IREC Country Report

Oman (2021)

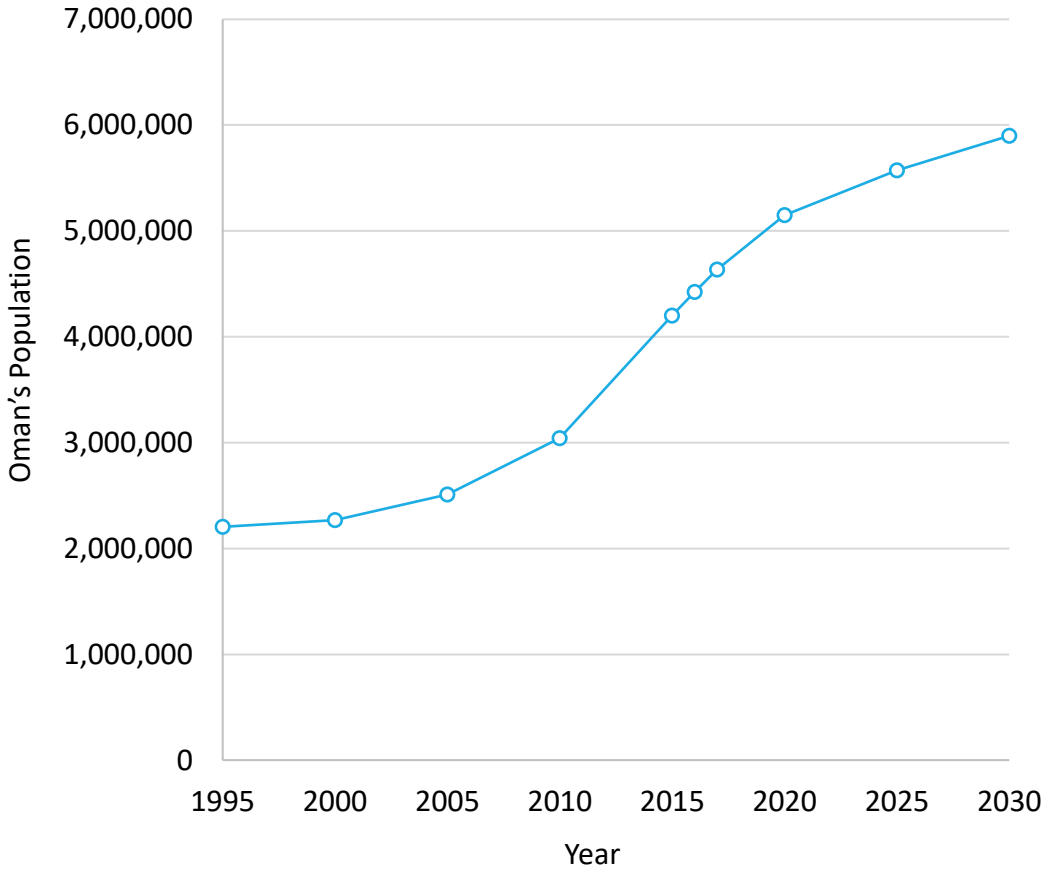
Introduction

Overview of Oman’s Energy Situation

General Snapshot - Oman's Population

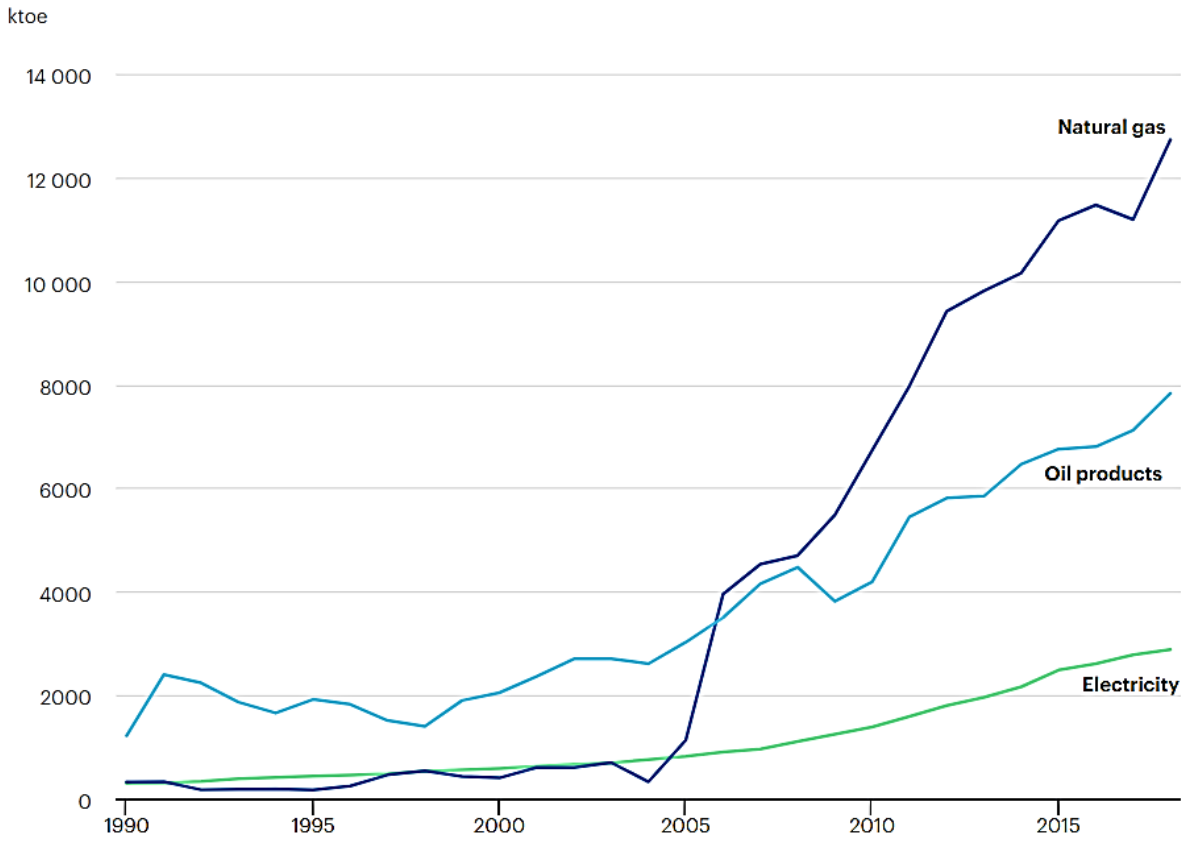
- 2020: 4.6 Million Persons
- 2030 (Projection): 6 Million Persons
- Approximately a 30% increase over the next decade

data.gov.om/OMPOP2016/population



General Snapshot - Energy Consumption

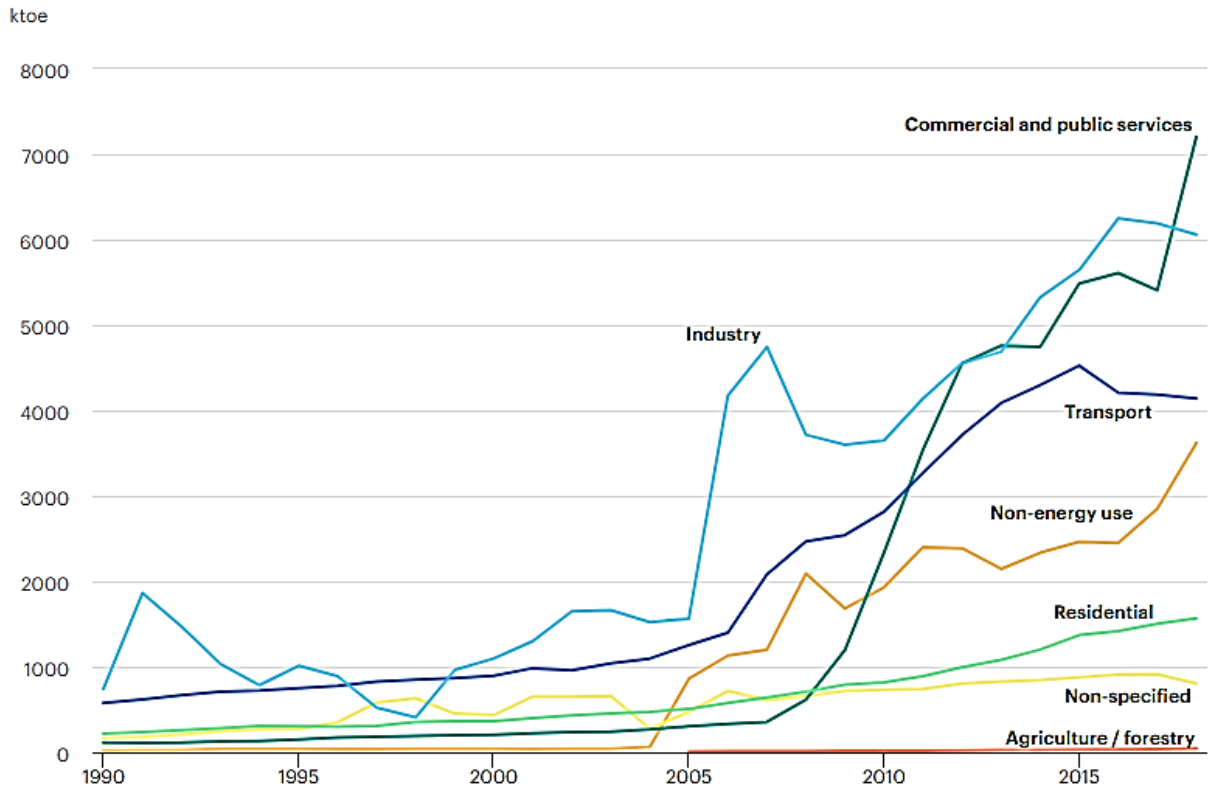
- As of 2018, Oman's Total Final Energy Consumption grew approximately 10% annually over the past decade and reached approximately 23 Mtoe, whereby 54% was natural gas, 33% oil, and 12% electricity



Source: IEA

General Snapshot - Energy Consumption By Source

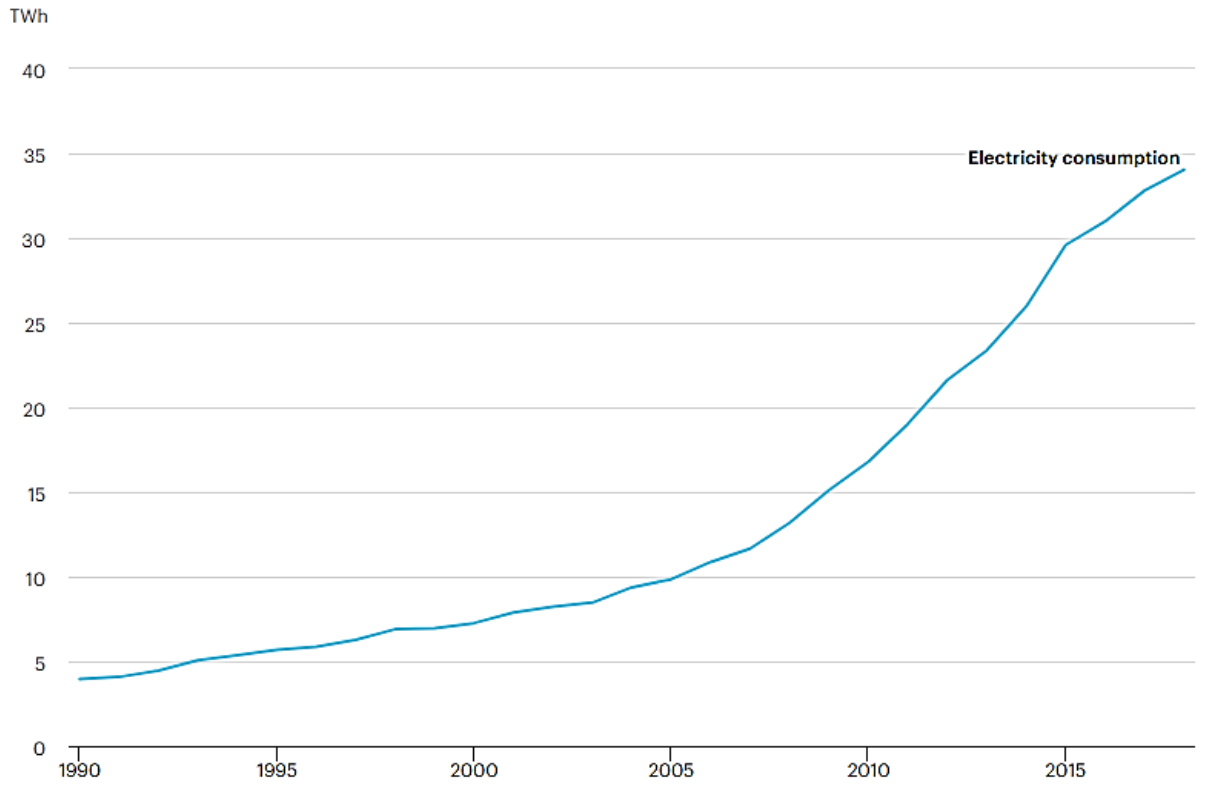
- In 2018, Consumption was highest for Commercial and Public Services (31%), Industry (26%), Transport (18%), Non-Energy Use (15%), and Residential (7%)



Source: IEA

General Snapshot - Electricity Consumption

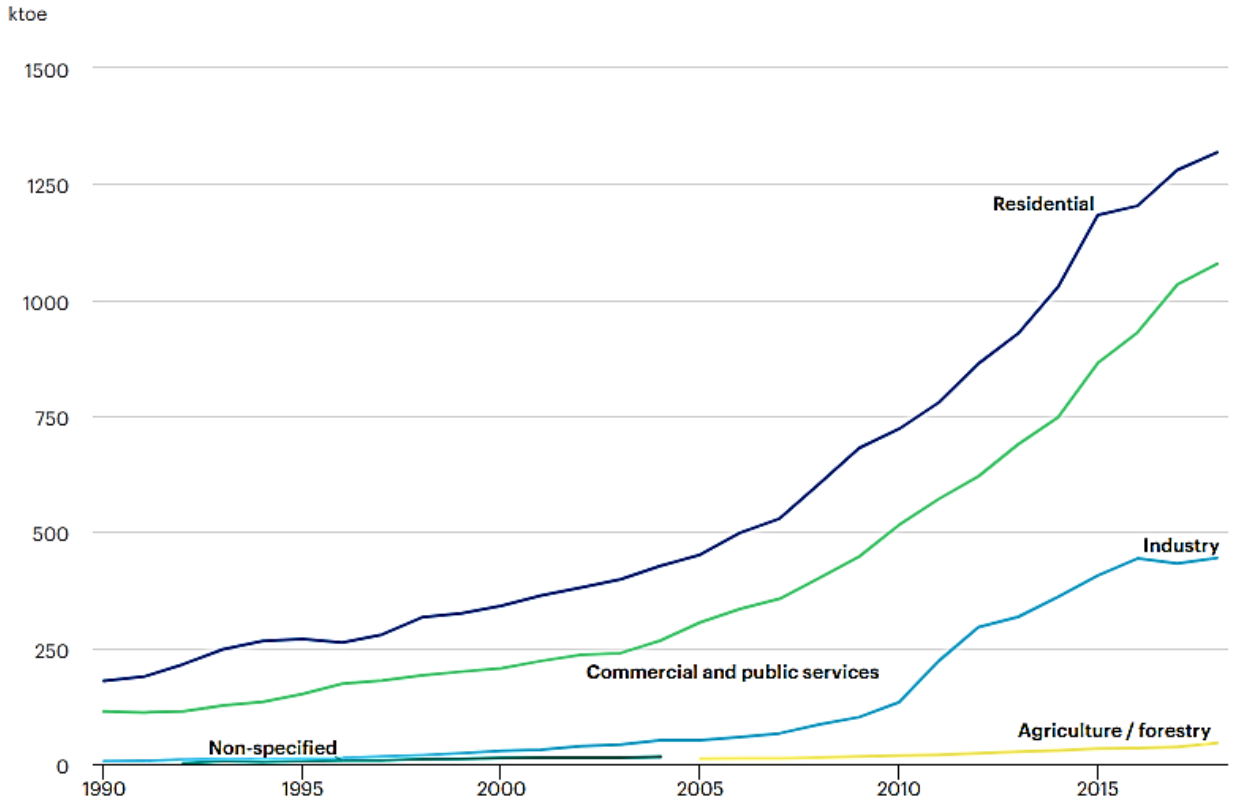
- Electricity Consumption reached 34 TWh in 2018, which grew at an average rate of 12% annually since 2010 (IEA)



Source: IEA / NCSI

General Snapshot - Electricity Consumption By Sector

- The Residential Sector was by far the highest consumer of electricity in 2018, accounting for roughly 45% of the total electricity consumption. Commercial and Public Services accounted for 37% and Industry accounted for 15%.



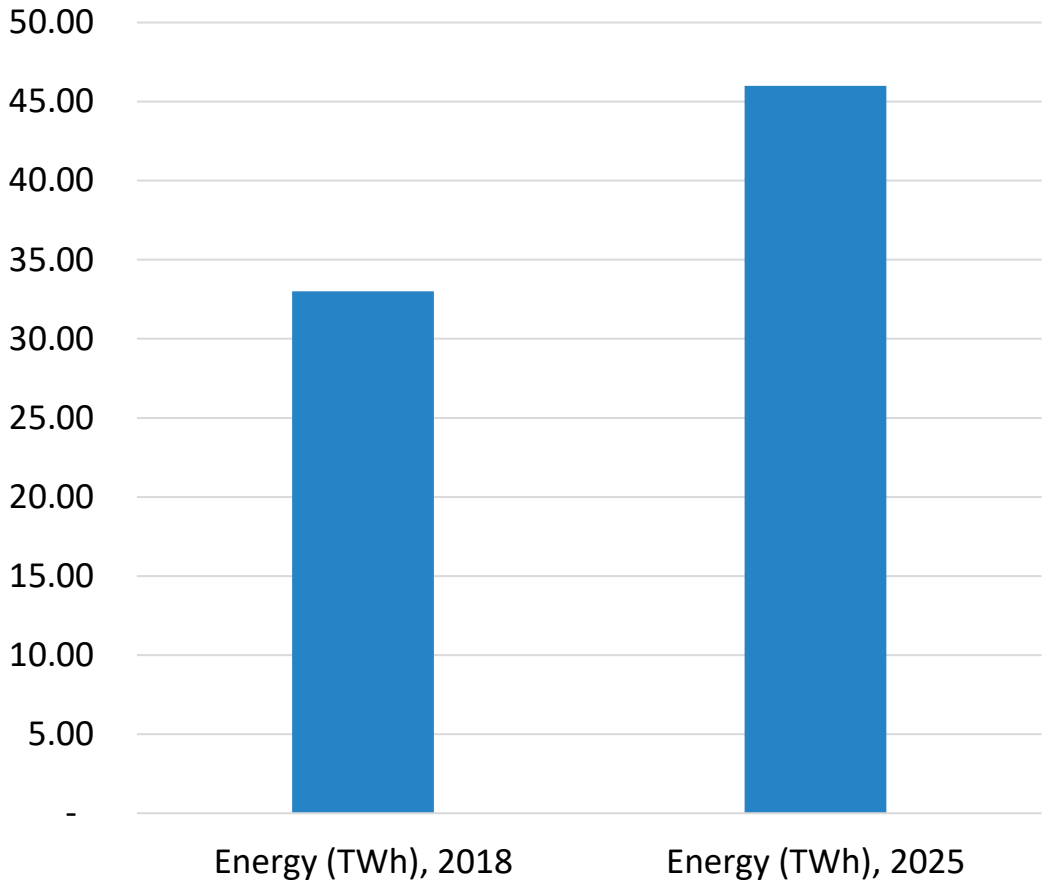
Source: IEA / NCSI

Generation and Demand

Generation and Demand Across Oman’s Various Grids

Generation and Demand

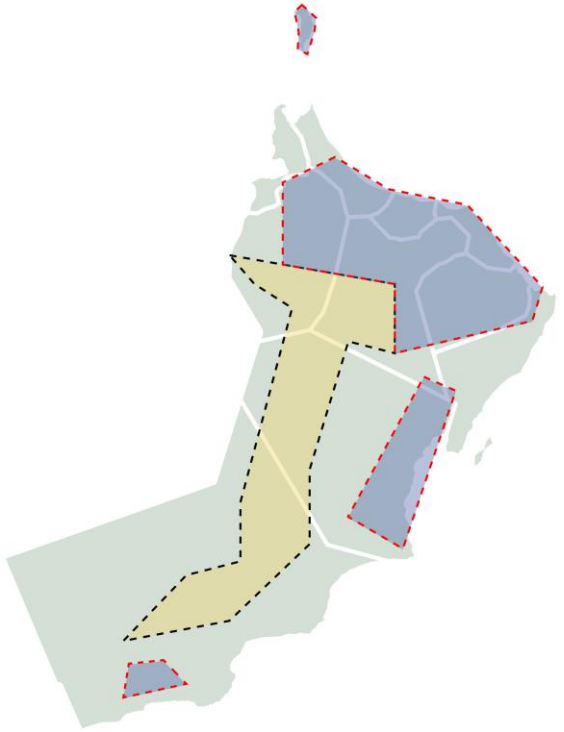
- Average Demand (Power) as well as Energy Consumption (Electricity) for the MIS System is expected to grow 5% per year until 2025 (OPWP)



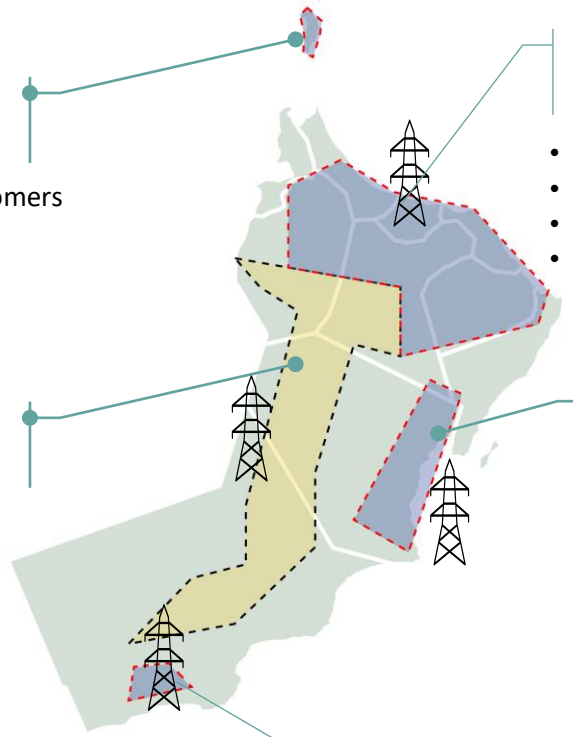
Source: OPWP

Generation and Demand

- In total, Oman's electricity grid is split into 4 Systems:
    - Main Interconnected System
    - Duqm Power System
    - Dhofar Power System
    - Musandam Power System, and
    - PDO (a '5th' and independent system with limited interconnection with the MIS)
- The MIS and Dhofar Power Systems are the primary systems for the country, and in fact 90% of Oman's total peak demand comes from the MIS alone. It should be noted that there is a separate system for Petroleum Development Oman ('PDO'), however that is not covered here in this report. Additionally, the Rural Authority for Electricity Company (RAECo) supplies energy to other areas of the country not connected by the above-mentioned systems. RAECo mainly supplies its customers with energy powered by diesel generators, which accounts for roughly 1.5% of Oman's energy consumption. The other 98.5% of energy is produced through natural gas fired power plants (as of 2019).



Generation and Demand



Musandam Power System

- Covers around 45,155 customers

Main Interconnected System

- **90% of total peak demand**
- **999,825 customers**
- **11 power generation facilities and 3 distribution networks**
- **Interconnected: PDO, Abu Dhabi**

PDO System

Duqm Power System

- Demand in this region is small at around 41 MW of power, this is expected to grow to 173 MW by 2025 due to increased commercial and industrial activities.

Dhofar Power System

- Covers around 110,063 customers
- 2 main generation facilities, a 132 kV transmission grid Existing average capacity is 359 MW

- **400 kV Interconnection:** MIS-PDO-Duqm-Dhofar
  Expected over the next several years (in several phases)

Generation and Demand

- The Main Interconnected System (MIS) extends through the Governorates of Muscat, Buraymi, Al Batinah North, Al Batinah South, Ad Dakhiliyah, Ash Sharaqiyah North, Ash Sharqiyah South and Ad Dhahirah, serving around 999,825 customers.

- The MIS has 11 power generation facilities, owned, and operated by separate companies. It has a 400/220/132 kV transmission grid, owned, and operated by Oman Electricity Transmission Company (OETC), which has recently entered into a sale for 49% of its share to a Chinese company.

- There is a total of 3 distribution networks in the MIS consisting of Muscat Electricity Distribution Company, Mazoon Electricity Company and Majan Electricity Company.

- The MIS is interconnected with the system of Petroleum Development Oman (PDO), the Emirate of Abu Dhabi and other Member States of the GCC Interconnection Authority via the Abu Dhabi Interconnect.
    - The 220 kV interconnection between the Oman (Main Interconnected System) and UAE (Abu Dhabi) power systems has been commercially operational since 2012.

- The Dhofar Power System is not fully integrated with the MIS (although it is integrated with the “central” PDO electrical system using a 132 kV link).
    - Full integration of the North and South systems is expected by 2023 through the use of a 400 kV transmission line.

Generation and Demand

	2019	2020	2021	2022	2023	2024	2025
Contracted Capacity	Net MW[a]						
Manah IPP[b]	264	-	-	-	-	-	-
Al Kamil IPP	291	291	291	-	-	-	-
Barka IWPP[c]	397	397	397	-	-	-	-
Rusail IPP	694	694	694	-	-	-	-
Sohar IWPP	597	597	597	-	-	-	-
Barka II IWPP	688	688	688	688	688	-	-
Sohar II IPP	766	766	766	766	766	766	766
Barka III IPP	766	766	766	766	766	766	766
Sur IPP	2,018	2,018	2,018	2,018	2,018	2,018	2,018
Ibri IPP	1,539	1,538	1,537	1,535	1,535	1,535	1,535
Sohar III IPP	1,744	1,742	1,741	1,738	1,738	1,738	1,738
TOTAL	**9,764**	**9,497**	**9,495**	**7,511**	**7,511**	**6,823**	**6,823**

- Oman's Power and Water Purchase Company (OPWP), is the sole purchaser of electricity in the country (i.e. they have a monopsony in Oman on electricity purchases).
- OPWP has both "contracted capacity" and "non-firm resources" that can supply power when needed. The contracted capacity refers to primary power plants that are contractually obligated to provide a specific capacity in MW upon demand.
- However, non-firm resources can sell power to OPWP but they are not obligated to provide any guaranteed level in MW, and the power they supply is subject to the availability after self-consumption and other obligations. Renewable energy projects such as PV and Wind are considered as non-firm sources in Oman.

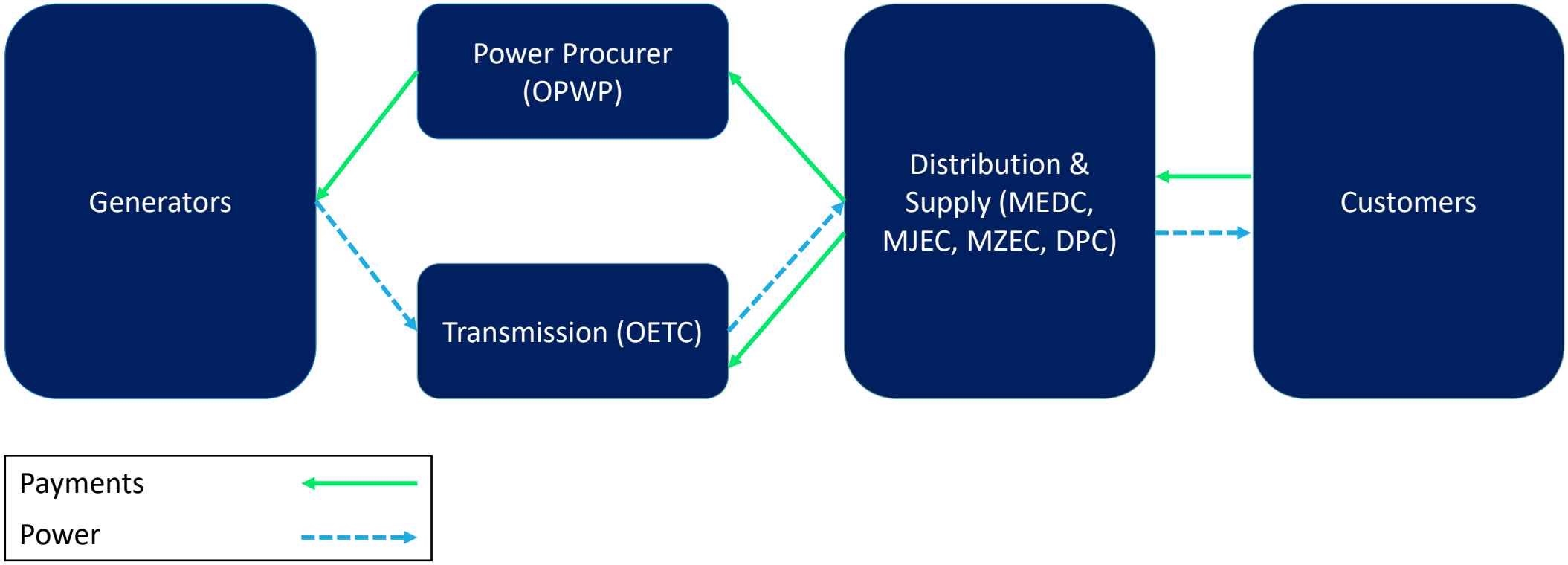
Generation and Demand

- MIS
  - MIS PPAs are with natural gas fired power plants. Total contracted capacity in the MIS is expected to go from 9,764 MW in 2019 to 6,823 MW in 2024 due to expiring contracts. And the total breakdown of all 11 PPAs is shown in the table below:
  - Some of the lost MIS capacity throughout the next 7-eyars will be supplemented with new PPAs in Manah, Duqm and the so-called “Power 2022” and Power 2024”, which the latter two will be a bidding process from existing generators that will have expiring contracts soon.
  - Overall, the peak capacity in 2018 was 6,168 MW and the average capacity was 3,748 MW for the MIS. In 2018, this resulted in an estimated 33 MWh of energy consumed. By 2025, the peak power demand is expected to grow to 8,600 MW and energy consumption to 46 MWh.
  - Development and Implementation of a Demand-Response Program, which should contribute to about 30 MW of capacity by 2021 and 100 MW by 2025.
- Dhofar
  - The Dhofar Power System covers around 110,063 customers. It has 2 main generation facilities, a 132 kV transmission grid operated by OETC and a distribution network owned and operated by Dhofar Power Company. Existing average capacity is 359 MW and is expected to increase to 577 by 2025. In 2018, 3.1 TWh of energy were consumed and this is expected to rise to 5.1 TWh by 2025.
- Duqm
  - All power requirements of the Ad Duqm region of Oman has been met by the Rural Authority for Electricity Company (RAECo). While currently the demand in this region is small at around 41 MW of power, this is expected to grow to 173 MW by 2025 due to increased commercial and industrial activities.
- Musandam
  - The Musandam Power System covers around 45,155 customers. RAECo uses diesel-fired generators with a combined capacity of 83 MW to provide power in parallel with the Musandam IPP which provides 123 MW of capacity to the region.

Electricity Market

Structure, Regulations, and Stakeholders

Electricity Market Structure



Electricity Market Structure

- The Electricity Market in Oman currently operates as a Monopsony, in which OPWP is the sole purchaser and seller of all power in the country. It procures all power in bulk from all generators in the country and provides it to the licensed suppliers (i.e. distribution companies). OPWP is tasked specifically with ensuring that the power and water needs in Oman are satisfied at all time at an the most economically preferred basis possible.

- It is expected that a Spot Market will be developed and implemented sometime in 2020 for the electricity market. The spot market will operate alongside the existing system of long-term PPAs. Thus, additional market players, even those existing generators who have expiring contracts over the next 7-years, will be able to supplement the power supply system on the spot market.

Electricity Market Structure

Electricity Sector	
OPWP	APSR (Regulator)

• Single Buyer for all Electricity
• Planning of the Electricity Sector, including
  • Ensuring sufficient electricity at the lowest cost possible
  • Meeting Growth Expectations and Future Capacity
  • Management (e.g. production)
	• Review and Approval all Capacity and Project Plans for OPWP, OETC, DisCos
	• Sets operating budget for these entities
	• Approves the BST (from OPWP) as well as Distribution / Transmission fees of the CRT
	• Issue Licenses for Electricity Sector
	• Facilitate Privatization of the Sector

**Initial structure of the CRT and the level of all other tariffs requires approval from the Council of Ministers*
**Energy (and Electricity Policy) now set by Ministry of Energy and Minerals (Formerly Ministry of Oil and Gas)*

Responsible Government Departments

- Authority for Public Services Regulation (APSR)
  - Regulator of Electricity Sector
  - [redacted]
  - Executive Director
  - [redacted]
- Oman Power and Water Procurement Company (OPWP)
  - [redacted]
  - Chief Operating Officer
  - [redacted]
- Ministry of Energy and Minerals – Undersecretary (Second in Charge)
  - Policy Maker for Energy and Electricity Sectors
  - [redacted]
  - [redacted]

Renewable Energy in Oman

Plans, Projects, and Trends

Renewables in Oman

- As of 2019, Oman has seen the addition of relatively significant sources of renewable energy to their grids.
  - Completion of PDO's 105 MW Amin Solar PV System (2019), and
  - The 50 MW Dhofar Wind Power System (2019)

- Smaller-scale systems (e.g. rooftop systems) began in earnest in 2017 with schools, commercial buildings, and some industrial facilities as well

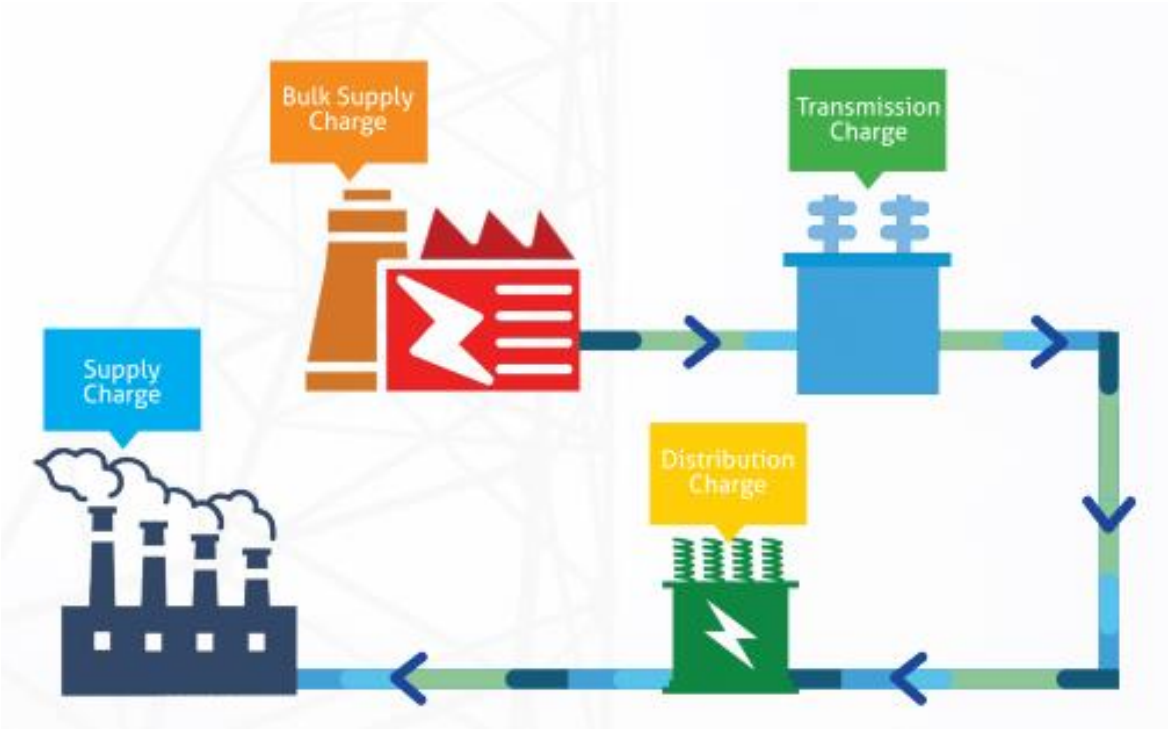
- Policies and Targets: 10% of electricity generation and 30% of electricity generation should be renewable by 2025 and 2030, respectively.

Renewables in Oman

	2019	2020	2021	2022	2023	2024	2025
MW							
MIS - Ibri II Solar IPP	-	-	-	500.00	500.00	500.00	500.00
MIS - Solar IPP 2022	-	-	-	-	500.00	500.00	500.00
MIS - Solar IPP 2023	-	-	-	-	-	500.00	500.00
MIS - Solar IPP 2024	-	-	-	-	-	-	500.00
MIS - Wind IPP 2023	-	-	-	-	-	100.00	100.00
MIS - Barka WTE IPP[c]	-	-	-	-	100.00	100.00	100.00
Duqm - Wind 2024						200.00	
Wind - IPP Capacity Contributions						70.00	
Duqm IPP (CSP/Coal)							600.00
Total Capacity	**-**	**-**	**-**	**500.00**	**1,100.00**	**1,970.00**	**2,800.00**

Renewables in Oman – Incentives

- Sahim 1: Small Scale Grid Connected Systems
  - Can claim an export tariff (i.e. bulk supply tariff) for solar exported to the grid
- Cost Reflective Tariff:
  - Unsubsidized electricity for highest energy consumers
- Sahim 2: Developer-Model Rooftop Program



Renewables in Oman – Incentives

- Reductions in energy consumption are on everyone's radar in Oman:
  - January 01, 2021: Oman put in place the first change to electricity tariffs for the first time since the 1980's
  - Essentially, all subsidies will be removed over the next 4-years
  - No schedule has currently been released on the changes (i.e. gradual removal)
  - Current electricity prices have increased roughly 5% for the average customer, and CRT kicks in at 100 MWh of consumption per annum (compared with 150 MWh)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Oman to phase out water and electricity subsidies in 5 years

New tariffs will be applied for electricity and water services gradually

Published: December 21, 2020 02:42
Tawfiq Nasrallah, Senior News Editor

A view of the Muscat city. The Dubai-Muscat bus service by Oman's Mwasalat has been running for several years with three daily buses.

Renewables in Oman – Incentives

Permitted Tariffs for Consumers below 100 MWh per Year			
Residential	**Before 2020**	***Current (Omani, Less than 2 Accounts)***	***Current (Non-Omani or More than 2 Accounts)***
Tier 1 Range (kWh)	0 - 3,000	0 - 2,000	0 - 500
Tier 1 Tariff (Baiza)	10	15	20
Tier 2 Range (kWh)	3,001 - 5,000	2,001 - 4,000	501 - 1,500
Tier 2 Tariff (Baiza)	15	20	25
Tier 3 Range (kWh)	5,001 - 7,000	Above 4,000	Above 1,500
Tier 3 Tariff (Baiza)	20	30	30
Tier 4 Range (kWh)	7,001 - 10,000	--	--
Tier 4 Tariff (Baiza)	25	--	--
Tier 5 Range (kWh)	Above 10,000	--	--
Tier 5 Tariff (Baiza)	30	--	--

Environmental Policies

Regulations and Climate Related Aspects to Renewables

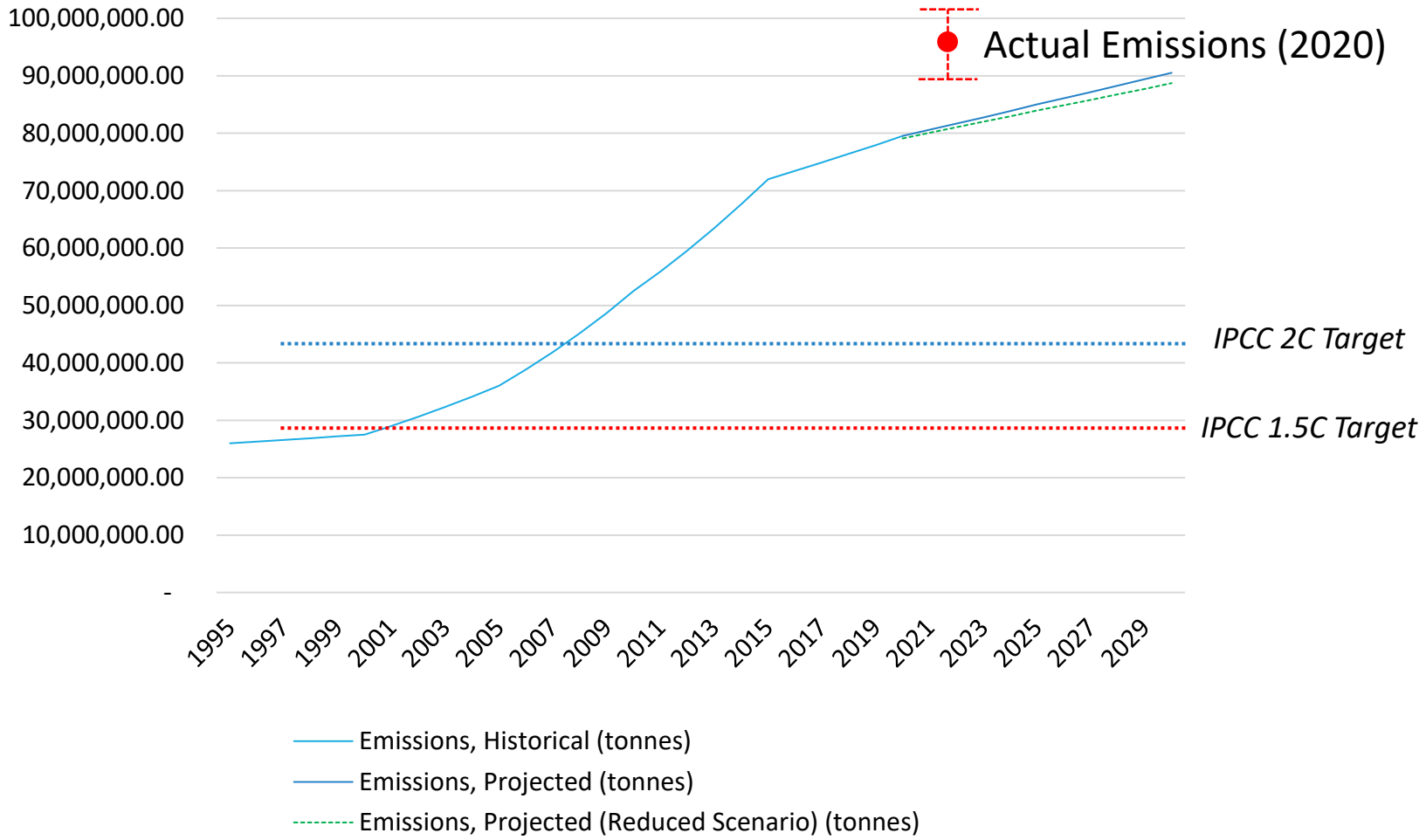
Environmental Policies and Regulations

- The Environmental Authority in Oman enforces Oman's environmental laws and legislation, however there are no regulations specifically targeting renewable energy and the environment in Oman.

- MECA is the National Designated Authority (NDA) for Oman under the Clean Development Mechanism (as part of the Kyoto Protocol), and thus MECA is able to facilitate the registration and approval of carbon credit related projects.

- National Environmental Policy for the Energy Sector (NEPES)
  - The government has announced the development of a National Environmental Policy for the Energy Sector (NEPES) which involves a number of government ministries and public sector bodies that have a stake in promoting the broader uptake of renewables and alternative fuel resources in place of natural gas as a primary fuel resource. Notable are the Public Authority of Electricity and Water (PAEW), Ministry of Regional Municipalities & Water Resources; Ministry of Commerce and Industry, Oman Chamber of Commerce and Industry, Ministry of Oil and Gas, and Oman Power and Water Procurement Company (OPWP). Activities include the preparatory assessment phase of the project which included preliminary engagement with stakeholders, identification of data requirement as well as conducting a baseline assessment of the current situation.

Environmental Policies and Regulations



Environmental Policies and Regulations

- While Oman is working on its National Environmental Policy for the Energy Sector (NEPES), there have been no publicly published details of this or those meetings.
- However, Oman submitted its 2nd National Communication on GHG to the UN in December 2019. In total, Oman's GHG emissions have risen significantly over the last 20 years, and specifically between the year 2000 and 2015 total GHG emissions for the country rose 375% from roughly 20 million tonnes to 95 million tonnes.
- In 2015, nearly 65% (or 61.5 million tonnes) of these emissions came from the energy sector along, while the rest mainly came from industry. Fugitive emissions of methane from the oil and gas sector were a huge contributor to the energy sector, accounting for 35% of all energy related emissions.

IREC Market Potential

Demand, Risks and Outlook

Demand Side Market Potential

- In terms of the demand for renewable energy, there is quite a lot of buy-in from both generators and customers as is described in some of the above sections. Particularly, the introduction of the Cost Reflective Tariff has put pressure on industry and commercial electricity customers to rethink their energy use and ways to reduce their energy bills. Even so, the electricity prices are so low in Oman such that the economics of rooftop solar PV, for example, has too long a payback time for many of these customers to take advantage of. Thus, being able to factor in additional sources of revenue such as RECs might further incentivize more distributed systems around the country.

- In parallel, the government is pushing forward with large utility scale projects, that have better commercials than smaller scale systems. And thus, any additional revenue that these systems can generate will be a welcome piece of added value for them.

- From the electricity customers' side, there is some indication of the private sector looking to set their own internal targets about energy savings or renewables integration. And currently with the economic downturn of COVID-19, it might be an opportune time for some of these companies to not invest the CAPEX/OPEX to build out their own systems, but instead to take advantage of IRECs for claiming that their electricity targets come in part or in whole from renewables.

Analysis of Political Disruption and Market Risk

- 2020 will prove to be a challenge for the whole world due to the COVID-19 health pandemic and economic downturn that followed it. Currently, oil prices are quite low and well below the breakeven point for Oman's budget. This will have the near-term impact of leaving CAPEX investments off the table for a lot of entities, and so IRECs seem like a logical way of those same entities to take advantage of making claims of renewable integration without investing in their own systems.

- Additionally, Oman has had a change in leadership for the first time in 50 years, since 1970 when Sultan Qaboos came to power. In January of 2020, Sultan Qaboos passed away and Sultan Haithim took over as the new leader of the country. The transition was sombre for the country yet smooth and went ahead without protest or other disruptions. Sultan Haithim has expressed his intent to stay in line with the projections of the country and visions put in place by Sultan Qaboos. While this might be expected, there is certain merit to this as Sultan Haithim was serving as the head of Oman's Committee for Vision 2040 while Suntan Qaboos was in power. Vision 2040 has been assessing the current forecasts in Oman's economy and making recommendations on needed changes to strengthen its position domestically and internationally.

Analysis of Regulatory Risks

- In general, the regulatory system in Oman has been moving towards further deregulation, liberalization and privatization over the past 1.5 decades. In 2017, the first ever regulations for small scale grid-connected solar systems were published in Oman and made it possible for these types of systems to be implemented.

- While the electricity tariff structure remains heavily subsidized currently, any future changes would only lead to removing a portion or all of the subsidies, further driving the development of small and large scale solar, wind and waste to energy projects in the country.

- Oman has ratified the Kyoto Protocol and has nominated the Ministry of Environment and Climate Affairs as the National Designated Authority for coordinating Certified Emissions Reductions (Carbon Credits) under the Clean Development Mechanism. There seems to be no impact on or risk with regulations and the CDM.

Existing Energy Certificate Systems:

- As of 2021, Three Pillars Consulting is now the local IREC issuer in Oman.

- Prior to 2021, there had been no plan to bring or develop Guarantees of Origin or similar Renewable Energy Certificates into the country as a policy or regulatory mechanism. After discussions with local stakeholders, some were not aware of the concept of the REC (e.g. OPWP, MOEM), while others such as the regulator were familiar with its concept but had no concrete plans to implement it here in Oman.

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Preparation Date	**May 26th, 2020**

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Environmental and Sustainability Consultancy

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