); or • Combination of both. The RO is expected to close to new generators on 31 March 2017. And electricity generation accredited under the RO will continue to receive its full lifetime of support (20 years) until the scheme closes in 2037.
Renewable Transport Fuels Obligation	The Renewable Transport Fuel Obligation (RTFO) order obligates fossil fuel suppliers to procure a share of fuel for road transport supplied in the UK from renewable sources or pay substitute amount of money. Applicable for fuel suppliers supplying at least 450,000 liters fuel per year
Tradable Certificates	'Renewable Obligation Certificates' (ROCs) are tradable certificates issued by Office of Gas & Electricity markets (OFGEM). Long-term value of a ROC is made up of the buyout price, i.e. the payment avoided by the supplier for presenting ROCs to OFGEM, plus 10% i.e. roughly £46 per ROC in 2013/14 prices.

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United Kingdom

Initiatives/Incentives	Description
Fiscal Incentives	
Capital Subsidies/Grants/Rebates	Renewable heat premium payment (RHPP) – One time payments to householders through vouchers for installing renewable heating technologies – solar thermal panels, heat pumps and biomass boilers. Interest free loans up to £10,000 are provided from the Scottish Government for owner occupiers in Scotland for installation of domestic renewables system.
Tax Exemptions & Rebates	Income tax holidays Duty-free import of machinery and equipment and related materials Real property tax of 1.5% on the original cost, less accumulated normal depreciation or net book value of equipment, machinery and other improvements actually used in the RE facilities Preferential corporate income tax rate of 10% on net income after lapse of income tax holidays period Accelerated depreciation on plant, machinery and equipment used Zero-rated value-added tax (VAT) on certain transactions e.g. sale of power generated from renewable sources, purchase of local goods/services needed for the development of the solar power plant Tax exemption on sale of carbon credits

Department/Institution	Support for Renewable Energy
Department for Business, Innovation and Skills	Funding renewable energy technologies as part of the Low Carbon Industrial Strategy to equip British businesses and workers to maximize the economic opportunities and minimize the costs of the transition to a low carbon economy
Carbon Trust	Supports renewable energy technologies as part of its portfolio of activities aimed at reducing future carbon emissions
Energy Technologies Institute	Funds renewable energy technologies
Technology Strategy Board	Funds renewable energy technologies to enable UK businesses to work with one another or with the research community to advance technology for UK business and economic benefit
Regional Development Agencies	Funds renewable energy technologies to support regional strategies and targets for renewable energy

United Sates of America

Initiatives/Incentives	Description
Regulatory / Policy Level Initiatives	
Feed-in-tariff scheme	Unlike a single feed-in-tariff for entire country, utility-based and state-level FIT policies have been implemented in the USA. • Utility based FIT scheme – Initiated by state utility to meet utility -specific goals such as RPS targets, encouraging distributed generation. For example, Madison Gas & Electric in the State of Wisconsin purchases renewable energy at a predefined FIT in green power purchase program • State level FIT scheme – Initiated by State Government and is followed by the utilities in respective states such as California, Washington among others.
Renewable Purchase Standards	Renewable portfolio standards (RPS) / renewable electricity standards (RES) are designed to promote renewable electricity generation by obligating energy utilities to supply a certain minimum share of their electricity from designated renewable resources. Although, no nationwide RPS program exists in the US, around 30 States have already implemented enforceable RPS or similar mandated renewable capacity policies. Suppliers can meet their obligation by: • Presenting RECs; or • Supplying renewable energy or • Combination of both.
Renewable Energy Credits or Green Tags	In US, most States with RPS programs have developed renewable energy certificate trading programs for promoting renewable energy development. For each unit of power that an eligible producer generates, a certificate or credit is issued which can be sold either in conjunction with the underlying power or separately to energy supply companies.
Net Metering Policies	Many States have issued 'Net Metering Policy' for enabling customers to use electricity generated in excess of their consumption for offsetting use of electricity from the grid in order to encourage distributed renewable generation. The net metering policies of States may differ from each other in terms of technology and fuel specified, capacity limits, aggregate capacity, compensation to customers etc.

United Sates of America

Initiatives/Incentives	Description
Regulatory / Policy Level Initiatives	
Renewable Fuel Standards (RFS)	RFS is a US federal program that requires certain percentage of transportation fuel in a given geographic area to be replaced by renewable fuels. Under this scheme, the regulator may specify sector wise goals for specific kind of fuels. For example, US Environmental Protection Agency (EPA) has set 6 million gallon target for cellulosic biofuels use in 2013. Various States have announced their specific RFS based upon local conditions and target technologies. For example, the States of Minnesota set a RFS of 2% biodiesel in total diesel sales till 2013.
Fiscal Incentives	
Renewable Energy Rebates	Renewable energy rebates / buy-down programs which provide a refund / discount for cost of new renewable energy installations. Such rebate programs are administered through local utilities / state agencies and rebates are provided based up on installed capacity of system. Some of the rebate programs under implementation are: • New Jersey Renewable Energy Incentive Program • California – Low income solar water heating rebate program • Colorado - Renewable energy rebate program • Oregon - Smart water heat rebate program • New York – Anaerobic digester gas-to-electricity rebate • Texas – Solar water heating rebate program
Grants	• Tribal Energy Program Grant – Provides financial and technical assistance for promoting tribal energy sufficiency, economic growth and employment on tribal lands through development of renewable energy and energy efficiency technologies • Repowering Assistance Bio refinery Program – Up to 50% grant offered by U.S. Department of Agriculture (USDA) to replace fossil fuels used to produce heat or power to operate the bio refineries with renewable biomass • Rural Energy for America Program (REAP) – Offers grant up to 25% of project cost for promoting promotes renewable energy and energy efficiency for agricultural producers and rural small businesses

United Sates of America

Loan Program	Description
Fiscal Incentives	
Clean Renewable Energy Bonds	Under Clean renewable energy bonds (CREBs) program, certain public entities such as electric cooperatives, government entities can issue bonds to finance renewable energy projects. The bondholder receives federal tax credits in lieu of a portion of the traditional bond interest, resulting in a lower effective interest rate for the borrower. • Eligible technologies – Solar thermal electric, photovoltaic, landfill gas, wind, biomass, hydroelectric, geothermal electric, municipal solid waste, hydrokinetic power, anaerobic digestion, tidal energy, wave energy, ocean thermal • Applicable sectors – Schools, Local Government, State Government, Tribal Government, Municipal Utility, Rural Electric Cooperative.
Qualified Energy Conservation Bonds	Issued by state, local and tribal governments to finance certain types of energy projects under the Energy Improvement and Extension Act of 2008, enacted in October 2008. QECBs are qualified tax credit bonds similar to Clean Renewable Energy Bonds or CREBs. The bondholder receives federal tax credits in lieu of the traditional bond interest. Credits exceeding a bondholder's tax liability may be carried forward to the succeeding tax year. • Eligible technologies – Solar Thermal Electric, Photovoltaic, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, Hydrokinetic Power, Anaerobic Digestion, Tidal Energy, Wave Energy, Ocean Thermal • Applicable sectors – State, local and tribal governments
Loan Guarantee Program	Under this program, U.S. Department of Energy DOE is authorized to offer > $10 billion in loan guarantees for energy efficiency and renewable energy projects (usually > $25 million) • Eligible technologies – Solar Thermal Electric, Solar Thermal Process Heat, Photovoltaic, Wind, Hydroelectric, Geothermal Electric, Fuel Cells, Day lighting, Tidal Energy, Wave Energy, Ocean Thermal, Biodiesel, Fuel Cells using Renewable Fuels • Applicable sectors – Commercial, Industrial, Nonprofit, Schools, Local Government, State Government, Agricultural, Institutional, Any non-federal entity, Manufacturing Facilities

Brazil

Initiatives/Incentives	Description
Regulatory/Policy Level Initiatives	
Feed-in-tariff scheme	Under the PROINFA program, a Government designated agency buys energy from wind, biomass and small hydro developers at pre-set preferential prices for a period of 20 years.
Mandatory Bio-diesel requirement	Mandatory Bio-diesel requirement have been designed in order to promote the consumption of biodiesel - a mix of vegetable oil and sugar-cane ethanol with standard diesel. Mandatory Biodiesel requirement law was enacted in 2005 with B2 biodiesel requirement (diesel with 2% biofuel) and currently B5 biodiesel requirement (diesel with 5% biofuel) is being implemented three years ahead of its scheduled implementation date of 2012 as per the 2005 law.
Renewable Energy Certificates	Renewable generators under the PROINFA program issue renewable energy certificates proportional to the amount of clean energy produced by the plant of each year.
Electric Power Auctions	New power projects participate in reverse auctions for long-term (20 years) power purchase agreements with energy distributors organized by Brazil's electricity regulatory agency. The power thus acquired is fed into the power pool thereby raising the average pool price and passed on to final consumer – capped to 5% increase during 20 year period.
Fiscal Incentives	
Tax rebates	• Federal tax – 75% reduction on income tax for projects in Northeast Brazil • State Tax – Reduction of 56%, 64% or 81% on VAT due from monthly sales, for a period of up to 12 years, depending on the nature of the project, its location etc. • Municipal tax - Reduction or exemption of municipal taxes.
Financing/Loans	• Brazilian Development Bank (BNDES) – As a part of promoting renewable energy, BNDES finances up to 80% of total investment with 60% national content requirement. BNDES passes funds to regional banks thereby building capacity of local financing institutions. It receives funding from international donors such as KfW, Giz, etc. who provide credit line to BNDES for small hydro, biogas and grid-connected PV pilot projects. • Brazil Northeast Bank – Soft loans for larger projects at cheaper rates in Northeastern states. • State Government Financing Agencies (DESENBAHIA) – Loans at lower rates for investments of up to US$ 25 million and for working capital.

Brazil

Parameters	Direct Funding	Indirect Funding
BNDES Financial Cost	• At least TJLP*	• At least TJLP*
BNDES Basic Spread	• 1.0% per annum	1.0% per annum
Credit Risk Rate	• Up to 2.87% per annum based upon credit risk	-
Financial Intermediation Rate	-	0.1% per annum for MSMEs; 0.5% per annum for other companies
Financial Institution spread	-	As negotiated between financial institution & the client

**TJLP long term interest rate – 5.00% per annum 31st May 2014*

Segment	Maximum Share (%)
Cogeneration using biomass boiler with pressure greater than or equal to sixty (60) bar	90

Segment	Maximum Amortization Period
Hydro plants (> 1000 MW)	20 Years
Hydro plants (30 MW – 1000 MW)	20 Years
Wind energy and biomass	16 Years
Small hydro and other alternative energy	20 Years

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Setting electricity markets to lower energy poverty

- Improve risk appetite in local financial markets
- Hedge risk by encouraging local RE products manufacturing finance
- Bespoke financial solutions for each demography and locality
- No off-take guarantees and capacity payments rather profit based subsidies for distributed generation
- Let markets define tariffs rather only regulate quality
- Renegotiate the overall energy mix—rethink 20th century models

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THANK YOU.

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Supporting Slides

Traditional Power Purchase Agreement

Agreement to purchase physical power from the project

Key Consideration:	Traditional PPA
Offtakers:	Utilities Serving Retail Load
Delivery Point:	Project Node
Volume:	Actual Quantity Generated
Environmental Attributes:	Included, Compliance
Term:	20 years

Risks involved:

- ✓ Creditworthiness of the parties over the life of the contract, fluctuating market prices, and concerns about project performance.

Potential risk management:

- ✓ Credit support requirements (which, for the utility, may be triggered only in the event of a credit downgrade) or
- ✓ Performance guarantees backed by liquidated damage provisions.

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Synthetic Power Purchase Agreement

Financially settled contract that replicates the economics of a traditional PPA

Key Consideration:	Synthetic PPA
Offtaker:	Large Non-Energy Companies
Delivery Point:	Project Node or Liquid Trading Hub
Volume:	Actual Quantity Generated
Environmental Attributes:	Included, Voluntary (Green-e)
Term:	12 - 13 years

Risk Involved:

- ✓ Long-term creditworthiness of the off taker is of critical concern
- ✓ Many corporate off takers have strong credit ratings, but corporate PPAs may also provide for a guaranty from a creditworthy parent company and for posting of a letter of credit if the off taker's or the parent guarantor's credit rating falls.

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Hedge (Physical and Financial)

Financial: Energy "sold" through a "fixed for floating" swap based on fixed volume of energy

Physical: Physical sale of a fixed volume of energy

Key Consideration:	Financial Hedge:	Physical Hedge:
Offtakers:	Power Marketer	Power Marketer
Delivery Point:	Liquid Trading Point	Liquid Trading Point
Volume:	Fixed Volume (P99)	Fixed Volume (P99)
Environmental Attributes:	Often Not Included	Often Not Included
Term:	12-13 years	12-13 years

Risk Involved:

- ✓ Basis Risk:
  Over time, the market price received by the project owner at the project node will be less than the market price paid by the project owner at the trading hub for resale to the hedge provider

- ✓ Volume Risk:
  Over time, the volume of energy generated by the project is less than the volume the project is required to deliver at the trading hub

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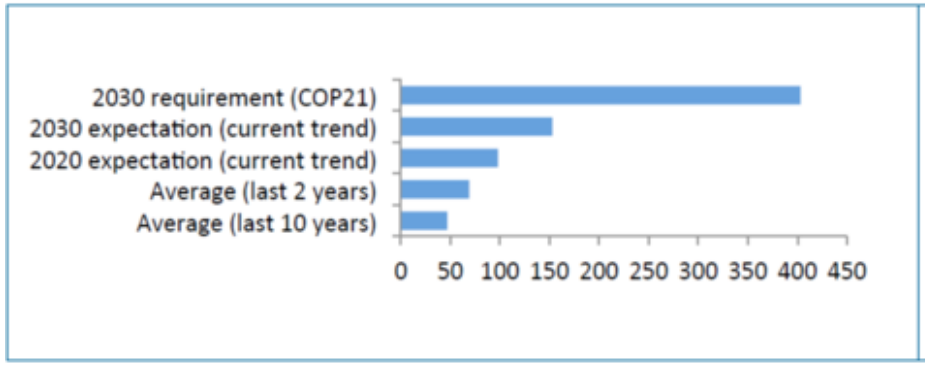
For DG financing; a fundamental shift in investments is required…

- ✓ With only 0.4 percent of institutional capital currently in the clean energy space, a fundamental shift in the current financing mechanisms is required for delivering institutional capital to distributed generation such as rooftop solar, community solar, energy efficiency and more.

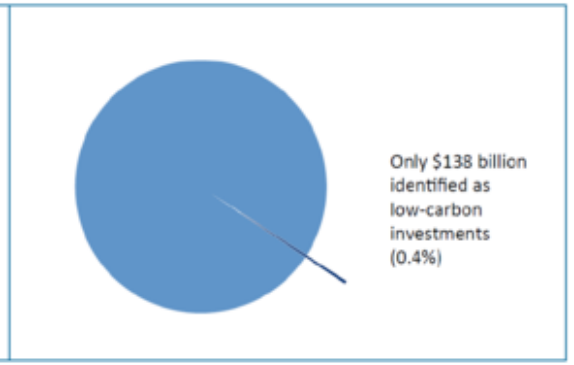
- ✓ Must look to aggregation financing models including:
  - Institutional equity
  - Institutional debt

Quarterly Investments ($bn)



$22+ trillion of investment required to meet global carbon reduction goals over next 20 years

Asset Owners AUM



But only 0.4% of institutional capital is in clean energy

Source: World Economic Forum, Renewable Infrastructure Investment Handbook: A Guide for Institutional Investors

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Case Studies

Financing schemes for renewable energy use in public and private buildings

The Less Carbon Climate Fund – Almada, Portugal

Beneficiaries:	**Municipality/Municipal Enterprises**
Type of Projects Financed:	Municipal investments in energy efficiency and RES featured in the city Sustainable Energy Action Plan (developed in the frame of the Covenant of Mayors initiative)
Type of Financial Support Provided:	Municipal investment
Date of Creation:	2009
Fund Size:	Initial fund size: USD 157,265 (evaluation of the CO_2 emissions for the first year 2008) Annual budget: in USD 2009: 157,265 2010: 168,500 2011: 179,733 2012: 213,433 2013: 561,692 2014: 561,692 Total size of the Fund (by 2014): USD 1,842,348
Financial Sources:	Municipal budget line which internalizes the compensation of the previous year's municipal CO_2 emissions
Fund Character:	Budget line
Operational Costs of the Scheme:	Unknown

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The Amsterdam Investment Fund – Amsterdam, Netherlands

Date of Creation:	2011
Fund Size:	Initial fund size: USD 84,280,054 (committed) USD 16,856,011 (20%) – for social projects USD 67,424,043 (80%) – for commercially viable products Annual budget: not applicable
Financial Sources:	City of Amsterdam – revenues from the sale of shares in "N.V. Nuon Energy" – a former local utility company that provides electricity, gas and heat in the Netherlands
Fund Character:	Revolving – any profits will be reinvested in the coming 15 years
Operational Costs of the Scheme:	General: • Staff (annually): 2 full-time workers • Communication, legal, other costs: USD 56,190 Incidental: • European tender for selection of fund manager USD 168,570 Financial return (professionally-managed fund): • Startup costs of USD 280,950 Management fee of 1.5% per year on the actually invested capital of the fund • Performance fee of 0.5% for project investments: -> a realized (at completion of a project) average annual net financial return of > 7% per year end -> a social outcome of at least 45 kg of CO_2 savings per project Dollar invested • The performance fee is 0.5% per year on the actual capital invested in the project investment.

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Beneficiaries:	**Residents, businesses, knowledge institutions and community organizations**
Type of Projects Financed:	Projects with a link to sustainability, improving the environment, aimed at saving energy, generating renewable energy or improving air quality in Amsterdam
Type of Financial Support Provided:	Social Initiatives – soft loans: The AIF finances residents, community organizations and businesses that are seeking funding for a sustainable social initiative benefitting all contributing parties without a primary commercial focus. The majority of the projects are selected in a tender procedure where projects are ranked on their effect (CO_2 reduction) per Dollar invested. Amount lent: up to USD 562,265 per project For unique projects a higher maximum is possible Interest rate: 1.99% House owners – soft loans: The city provides soft loans – known as the Amsterdam Energy Loan – to house owners to improve energy efficiency of their homes. Thanks to lower energy bills, property owners are able to pay back the loan. Interest rate: 2% Startups – seed funding: The city helps startups in the field of sustainable energy via Rockstart, the startup acceleration company that supports the growth of new, innovative growth companies in the first 1,000 days. It provides the most promising startups worldwide with access to capital, resources and networks – infrastructure critical for success. The Rockstart Smart Energy Program, which started in January 2014, supports 10 startups selected from 130 applications from 39 different countries via: • Seed funding: up to USD 22,490 • In kind investment of USD 61,853 (office, legal and fiscal support, mentoring, events, international road trip, deals) • Intensive coaching by 80 mentors: successful entrepreneurs, industry executives and specialists • Pitching in front of 200+ investors & VIPs at Demo Day • International road trip taking startups to smart energy hot spots, meeting potential investors, customers, startups & programs Companies – loans (mostly subordinated): Companies seeking funding for financially and sustainably viable energy projects can use the Amsterdam Climate and Energy Fund. The fund provides loans under normal market conditions. This means that no soft loans are made and that there is a strong focus on financial return. Amount lent: minimum USD 562,300 – max USD 5,622,904 Interest rate: 7-12% per year, plus risk margin (depends on project, includes fee for fund manager = 1.5%) Maturity: maximum 15 years

The Brussels Green Loan Scheme - Brussels-Capital Region, Belgium

Date of Creation:	2008
Fund Size:	Initial fund size: USD 98,954 (including USD 29,236 for the guarantee) Annual budget: since 2013, an annual budget of USD 364,333 disbursed as follows: • USD 224,897for interest subsidy • USD 26,987for guarantee • USD 112,448 for operational costs (staff, running costs and a small budget for promotion) The loan itself is financed by the bank.
Financial Sources:	• Regional Energy Fund (fed by the gas and electricity providers): 62% • Regional budget: 38%
Fund Character:	Revolving
Operational Costs of the Scheme:	• USD 112,448 (staff, running costs and a small budget for promotion) The Energy House is not included. The scheme was launched in 2008. The Energy House was launched in 2013 and the Brussels Green Loan is only a small part of its mission.

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Beneficiaries:	**Building/house owners - occupants, landlords, tenants (in agreement with their landlords)** **<u>Beneficiaries - eligibility criteria:</u>** • **1-person household: annual taxable net income of max. USD 33,733** • **Couple (married or cohabitants): annual taxable net income of max. USD67,467** **+ USD 5,622 if the applicant is < 35 years old** **+ USD 5,622 per dependent** **The income limits of beneficiaries were set up quite high. In fact, one of the objectives was also to stabilize young middle-class households with children and encourage them to stay in the Region rather than 'emigrate' to individual houses in the suburbs outside the Region.**
Type of Projects Financed:	Energy efficiency measures in private residential housing such as: • Building envelope: roof, wall and floor insulation, super insulating glazing, controlled mechanical ventilation • Equipment: gas condensing boiler, thermostatic controls • The loan covers the costs of the technologies/materials and the installation (Labour costs) with an upper limit of USD 22,488.
Type of Financial Support Provided:	Zero-interest loans: Max. amount lent: USD 22,488 – a consumption credit Interest rate: 0% Maturity: determined by Belgian law Guarantees: Regional warranty in case of no repayment Maximum duration: 84 months (7 years) Maximum monthly instalment: USD 267/month Guarantees: Covering the loss (loan) + administrative costs. Granted after validation of the (subsidy) committee. Grants: The green loan is linked to the regional energy grants for insulation and heating system. See the summary table. The amount of grant depends on the beneficiary's income (lower income = higher support) and is not related to the energy performance achieved.

Regional Investment & Guarantee Fund, Regional Schemes Targeting Private Housing - Centre Region, France

Date of Creation:	**2012**
Fund Size:	Initial fund size: The Investment Fund 'Preveo': USD 337 million The Regional Guarantee Fund: unknown Annual budget: not applicable
Financial Sources:	The Investment Fund: • European Investment Bank – USD 168 million • Local commercial banks (Crédit Agricole, Caisse d'Epargne et Banque Populaire) – USD 168 million The Regional Guarantee Fund: • Region Centre • Oséo
Fund Character:	Revolving
Operational Costs of the Scheme:	Unknown
Beneficiaries:	**Any client without restriction on the legal status with the exception of physical persons: craftsmen, businesses of all sizes and in all sectors of activity (VSE, SMEs, large companies), local authorities, associations, social housing organisations, etc.**
Type of Projects Financed:	• Decentralized renewable energy production in the region: solar, wind, biogas, biomass, geothermal • Energy renovation of existing buildings achieving minimum 20% energy consumption reduction • Construction of new low energy buildings achieving the label "BBC Effinergie +"
Type of Financial Support Provided:	Soft loans: Loans at preferential rates are offered to beneficiaries. The interest rate is lower than the actual market rates at the date. The interest rates vary depending on the duration of the loan and type of project. The Regional Guarantee Fund significantly improves the financial conditions for the VSE and SME. Other tools set up by the Region to support certain beneficiaries: • A Mutual Fund • Equity investments in SMEs

The Delft Energy Saving Fund – Delft, Netherlands

Date of Creation:	**2006**
Fund Size:	Period 2006-2013: a budget of USD 224,904 approved by the City Council Period 2013-2016: a budget of USD 562,260 approved by the City Council
Financial Sources:	Municipal budget
Fund Character:	Revolving
Operational Costs of the Scheme:	The management fee for the bank is paid from the Fund. Operational costs are part of the operational budget of the Delft Local Energy Action Plan: - Staff: 0.5 full time person, - Communication costs
Beneficiaries:	**Citizens – house owners and non-profit organizations**
Type of Projects Financed:	Energy saving measures Renewable energy heating and green electricity production
Type of Financial Support Provided:	Soft loans Amount lent: • Private house owners: USD 1,686 - USD 11,245 • Non-profit organizations : USD 1,686 – USD 56,230 Interest rate: 4% below the market rate, with a minimum of 1.5% (this has also been an average for several years) Maturity: 10 years Guarantees: no guarantees (if there's no repayment the Fund value decreases and less projects can be supported) Insurance: not applicable Grace period: not applicable Self-financing: not applicable Maximum monthly instalment: depends on the size of the loan (min. USD 16.17/month up to USD 539/month (interest + instalment)