2030 Morocco Roadmap

Multiplying the Transition: Market-based solutions for catalyzing clean energy investment in emerging economies

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BloombergNEF

CIF CLIMATE INVESTMENT FUNDS

About

BloombergNEF is working with the Climate Investment Funds to identify how financial intermediaries can mobilize clean energy investment in emerging markets. In the context of post-pandemic sustainable recoveries and the need to meet international climate commitments such as the Nationally Determined Contributions (NDCs), accelerating the global energy transition is now more pressing than ever. BNEF sees electrification through clean power and transport as the basis of decarbonization, and therefore, as the backbone of the energy transition. With investors' appetite for ESG products at an all-time high and capital needs for clean energy investment in many emerging markets often unmet, this project looks at how to better match this supply and demand. This slide deck serves to support the dialog with stakeholders on this topic.

About Climate Investment Funds (CIF)

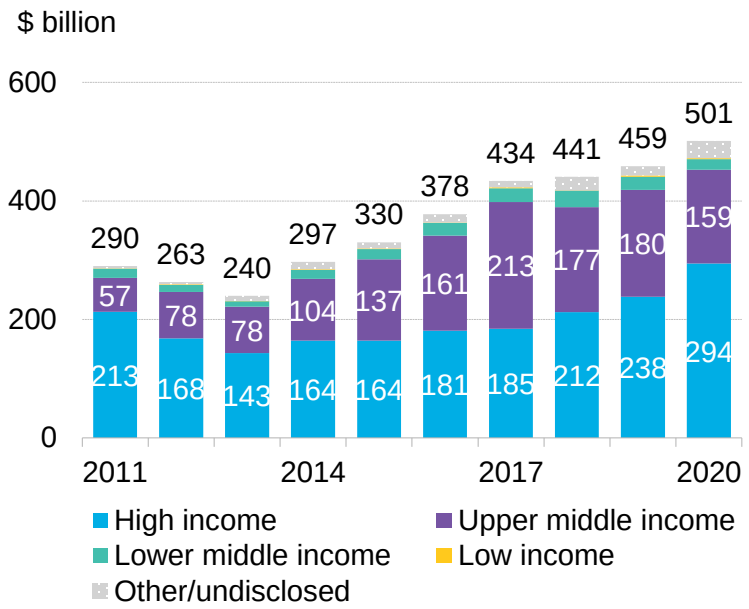
The Climate Investment Funds (CIF) is one of the world's largest and most ambitious climate finance mechanisms. Founded in 2008, it represents one of the first global efforts to invest in a dedicated climate finance vehicle. The CIF emerged from recognition by world leaders that climate change and development are inextricably intertwined. The CIF's creation also recognized a need to fill a gap in the international climate finance architecture—to deliver climate-smart investment at scale. The CIF supports developing and emerging economies in shifting to low carbon and climate resilient development.

About BloombergNEF (BNEF)

BloombergNEF (BNEF) is a strategic research provider covering global commodity markets and the disruptive technologies driving the transition to a low-carbon economy. Our expert coverage assesses pathways for the power, transport, industry, buildings and agriculture sectors to adapt to the energy transition. We help commodity trading, corporate strategy, finance and policy professionals navigate change and generate opportunities.

BNEF Take: Emerging markets and the energy transition

Global energy transition investment



- Despite reaching a record-high in 2020, at $501 billion, global energy transition investment has become even more concentrated in high income countries as a result of the Covid-19 pandemic. Emerging markets are, however, key to achieving the global energy transition, as they will produce the bulk of global emissions until 2050. In the context of delivering sustainable post-pandemic recoveries, accelerating economy-wide decarbonization is therefore more important than ever to keep global temperatures well below 2°C to deliver on the goals set under the Paris Agreement.
- BNEF sees electrification through clean power as the basis of decarbonization, and therefore, as the backbone of the energy transition. The power sector is a major contributor to overall emissions, with coal still the largest source of generation. Clean power generation technologies are the most readily available, scalable decarbonization solutions. To enable zero-carbon electrification of further sectors, renewable energy capacity needs to be expanded through utility-scale projects and distributed assets.
- At $307 billion in 2020, investment volumes in renewable energy and storage are, however, far from the necessary levels to achieve this: BNEF estimates that expanding and decarbonizing the power system to stay on track for warming of as much as 1.75 degrees Celsius would require over $2 trillion globally in power generation assets and batteries per year until 2050. There is therefore an urgent need to mobilize and accelerate clean power investment, particularly in emerging markets.

Source: BloombergNEF. Note: Numbers include renewable energy, electrified transport, electrified heat, energy storage, carbon capture and storage and hydrogen.

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Project overview

- **Focus: Scaling up clean energy investment through financial intermediaries in emerging markets**
  - Global energy transition investment and sustainable debt issuance reached a record high in 2020, but flows continue to be concentrated in the world's wealthiest countries and a select group of trail-blazing emerging markets.
  - The 2020s are the decade where lessons learned need to be replicated and scaled across emerging markets to ensure that their economies can grow sustainably, and help meet the objectives of the Paris Agreement.
  - Through fund-deployment and fund-raising activities, financial intermediation has an important role to play in activating more players in the investment chain, mobilizing more capital and ensuring more liquidity for the energy transition.

- **The "Roadmaps": Exploring country-level clean energy finance to 2030**
  - Focus: The short- to mid-term opportunities for intermediation in mobilizing clean energy investment in emerging markets in order to fulfil the commitments of the Paris Agreement.
  - Countries: India, Indonesia, South Africa, Morocco and Brazil.

- **Final report - structure:**
  - Part 1: "Looking back": The evolution of financial intermediation in delivering clean energy investment.
  - Part 2: "Present situation": Current opportunities and constraints to mobilizing investment through intermediaries.
  - Part 3: "Looking forward": The further potential of leveraging intermediaries to accelerate clean energy investment.

Morocco: Key references and background reading

- Morocco Ministry of Energy, Mines and the Environment (2009): National Energy Strategy
- Morocco Ministry of Energy, Mines and the Environment (2010): Law 13-09 on Renewable Energy
- Morocco Ministry of Energy, Mines and the Environment (2015): Law 54-14 on Renewable Energy
- Morocco Economic, Social and Environmental Council (2020): Opinion on the Energy Transition
- Morocco Ministry of Energy, Mines and the Environment (2021): Overview of targets and legislation

Morocco contents

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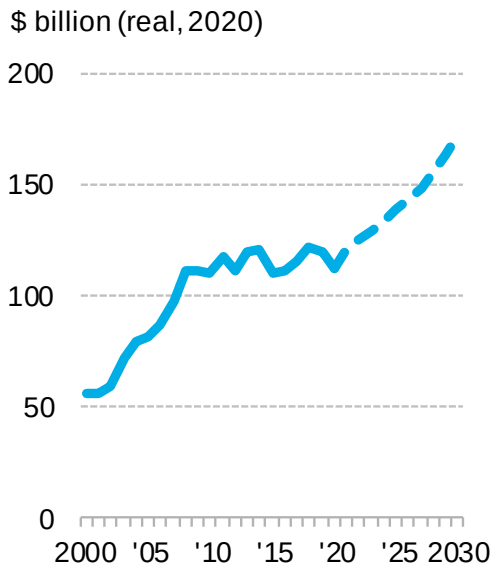
State of the energy transition

Morocco

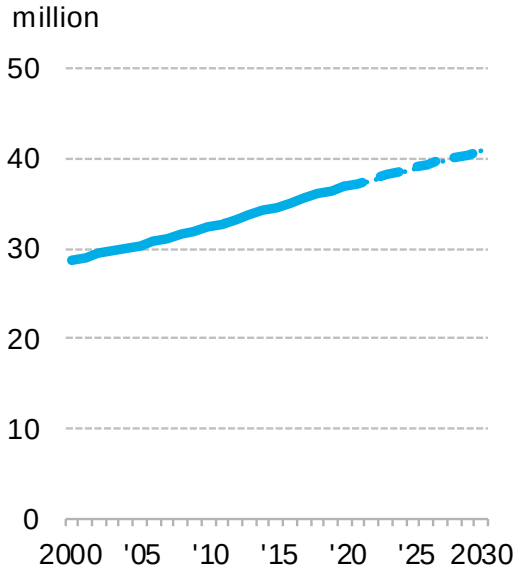
Young and service-driven, Morocco's economy is set to expand

GDP



Source: BloombergNEF, IMF, OECD.

Population



Source: World Bank.

Comments

- Services and agriculture make up a large share of Morocco's economy. A low level of industrialization sees large end-users account for a relatively small share of demand.
- Growth has fluctuated, but is expected to pick up as the economy emerges from the Covid-19 crisis.
- A young and increasingly urban population will continue to expand over the coming years, pushing up power demand.
- Electricity consumption has risen swiftly from 400kWh to 900kWh per capita between 1993 and 2019.

Source: BNEF New Energy Outlook 2020.

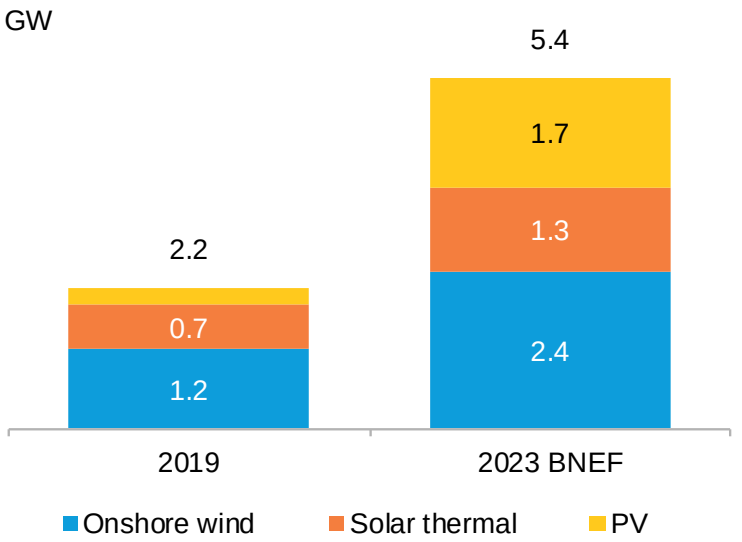
Moroccan renewables targets are among the region's most ambitious

Renewable energy targets

Entity	Target	Comments
Ministry of Energy, Mines and the Environment	52% of renewable power capacity by 2030, including large hydro (against 36% in 2019).	No technology breakdown. Previous 42% target for 2020 was narrowly missed.
Nationally Determined Contribution	Morocco has committed to reducing its greenhouse gas emissions by some 42% below business-as-usual levels by 2030.	Decarbonizing the country's coal-heavy power mix will be required to achieve this target.

Source: BloombergNEF.

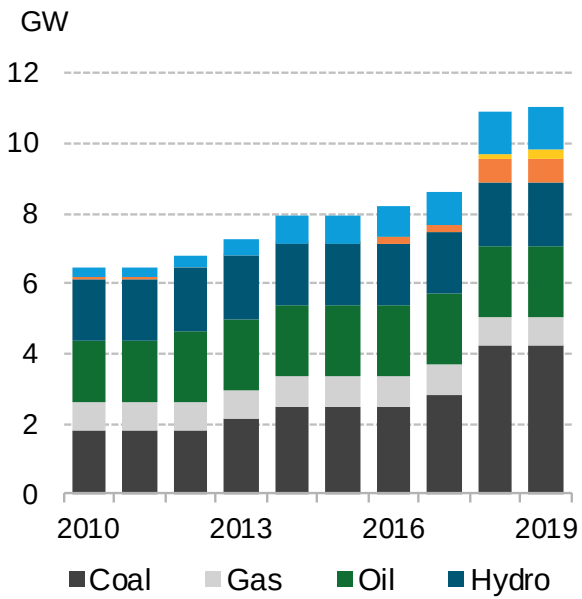
Installed clean power capacity outlook



Source: Moroccan Energy Ministry, BloombergNEF. Note: Hydro (1.8GW installed in 2019) not shown. Target expressed as percentage of total capacity, shown here assuming 2019 installed capacity of 11GW. Target includes hydro.

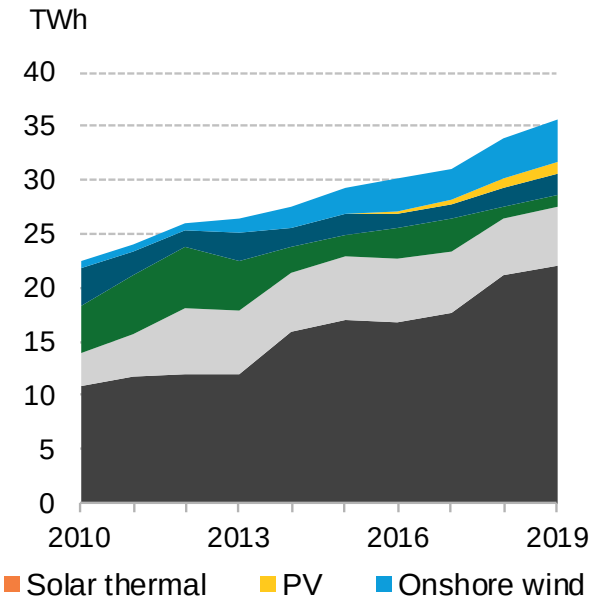
Renewables have replaced costly oil burn, but fossil fuels still dominate

Installed capacity



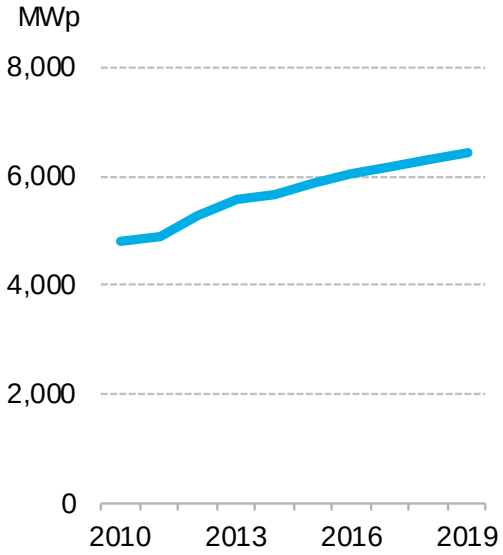
Source: BloombergNEF.

Power generation mix



Source: BloombergNEF.

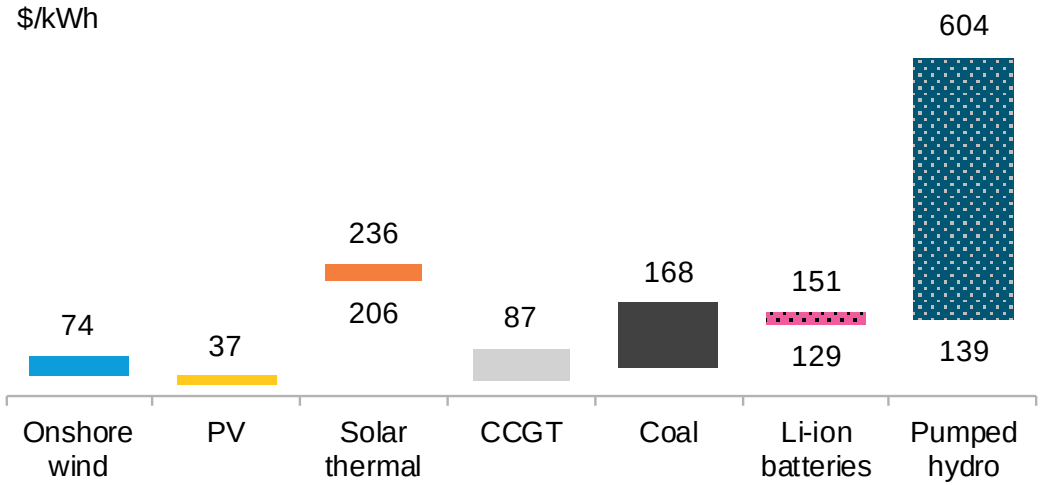
Peak power demand



Source: BloombergNEF..

Excellent resources give renewables an edge

MENA LCOEs (2H 2020)



Source: BloombergNEF. Note: LCOE refers to levelized cost of electricity. Note: Ranges for solar thermal are for Morocco, PV (fixed-axis) is for U.A.E., onshore wind and coal are for Turkey. Pumped hydro and lithium-ion battery (4-hour storage) LCOEs are unavailable for MENA, ranges are for Australia.

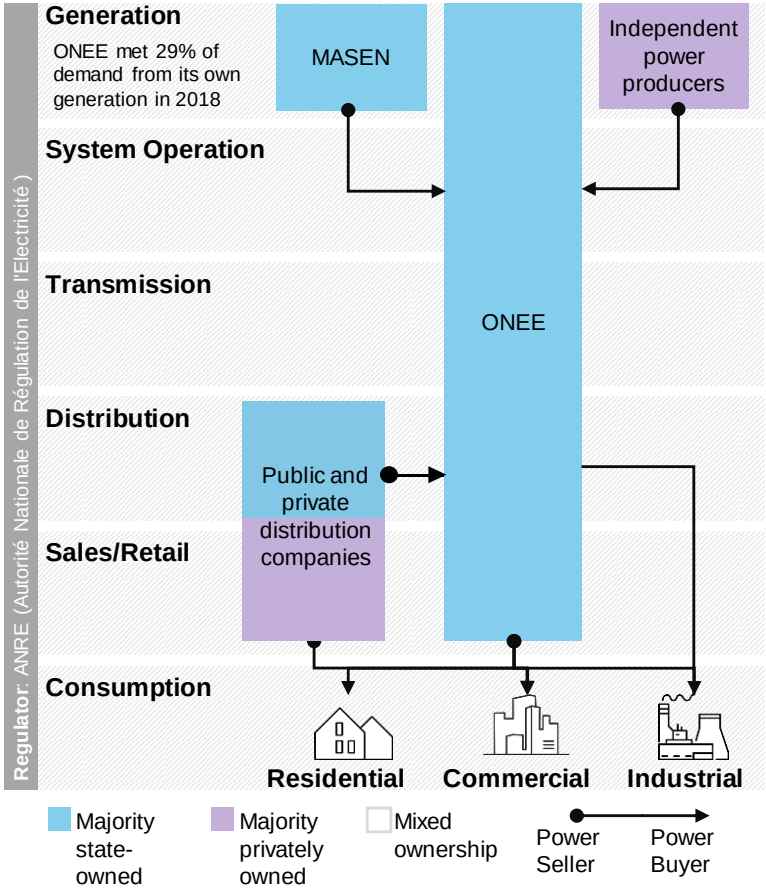
Comments

- World-beating renewables resources drive down the cost of new solar and wind capacity when viewed on a levelized-cost basis. Capacity factors for solar and wind have surpassed 20% and 45%, respectively.
- Morocco boasts little in the way of domestic fossil-fuel deposits. A consequent reliance on imported gas, coal, diesel and heavy fuel oil boosts the economic case for clean power.
- Solar thermal's higher upfront cost over PV belies the technology's flexibility. This is a valuable asset when it comes to meeting the country's evening electricity demand peaks.

Private power sector actors play a limited role

Power sector fundamentals	Status	Comments
Utility unbundling	🔴	ONEE remains vertically integrated despite private participation in power
Private participation	🟡	Generation and distribution open to private players under select conditions
Bilateral contracts	🟡	On- and off-site, but ONEE is involved for connections to transmission grid
Off-grid generation	🟡	Self-generation allowed up to 50MW. High electrification to limit growth
Purchase obligation	🟡	No standardized rules but risk of overproduction is low
Cost-reflective tariffs	🔴	Determined by Energy Ministry
Wholesale market	🔴	No wholesale market
Standardized PPAs	🟡	Bilaterally negotiated, but some standardization across similar tenders

Source: BloombergNEF. Note: Orange = somewhat available, red = not available.



Just a handful of policy measures have driven renewables deployment

Clean power policy	Status	Start date	Technologies	Impact to date	Details
Clean power target	In force	2009	All renewables including large hydro	High	Target of 42% share of renewable power in total installed capacity by end of 2020 was narrowly missed. Next up is achieving 52% by 2030.
Auctions	In force	2010	PV, solar thermal, onshore wind	High	More than 1.8GW has been contracted through renewable energy auctions. Contracts extend to 25 years, and payments are in USD and inflation-linked.
Tax exemptions	In force	-	All renewables except geothermal	Medium	A 90% import duty reduction applies to most renewable technologies. The measure has been a feature of the tariff schedule for over a decade. The standard 20% VAT rate applies.
Net metering	Planned	-	All renewables	Weak	Legislation to allow net metering for plants connected to lower-voltage grids is reportedly in the works, but has yet to be passed.

Building on past success requires a change of tack

Looking back

- A centralized auction program has procured large volumes of renewables, contracting more than 1.8GW by 2019. That has reduced costly oil burn. Auctions for PV, solar thermal and onshore wind have attracted bids from many international and domestic players.
- A series of reforms have opened up the power sector to private generators. A law passed in 2010 (13-09) notably allows independent power producers to sell renewable power directly to end-users over transmission grids.
- The state utility and renewables agency have weak financials. This is largely due to retail electricity tariffs not reflecting production costs, which in turn complicates future renewables procurement and power sector reform.
- A commitment to expand renewables generation has coexisted with investments in fossil fuel capacity. More than 2.4GW of coal has been added since 2011.

Looking forward

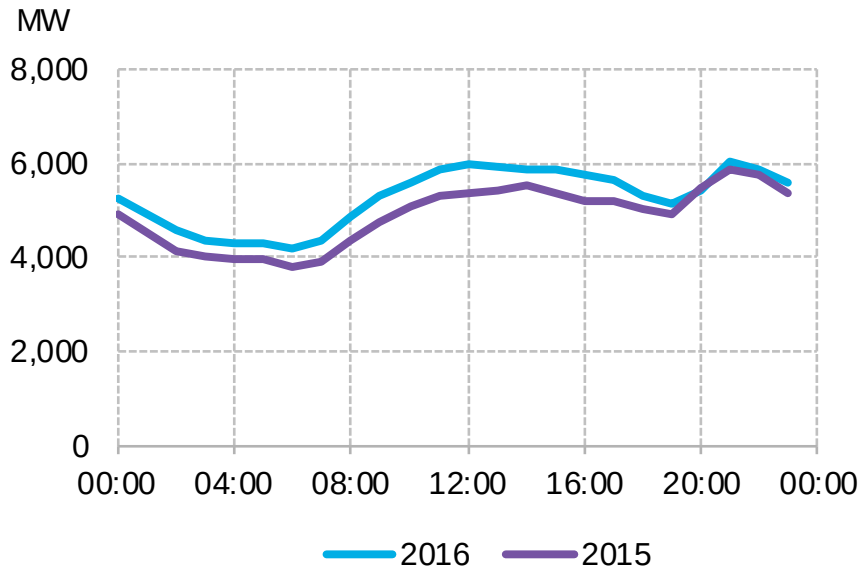
- The country's 2030 target is expressed in capacity terms, and should be achievable if previous additions are anything to go by. Yet the technologies used to achieve the target are likely to change in line with the apparent opposition to new solar thermal additions. PV, wind and hydro will play a correspondingly greater role.
- Further regulatory change could incentivize commercial and industrial solar. For instance, reforms to allow private renewable generators to sell their power over medium and lower voltage grids have stalled in the face of opposition from incumbents.
- The government plans to increase power exports to Europe and West Africa. That will require building more interconenctors and maintaining a capacity reserve margin. An opportunity has been spotted in marketing green hydrogen to serve European demand centers.

Betting on solar thermal to meet the evening peak

Background

- Morocco's electricity consumption generally peaks after 8pm. For many years, efforts to respond to evening demand spike has relied on dispatching costly, imported heavy fuel oil costing up to $0.30/kWh.
- Reconciling decarbonization with system planning is therefore tricky. Solar PV without storage – the least-cost renewable option on a capex basis – is ill-placed to provide the five hours of power that much of the population continues to rely on after dark.
- The national renewable energy agency, MASEN, concluded that thermal solar would be suited to supply evening demand. With plants commissioned in Morocco providing 3 to 7 hours of storage, the technology provides higher capacity factors later in the day.

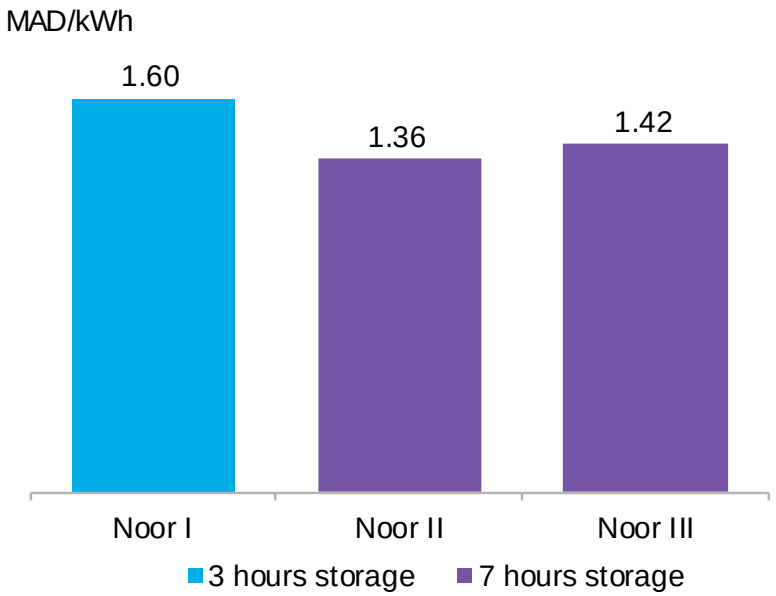
Morocco hourly peak demand



Source: ONEE, BloombergNEF. Peak demand is given for day of maximum instantaneous demand; 26th July 2015 and 26th July 2016.

Early auction successes stalled as political headwinds buffet solar thermal

Morocco solar thermal tariffs



Source: BloombergNEF.

Background

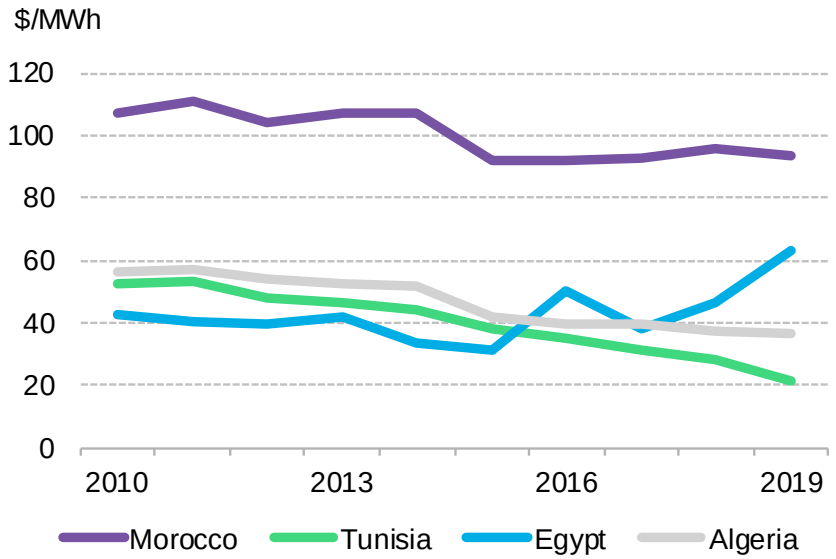
- Morocco's renewables auctions have provided developers with pre-developed sites, guarantees and provisions to negate currency risk. All have been key to attracting investment.
- PV and onshore wind have been procured for competitive tariffs. Concessional financing helped fund solar thermal projects, three of which have been completed to date.
- High solar thermal tariffs were approved to deploy a nascent technology. Yet the national economic watchdog issued a scathing report in 2020, condemning the 'Noor' plants' 800 million dirhams ($218m) in annual costs as excessive.
- The public appetite to build solar thermal appears to have been sapped, despite the technology's strengths. Upcoming tenders will likely focus on onshore wind, solar and possibly batteries. Meanwhile, little progress has been made on Noor-Midelt, a planned PV-solar thermal plant that has been on hold for several years.

Retail tariffs are North Africa's highest, but are still insufficient to cover costs...

Background

- Concerns about the cost of solar thermal resonate due to the indebtedness of Morocco's power sector. Several factors are at play, chief among which are the low retail tariffs charged to consumers. These are differentiated by time of use and voltage level.
- Morocco's government levies higher power prices than its neighbors, where electricity subsidies are even more generous. Rather than raising prices, the emphasis has been on improving collection rates and combatting fraud. Adjustments to tariffs are infrequent.
- The Covid-19 crisis has made the prospect of tariff increases even more remote, complicating ONEE and MASEN's efforts to cover their running costs. That could slow down progress on procuring relatively capital-intensive renewable technologies, despite their cost efficiency when viewed over a project's lifetime.

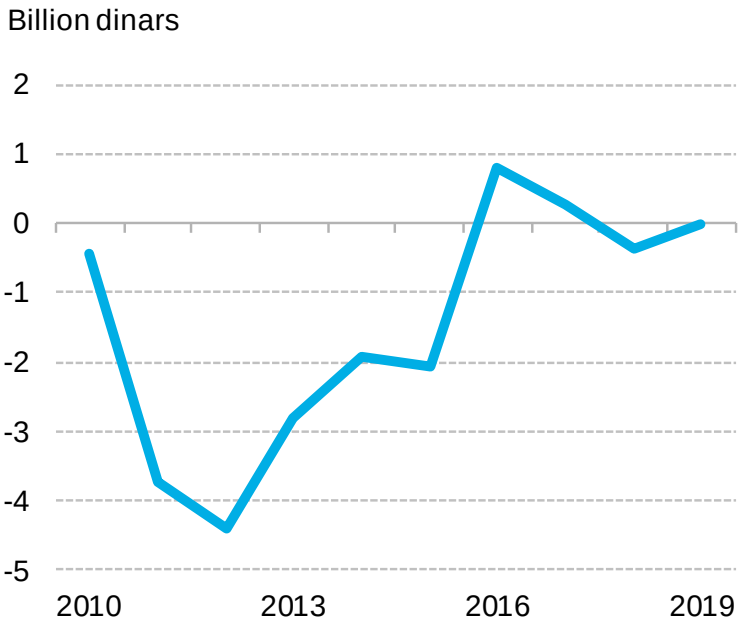
Retail electricity tariffs in North Africa



Source: BloombergNEF.

... While the national utility's financials complicate power sector reform

ONEE net profit and loss



Source: World Bank, BloombergNEF.

Background

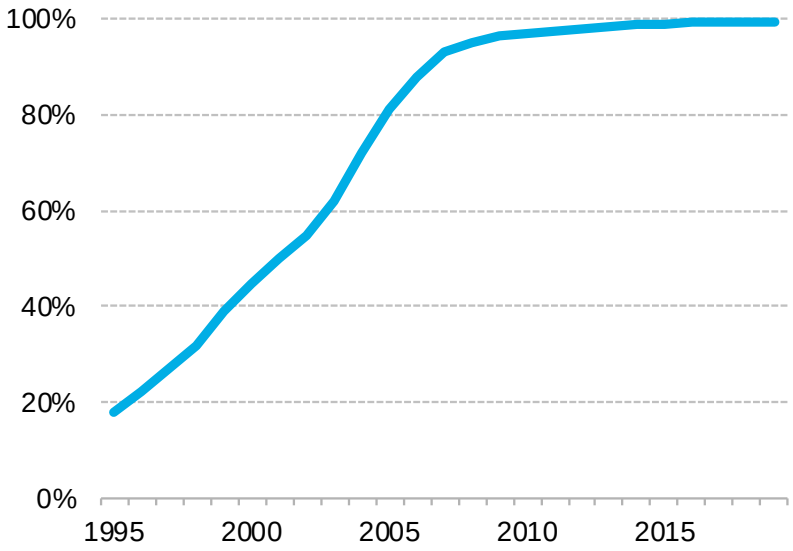
- It is difficult to find data on state utility ONEE‘s financial situation. However, considerable progress has been made in increasing its profitabitility through a financial restructuring plan carried out over the last decade. As a state-owned entity, it is not able to issue new equity but can issue bonds.
- Still, ONEE's financials appear far from healthy. Poor cash flow has delayed investments in maintaining its grids, contributing to growing network losses. Entirely state-owned, ONEE's performance impacts the state budget, and a large share of the loans it makes out are backed by government guarantees.
- Progress in liberalizing generation is hindered as a result, even as offtaker risk remains low. For instance, fully implementing law 13-09 would enable companies connected to medium- and low-voltage grids to procure renewables from private generators. That would mean revenues would be redirected from ONEE and private distribution companies, both of which oppose further reform as a consequence.

Rapid electrification limits the role of off-grid solar

Background

- The utility-led electrification of Morocco's rural hinterlands through PERG, a government-led program backed by international financiers, has proceeded at a breakneck pace. Access to power in rural regions has increased from less than 20% in 1995, to almost 100% in little over a decade.
- Most connections have been achieved by expanding the grid, and the contribution of solar has been marginal. That said, programs such as INDH have distributed PV kits to areas lacking access to power, with 71,000 rural households electrified as of 2019.
- Reaching almost full electrification reduces scope for the deployment of additional solar home systems or renewable-hybrid mini-grids. However, 800 villages lacked access to power in 2020. That amounts to an addressable market that, while small, is not insignificant.

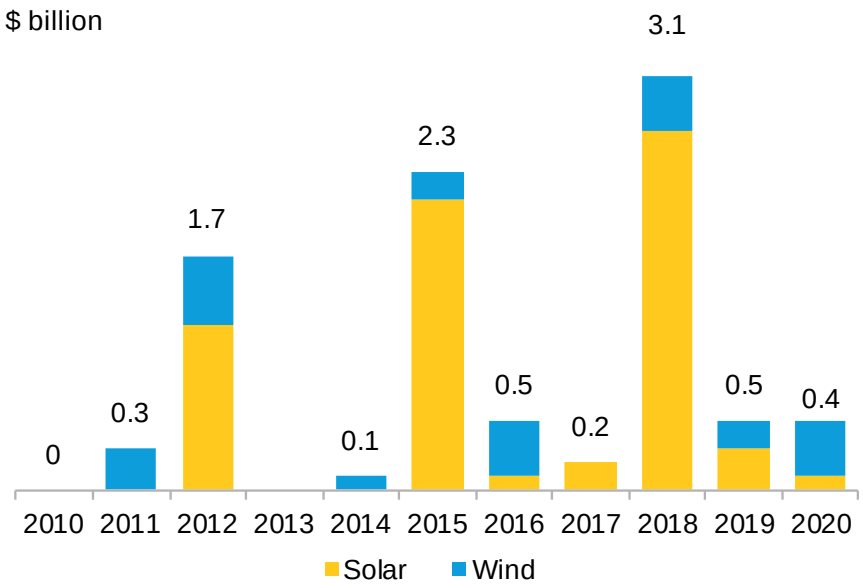
Morocco rural electrification rate



Source: BloombergNEF.

Investment has risen and fallen in line with large solar auctions

Morocco renewable energy investment



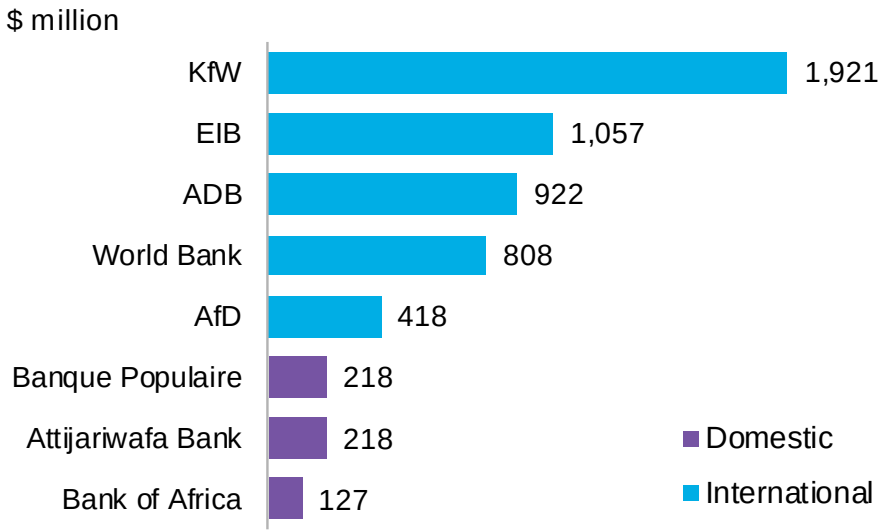
Source: BloombergNEF.

Background

- Funding for renewables has primarily flowed to solar technologies. Investment has been erratic with large year-on-year variances.
- Fluctuations are partly the result of Morocco's emphasis on holding periodic, painstackingly de-risked solar auctions with large capacity buckets.
- Such an approach is typical for power markets where procurement remains centralized, and auctions are the main road to market for renewables developers. However, average investment will have to pick up if renewables are to achieve greater scale.
- Investments in onshore wind have been more consistent across the years. Efforts have been made to bundle tendered wind projects, but these have yet to rival the capacity volumes deployed through Morocco's solar auctions.

International investment has been crucial over the last decade

Morocco top clean power lenders, 2011-2020



Source: BloombergNEF. Note: KfW = Kredit für Wiederaufbau, EIB = European Investment Bank, ADB = African Development Bank, AfD = Agence Française de Developpement.

Background

- Development finance remains dominant when it comes to investment over the last decade. The involvement of local banks has made an impact, as has local finance deployed by MASEN.
- Morocco's financial sector is relatively mature, but the risk profile associated with relatively immature technology like solar thermal has led to a reliance on concessional finance.
- Taken together, European development finance institutions top the charts. Germany's KfW, France's AfD and the EU's EIB have all deployed considerable sums in backing clean power projects.
- The African Development Bank and the World Bank's Clean Technology Fund have also played a fundamental role in backing Morocco's initial ventures into building out renewables.

Summary: A strong enabling environment masks missed opportunities

Opportunities

Experience in clean power procurement across technologies

Plans to scale renewables deployment will leverage Morocco's substantial experience in procuring clean power. Confidence in the country's track record should help attract foreign investment in the country's renewable power sector.

Strong political buy-in backs renewables deployment

The number one factor driving Moroccan clean power deployment has been the government's strong commitment to building out renewables. This was stepped up in 2015 and is likely to persist as the government seeks to achieve the 52% renewables capacity target set for 2030.

Renewables procurement frameworks are thoroughly derisked

A combination of experience and political commitment have helped lift barriers to bidding in renewables auctions. Developers are offered pre-developed sites, connections and provisions that negate currency risk. Moreover, government guarantees back contracts signed with private generators.

Ambition to develop energy exports could boost renewables build

The government is looking to become a major energy exporter to Europe and West Africa. In the short term, it will continue to build out power interconnectors. Long-term ambitions are to export green hydrogen to Europe. A growing supply of renewable power is critical to both.

Challenges

Single buyer model reduces opportunities for small-scale PV

ONEE's dominance of the power sector is set to persist. In the absence of promised reforms, the direct sale of power over lower voltage grids limits opportunities for commercial and industrial solar.

New fossil fuel additions weaken case for building new renewables

Recent years have involved the signing of new 30-year power purchase agreements for planned coal-fired power plants. The coal sector has added more than 2.4GW of capacity since 2011, with 1.3GW added in 2018. That extra capacity could slow renewables growth.

Recent tendering delays point to a slowdown in progress

Tenders have been conducted fairly regularly over recent years. That is impressive given the challenges of procuring nascent technologies (solar thermal) and the market's immaturity when it comes to renewables. Yet delays affecting a PV-solar thermal tender leave little visibility on future additions.

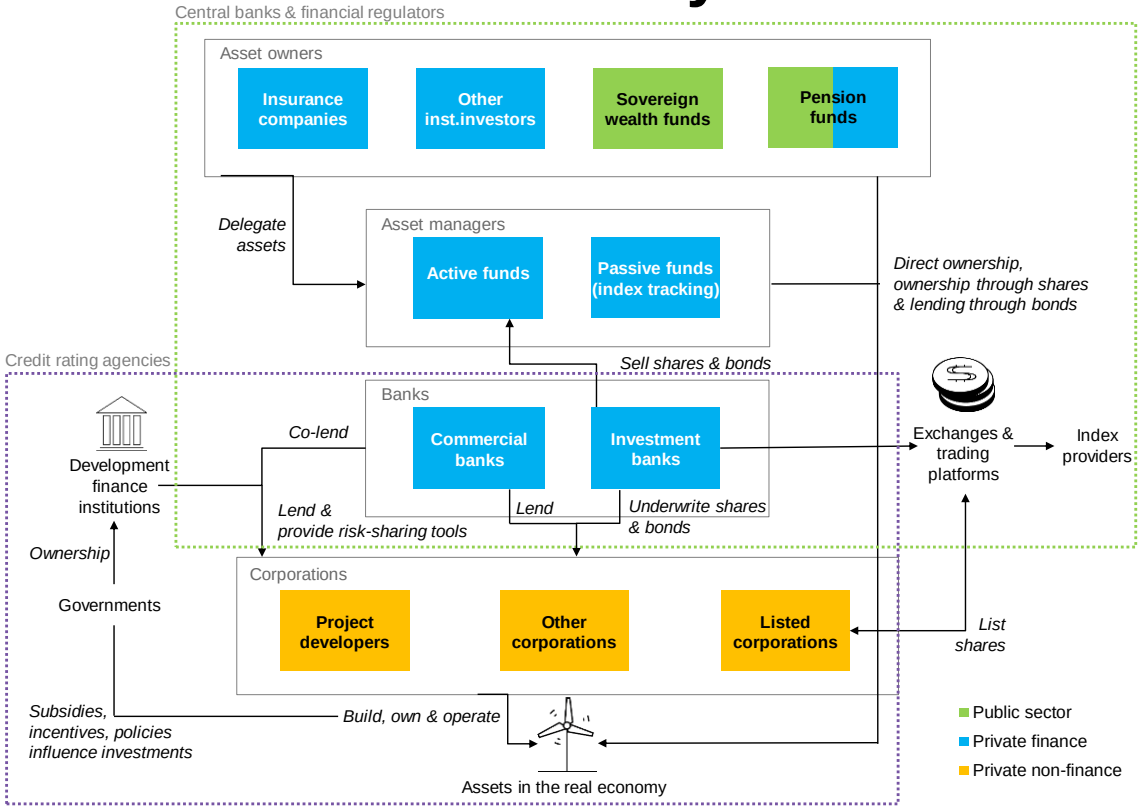
Non-cost reflective power tariffs deepen deficit of key public players

Retail electricity tariffs are high for North Africa, but remain too low to allow the state utility to recoup its operating expenses. Renewable agency MASEN, to which ONEE is gradually transferring its renewables assets, faces similar issues. Deficits could hinder future capacity additions and power sector reform.

Financial ecosystem, capacity and financing needs

Morocco

Morocco's investment chain is fully activated



Source: CFLI, BloombergNEF.

Morocco hosts a range of entities across the value chain

Investment chain representation

Entities	National	International
Asset owners	Not active	Not active
Asset managers	Not active	Not active
Banks	Active	Active
Corporations	Semi-active	Active

BNEF Take: Intermediation in focus

Moroccan and international markets are generally able to provide most of the clean power investment required, provided that policy, regulatory and offtake risks are properly accounted for. Local and international MFIs such as the World Bank and African Development Bank nonetheless offer support to crowd-in investment through a number of initiatives.

Source: BloombergNEF.

- Morocco's financial sector is relatively mature. All major actors of the investment chain are activated and vested in renewables undertakings.
- The country's sovereign wealth fund and largest pension fund have both invested in clean power projects. The former, Ithmar Capital, also seeks to invest in projects involving green hydrogen production.
- A number of domestic financial institutions provide capital for renewable energy projects, foremost among which ranks Attijariwafa Bank.
- Currency risk remains a hurdle. Measures to reduce exchange risk fluctuations, or otherwise hedge, increase project costs.
- Domestic and international investors are comfortable with established renewables technologies like solar and wind. This includes both greenfield and brownfield projects.

Intermediation is a critical part of Morocco's renewables sector

Examples of financial intermediation in clean power projects in Morocco

Entity	Public actors	DFIs with commercial banks
Example	MASEN, whose role has expanded to cover responsibilities previously managed by ONEE and the public Energy Investment Company (SIE).	Various partnerships between key players such as BMCE, the Climate Investment Fund, EBRD, and Global Environment Facility.
Aim	Overarching aim is to achieve renewables targets at least cost. Manages procurement frameworks so as to attract low-cost finance.	Expand renewables through strategic long-term, concessional finance, and support policy development, capacity building and knowledge sharing through grants.
Intermediation	Fund-raising and deployment.	Fund deployment.
Instruments	Equity stakes, forex provisions, green bonds, facilities agreements.	Concessional loans, grants.
Outcome	Successfully attracted international and domestic finance in contracting more than 1.8GW of renewables capacity.	DFI support reduces the cost of lending, making an early-stage technology commercially viable, and expands the market using technical assistance.

Renewables rely on international debt despite a fairly mature financial market

Financial sector maturity

Indicator	Value
Domestic credit from financial sector	141.8% of GDP
Domestic credit to private sector by banks	87.8% of GDP
Stocks traded, total value	2.7% of GDP
Turnover ratio of domestic shares	5.0%
Depth of credit information index (0=low, 8=high)	7
Strength of legal rights index (0=weak, 12=strong)	6

Source: World Bank. Note: 2019 data.

Background

Debt:

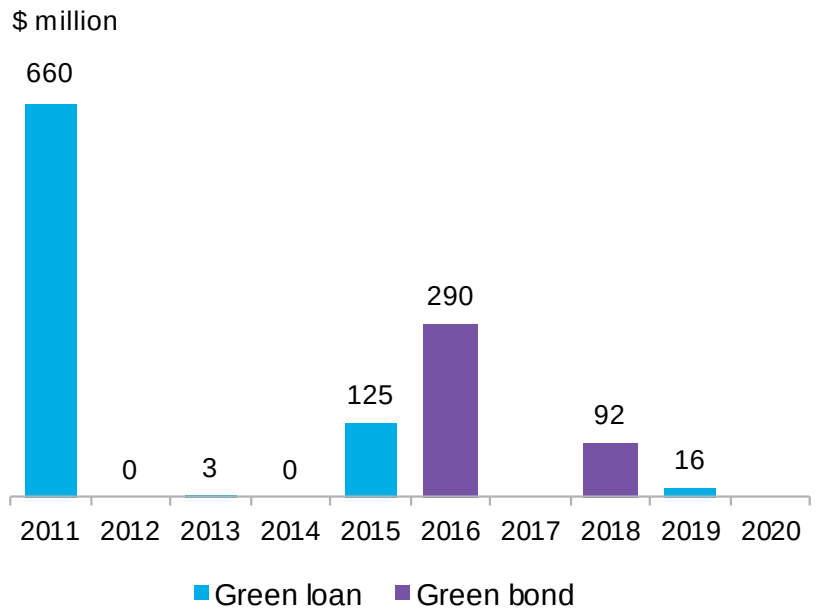
- Several domestic banks provide loans for renewables projects. Yet for the most part, domestic debt instruments available to finance renewable projects generally have short tenors and high interest rates.
- Many renewables projects have combined international public debt financing with private equity.
- Access to international, concessional debt has been vital to kick-starting the country's early-stage renewables market.

Equity:

- Few domestic entities take equity stakes in renewables projects. One exception is MASEN, which has taken minority stakes in several clean power projects.
- Planned projects such as the Noor-Midelt PV-solar thermal plant foresee initial expenses financed via a gearing ratio that required commercial equity to cover 20% of project costs.

Early issuance of sustainable debt has not translated into volume

Sustainable debt issuance



Source: BloombergNEF. Note: Data includes all sub-industries.

Background

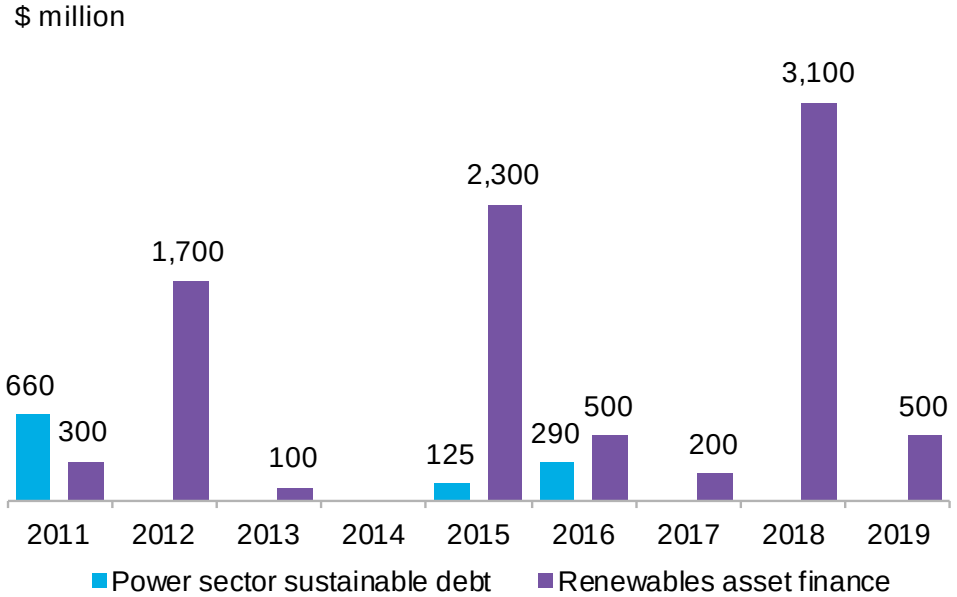
- The Moroccan regulator issued Africa's first green bond guidelines in 2016. The country is the second issuer of sustainable debt in Africa after South Africa – five green bond issuances have been made to date.
- Sustainable debt volumes remain low, but green bonds have targeted an array of sectors. These include funding building efficiency in Casablanca and refinancing renewables assets.
- The country's first green bond was issued by the public renewables agency, MASEN. A $117 million bond offering in 2017 helped finance the country's first hybrid PV-solar thermal plant, Noor 1.

BNEF Take: Green bonds

Green bonds are attractive instruments for IPPs to meet their debt needs, particularly if local lending conditions do not match renewable energy project development conditions. Green bonds can also be interesting to international institutional investors seeking to fulfil ESG mandates.

Sustainable debt volumes are low compared to funding for renewables assets

Clean power sustainable debt volume compared to asset finance



Background

- Sustainable debt has generally trailed asset finance. Taking only issuances linked to the power sector, 2011 is the only year in which sustainable debt surpassed investment in renewables assets.
- There is little correlation between sustainable debt issuances and overall investment volumes in clean power plants.
- Generally, sustainable debt issuance appears to have slowed down. That is despite a diverse pool of past issuers and an early lead in developing a framework for green bonds.

Source: BloombergNEF. Note: Sustainable debt here only includes issuances from the power industry (utilities, renewable energy and power generation).

Summary: future clean power investment will depend on the regulatory environment

Opportunities

Strength of local and international financial sector

The Moroccan financial ecosystem is relatively developed. That makes it well positioned to finance (or indeed refinance) greenfield and brownfield renewables projects by deploying a variety of entities and instruments. The ability to tap into international markets opens up further financing opportunities.

Advanced sustainable finance regulation

Buoyed by a strong commitment to expanding clean power, Morocco can build on its initial foray into green bonds and advanced sustainable debt regulation to refinance existing clean power projects. A deeper bond market could offer more opportunities to invest in suitable assets that meet corporate ESG mandates.

Financial sector maturity

The market is developing experience in funding renewables, although many larger projects are reliant on international finance.

Challenges

Power sector's financial health

Financial reforms have been instrumental in improving ONEE's economic outlook. Yet the utility remains vulnerable to financial headwinds. Efforts should be made to tackle network losses and raise heavily subsidized tariffs where consumers are able to pay. Failure to address such issues could thwart plans to reform the power sector.

Deteriorating credit rating

Despite macroeconomic stability and low inflation, Morocco's credit rating is deteriorating as the country's finances bore the brunt of the Covid-19 crisis. This is likely to make it more challenging to access the capital required for future renewables projects.

Lack of financing options for small-scale solar

Options for financing rooftop PV will remain restricted until developers are able to sell power to end-users over lower-voltage cables.

Leveraging intermediaries to accelerate clean power investment

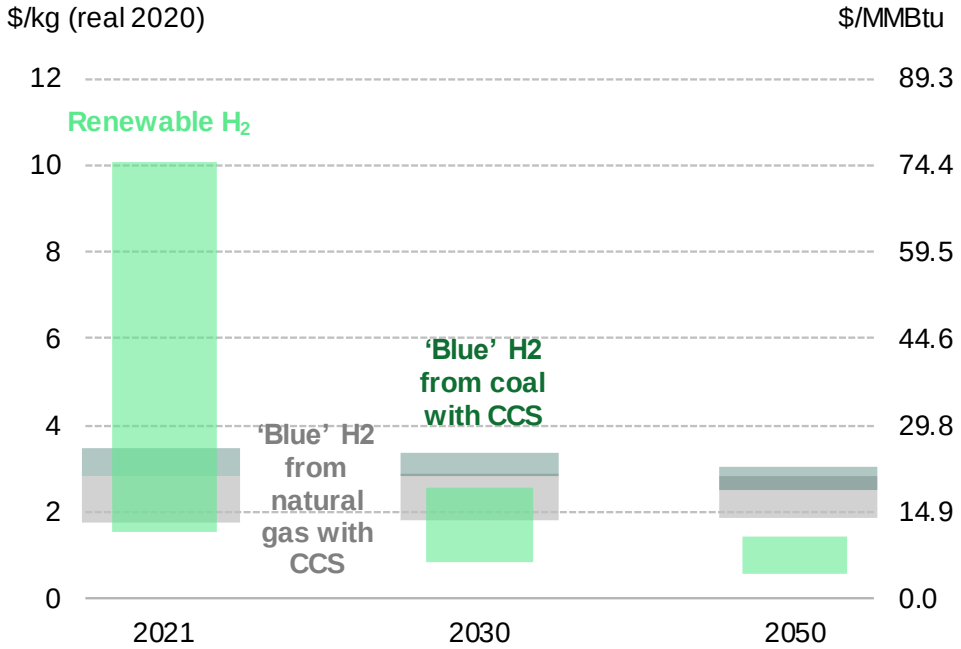
Morocco

Morocco's energy export ambitions

Background

- As in many parts of the world with high solar capacity factors, PV is set to provide the largest market opportunity for clean power investment.
- Morocco aims to become a major energy exporter. Power exports are set to grow as it expands interconnections with its neighbors and Europe.
- The government has also set its sights on green hydrogen – the type produced by renewable power – as a source of export revenues.
- That would require significant extra volumes of renewables, but could prove lucrative as demand in Europe ramps up and local production costs fall.
- Progress in a hydrogen partnership Germany was waylaid by political tensions. Regardless, Morocco's low renewables costs equip it to become a major exporter should an international hydrogen market develop in the coming years.

'Green' and 'blue' levelized cost of hydrogen



Source: BloombergNEF.

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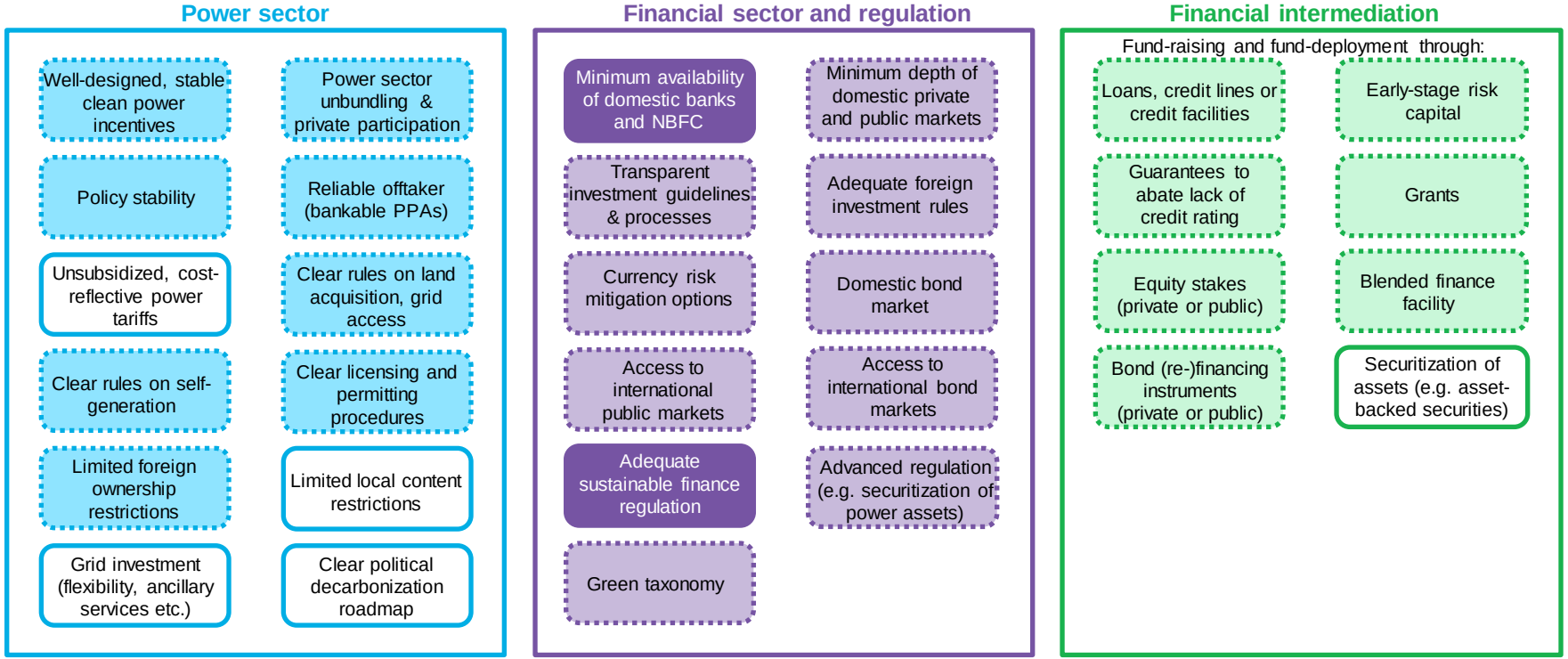
Morocco hosts a favorable enabling environment



Source: CFLI, BloombergNEF.

Note: Full color = availability; dotted lines = partial availability; blank = remaining opportunity.

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Intermediation could leverage Morocco's solid fundamentals

- Morocco's success in procuring renewable power speaks to the importance of strong market fundamentals in attracting investment. In the space of less than a decade, Morocco has risen to become Africa's second renewables market after South Africa and one of the foremost recipients of renewable energy investment across emerging markets.
- In the power sector, characteristics such as a strong enabling framework, policy stability and excellent renewables resources have been key drivers in clean power investment over the past decade.
  - **Acceleration opportunity:** responding to growing electricity consumption by procuring additional clean generation capacity. In time, this will require enhancing grid infrastructure to enable it to handle increasing penetration from variable renewables. Tapping into alternative capital market options to finance utility-scale PV and wind assets, in addition to conducting further power sector reform in order to expand small-scale and self-generation projects.
  - In the financial sector, the critical role played by public entities such as MASEN, alongside clear investment rules, a diverse financial ecosystem, and a variety of debt and equity instruments have helped to provide financing for renewables in the past.
  - **Acceleration opportunity:** leveraging the full potential of instruments such as bonds would unlock larger volumes of investment. International investment has been limited to the largest projects. That is partly due to the cost of managing factors such as currency risk, in addition to the country's centralized procurement framework. Further models such as securitization could also be increasingly explored, for instance to pool small- or medium-scale assets.

Action area 1: Meeting growing power needs through clean capacity

Utility-scale renewables additions will have to come fast for Morocco to meet its growing power demand and achieve its 2030 renewable energy target. In the longer term, clean power will be critical to considering the renewables capacity required to develop nascent industries such as green hydrogen production.

Investment opportunities

- Despite growing participation from domestic financiers, international financial intermediaries will continue to drive deployment by channeling capital into undertakings coordinated by MASEN. This will accelerate the deployment of mature renewables such as PV, and facilitate the adoption of early-stage technologies like grid-scale battery storage and hydrogen electrolyzers.
- Morocco's financial market is mature but there is scope for the use of instruments to unlock new funding sources. Capital recycling could help tap into fresh liquidity. Obligations could also be refinanced via public or private placement green bonds. Debt funds could also draw in a wider pool of institutional investors.

Enabling environment opportunities

- DFI support in providing blended finance remains critical despite domestic and international intermediaries' familiarity with renewables. It will become clearer as to where their efforts should be directed once ambiguity about the country's procurement priorities are clarified – for example, concerning the fate of the delayed Noor-Midelt project.
- Given the fairly shallow Moroccan bond market, DFI support could also be useful in facilitating private placements, and bond-issuing or purchasing programs with institutional investors. Moroccan institutional investors have already deployed funds for renewables projects, and this should be built upon.
- Foreign exchange risk has been taken on by MASEN for past procurement rounds, allowing developers to bid in hard currency. Yet accessing international capital markets could be facilitated by investigating options such as green hedging instruments.

Action area 2: Preparing the grid for intermittent generation

Making good on the government's target to achieve 52% renewables generation capacity by 2030 will involve integrating large volumes of variable renewables. Whether by investing in the grid, better managing demand or procuring batteries, enhancing system flexibility will be key.

Investment opportunities

- Solar thermal has historically contributed to reducing oil burn while meeting the country's late evening peak. Concessional finance will be required to procure future flexibility solutions, such as utility-scale storage.
- ONEE's smart meter deployment program and the enforcement of time-of-use tariffs opens the door to scaling demand-side response measures and small-scale storage.
- Morocco's grid is becoming inadequate as ONEE struggles to make the investments required to reduce network losses. Domestic intermediaries will be important to deploying and raising funds for transmission and distribution investment.
- Investment opportunities for transmission include the financing of regional (and intercontinental) interconnectors. Morocco's interconnection with Spain is a case in point. The government is also considering using corporate PPAs to serve European demand.

Enabling environment opportunities

- Implementing energy storage mandates or subsidies for storage will require significant technical assistance from DFIs and other international intermediaries. The inclusion of storage in national auctions is not new in Morocco, which has shown appetite for exploring innovative technologies for managing domestic consumption. Policy makers could also benefit from advice on crafting frameworks through which to remunerate flexibility or mandate balancing requirements.
- Concessional financiers can assist by increasing the domestic financial sector's familiarity with lending opportunities relating to network upgrades, such as digitalization, flexibility and demand-side response measures. These could all be use cases for blended DFI funding. More than in other sectors, distributed and flexible technologies benefit from efforts to pool such loans into a package, a step which could attract a wider range of investors.

Action area 3: Enabling a transition away from fossil fuels

The decarbonization of Morocco's power sector hinges around supporting the government as it reconfigures its power mix. In time, this will involve aligning security of supply and economic objectives with the country's strong climate agenda. This could involve replacing uneconomic or undepreciated coal assets with clean capacity. Intermediaries could help by providing technical support to the government and assistance with finding suitable financing instruments.

Investment opportunities

- Once a clear government commitment has been set, domestic and international intermediaries can raise finance to decommission coal assets and replace these with least-cost renewables and storage. At the outset, this will likely require DFI support.
- ONEE, its subsidiaries and IPPs that have power purchase agreements with ONEE can for instance raise green or transition bonds. MASEN has accessed the bond market in the past, providing it valuable experience that can be built upon. However, the novelty of these instruments means that DFI support is likely to remain crucial if they are to be employed to their full potential.
- Another option is to employ securitization to pool and refinance uneconomic or underused coal plants off-balance sheet in order to provide funding for clean replacement capacity.

Enabling environment opportunities

- The government should refer to existing decarbonization commitments when enforcing measures to reduce its reliance on fossil fuel plants. The fact that Morocco's coal is imported reduces the social and economic cost of a coal phase-out.
- Technical assistance is needed to support these dialogues and processes. Much of the country's coal capacity is relatively new, which enhances the case for renegotiating fuel supply contracts or exiting coal PPAs with IPPs.
- The government will likely require support in structuring the adequate financial instruments to take coal assets offline. Technical assistance could help establish the required regulations to securitize assets, a step with benefits in terms of raising capital and paying down coal assets.

Action area 4: Scaling up the self-generation market

Greening the grid-scale generation fleet provides the most direct route to decarbonizing Morocco's power sector. However, this should not replace efforts to address other segments. Installing self-generation facilities could enable industrial and commercial players to reduce their carbon intensity. Yet financing mechanisms and project opportunities for private renewables procurement are lacking.

Investment opportunities

- Direct electricity sales from private generators to end-users are generally restricted to entities that are positioned to do so across transmission grids. A legislation that would solve this issue is reportedly in the works, but has yet to be implemented.
- Efforts should be concentrated on supporting domestic banks' ability to channel funds to small-scale PV and storage projects. This would reduce procurement costs for commercial and industries enterprises, and build familiarity with decentralized power solutions.
- Once local financial actors have increased their familiarity with self-generation, the pooling of similar projects via securitization could unlock access to a wider range of investors.

Enabling environment opportunities

- Allowing private generators to sell electricity over distribution and lower-voltage transmission lines would help stimulate the rooftop PV market.
- Considerable technical assistance will be required to enable the integration of small-scale variable renewables. This will help implement the necessary regulatory changes, including setting capacity thresholds, licensing procedures and wheeling agreements.
- Various financing facilities could be provided by DFIs willing to support self-generation projects. These could include loans, credit lines or other instruments. Such assistance will be vital to developing awareness of procurement options among potential customers.

Action area 5: Reinforcing the domestic financial sector

A broad range of domestic financial actors have backed renewables projects, yet many local players still remain unfamiliar with the opportunities available. Many independent power projects have, for instance, been financed in foreign currency.

Investment opportunities

- DFIs would do well to support local financial institutions that have already shown a willingness to support renewables projects. These include Attijariwafa Bank and Banque Populaire's regional branches. DFIs could provide technical assistance as well as de-risking mechanisms, such as first-loss positions or guarantees.

Enabling environment opportunities

- DFI funds have already proven effective when blended with local finance through projects overseen by MASEN. Full and partial guarantees could increase the government's appetite for procuring greater volumes of renewables. Past projects have seen public entities issue guarantees backing power purchase agreements with independent power producers.
- MASEN's procurement program takes on foreign exchange risks when signing contracts with private generators. That significantly increases procurement costs. As Morocco's renewables market becomes increasingly mature, efforts should be made to enhance the ability of local financial institutions to extend credit denominated in Moroccan dirhams.

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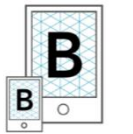

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