BUSINESS MONITOR INTERNATIONAL

Q1 2015

www.businessmonitor.com

IRAN

POWER REPORT

INCLUDES 10-YEAR FORECASTS TO 2023

ISSN 1755-7054
Published by:Business Monitor International

Iran Power Report Q1 2015

INCLUDES 10-YEAR FORECASTS TO 2023

Part of BMI's Industry Report & Forecasts Series

Published by: **Business Monitor International**

Copy deadline: December 2014

Business Monitor International
Senator House
85 Queen Victoria Street
London
EC4V 4AB
United Kingdom
Tel: +44 (0) 20 7248 0468
Fax: +44 (0) 20 7248 0467
Email: subs@businessmonitor.com
Web: http://www.businessmonitor.com

CONTENTS

BMI Industry View

BMI View: *Iranian plans to expand its energy sector continue to be hampered by ongoing uncertainty over the outcome of international talks to loosen sanctions on the country. It appears clear that the government intends to press ahead with the construction of nuclear power stations, but perilous government finances could threaten its ability to continue financing new power infrastructure projects. That said, if a deal is reached and Tehran continues investing in the sector, there is significant potential for rapid growth in the years ahead.*

Iran will continue to rely largely on conventional thermal sources for electricity generation, with many of the power projects that are currently under construction slated to increase the nation's natural gas generation capacity. At the same time, the government appears committed to plans to increase its nuclear capacity, plans which had been boosted by progress in talks between Iran and the international community, which could see the US, the EU and other nations ease sanctions on Iran in return for the country ending its pursuit of military nuclear capability. Although the Bushehr plant (at present the country's only nuclear reactor) has suffered from significant teething problems, the plant has now become fully operational. However, progress towards a more wide-ranging deal has stalled and with the deadline for reaching a deal approaching, the outlook for the country's nuclear ambitions remains uncertain.

With abundant natural resources, a large and growing population driving up demand for electricity, and many of the country's neighbours suffering from energy shortfalls, the government will continue to invest in capacity expansion over the coming years, and exports to energy-hungry neighbours such as Turkey and Pakistan have the potential to grow significantly over the coming decade. That said significant challenges lie ahead. In particular, government subsidies continue to play a major role in driving energy consumption in Iran. The government has long harboured plans to scale back subsidies, and introduced a hike in electricity prices early in the year in an effort to boost fiscal coffers. Further moves in this direction are likely over the coming years. While such a move would ease domestic demand for energy, it would be positive from an overall macroeconomic standpoint, and could pave the way for increased exports to its neighbours.

Key Trends And Developments

- The Iranian government announced in September 2014 that it had reached a deal with Russia for the construction of eight new power plants in the country. The preliminary contract, which is worth an estimated USD10bn, will see two power plants built in Tabas in the South Khorasan, two in Tabriz in the East Azarbaijan province and four in Bandar Abbas in Hormuzgan. Russian companies will be invited to submit their proposals in the next stage of the process, with the plants expected to generate up to 2,800MW. Iran has also announced that it will push ahead with the construction of two new nuclear

power plants in the southern province of Bushehr, which is where the country's sole nuclear reactor is located at present. In a statement it claimed to have reached an agreement with **Rosatom** to build the plants, which will have an estimated capacity of 2,000MW.

- The Energy Ministry announced plans to build 35 new dispersed power stations in the next calendar year (which begins in March 2015). The plants will be strategically located across the country's electricity grid in order to overcome bottlenecks in power supply and prevent shortages and outages. The ministry has allocated USD250mn for the construction of the power stations.

- Mohammad Ja'fari, an official with the Energy Ministry, has announced ambitious targets for Iranian electricity exports. He claims that Iran has the capacity to export more than USD20bn worth of electricity and power equipment to neighbouring countries, a figure which is approximately equal to the value of Iranian oil exports. During the period 2014-2023, Iran's overall power generation is expected to increase by an annual average of 3.3%, to reach 313.3TWh. Driving this growth is the build-up of output from the country's first nuclear power facility, which was connected to the grid in 2012 and became fully operational in late 2013. Growth from non-hydro renewables generation is expected to accelerate and deliver an average annual supply growth of 2.5% over the 2013-2023 period.

- Iran's 2014 real GDP is estimated by **BMI** to have grown by 2.8%, following an estimated contraction of 2.9% in 2013. We forecast growth to recover to an average of 3.5% between 2014 and 2023. The population is expected to rise from an estimated 78.5mn in 2014 to 87.3mn by 2023, while net power consumption looks set to see far greater gains, increasing from an estimated 189.9TWh in 2014 to 263.2TWh in 2023. Over 2015-2023, electricity demand is forecast at to grow at an average annual rate of 3.0%.

- Owing partly to the projected rise in net generation, growth of which falls below underlying demand trend, Iran's power supply surplus is likely to increase slightly over the medium term, although the country is keen to develop its power export capability. A decline in the percentage of transmission and distribution (T&D) losses from an estimated 15% in 2014 to 13.8% by end-2023 will further support the widening of the surplus. The forecasted net export capability in 2023 is put at 6.9TWh.

SWOT

Iran Power SWOT

Strengths	▪ Iran has abundant reserves of hydrocarbon wealth, providing the basis for long-term energy self-sufficiency. It is estimated to hold the world's second-largest gas reserves and fourth-largest oil reserves. It also has some hydroelectric resources, abundant sunlight, and despite international opposition, continues to pursue its nuclear power ambitions.
Weaknesses	▪ The price of natural gas to residential and industrial consumers is state controlled at extremely low prices, encouraging rapid consumption growth and replacement of fuel oil, kerosene and liquefied petroleum gas (LPG) demand.
Opportunities	▪ Iran is believed to have the potential to produce some 6.5GW of electricity from wind energy, as well as significant solar power potential. ▪ The country is surrounded by nearby countries, such as India and Pakistan, which face a shortage of electricity, providing an opportunity for Iran to increase production for export. Iran currently trades power with Afghanistan, Armenia, Azerbaijan, Iraq, Pakistan, Turkey and Turkmenistan.
Threats	▪ Although the preliminary deal that was agreed between Iran and the international community is a step in the right direction, a more substantive and long-term deal has yet to be reached and the deadline for ongoing international talks to reach agreement is approaching. ▪ Despite recent steps towards international agreement over Iran's nuclear programme, a full agreement has yet to be reached, which could result in significant capacity expansion.

Industry Forecast

Iran Snapshot

Table: Country Snapshot: Economic and Demographic Data (Iran 2014-2019)

	2014f	2015f	2016f	2017f	2018f	2019f
Nominal GDP, USDbn	420.1	434.9	453.2	487.8	522.2	567.1
GDP per capita, USD	5,354	5,472	5,632	5,990	6,340	6,810
Real GDP growth, % y-o-y	2.8	2.1	3.0	2.6	2.8	3.6
Population, mn	78.5	79.5	80.5	81.4	82.4	83.3

f = BMI forecast. Source: National Sources/BMI

Table: Country Snapshot: Economic and Demographic Data (Iran 2019-2024)

	2019f	2020f	2021f	2022f	2023f	2024f
Nominal GDP, USDbn	567.1	596.7	629.1	658.3	703.1	718.3
GDP per capita, USD	6,810	7,090	7,401	7,671	8,119	8,224
Real GDP growth, % y-o-y	3.6	4.1	4.2	4.0	4.0	4.0
Population, mn	83.3	84.1	85.0	85.8	86.6	87.3

f = BMI forecast. Source: National Sources/BMI

Table: Country Snapshot: Power Sector

Access to Electricity, % of population	**97.9**
Quality of Electricity Supply (Value)	4.7/7
Quality of Electricity Supply (Rank)	72/144

Source: World Economic Forum - Global Competitiveness Report 2012-2013, World Bank, BMI

Iran Power Forecast Scenario

Electricity Generation And Power Generating Capacity

Table: Total Electricity Generation Data And Forecasts (Iran 2013-2018)

	2013	2014f	2015f	2016f	2017f	2018f
Generation, Total, TWh	224.033	228.134	235.719	244.880	254.006	263.720
Generation, Total, % y-o-y	1.295	1.831	3.325	3.887	3.727	3.824
Generation, Total, KWh per capita	2,892.726	2,907.272	2,965.903	3,043.494	3,119.600	3,202.040
Generation, Thermal, TWh	206.625	210.294	217.277	225.764	234.239	243.269
Generation, Thermal, % y-o-y	-1.070	1.776	3.321	3.906	3.754	3.855
Generation, Thermal, KWh per capita	2,667.950	2,679.921	2,733.856	2,805.915	2,876.830	2,953.729
Generation, Thermal, % of total generation	92.230	92.180	92.176	92.194	92.218	92.245
Generation, Coal, TWh	0.401	0.415	0.424	0.428	0.434	0.441
Generation, Coal, % y-o-y	0.300	3.374	2.230	1.100	1.250	1.720
Generation, Coal, KWh per capita	5.177	5.282	5.332	5.324	5.327	5.357
Generation, Coal, % of thermal electricity generation	0.194	0.197	0.195	0.190	0.185	0.181
Generation, Coal, % total electricity generation	0.179	0.182	0.180	0.175	0.171	0.167
Generation, Natural Gas, TWh	150.507	154.119	161.060	169.517	177.967	186.973
Generation, Natural Gas, % y-o-y	-1.500	2.400	4.503	5.251	4.985	5.061
Generation, Natural Gas, KWh per capita	1,943.350	1,964.046	2,026.510	2,106.841	2,185.711	2,270.198
Generation, Natural Gas, % of thermal electricity generation	72.841	73.288	74.126	75.086	75.976	76.859
Generation, Natural Gas, % of total electricity generation	67.181	67.556	68.327	69.224	70.064	70.899
Generation, Oil, TWh	55.717	55.760	55.794	55.819	55.839	55.854
Generation, Oil, % change y-o-y	0.100	0.077	0.060	0.046	0.036	0.027
Generation, Oil, KWh per capita	719.423	710.592	702.015	693.750	685.792	678.173
Generation, Oil, % of thermal electricity generation	26.965	26.515	25.679	24.725	23.839	22.960
Generation, Oil, % of total electricity generation	24.870	24.442	23.670	22.795	21.983	21.179
Generation, Nuclear, TWh	5.256	5.440	5.725	6.010	6.282	6.565
Generation, Nuclear, % y-o-y		3.500	5.230	4.990	4.522	4.500
Generation, Nuclear, KWh per capita	67.866	69.325	72.027	74.697	77.152	79.706
Generation, Nuclear, % of total electricity generation	2.346	2.385	2.429	2.454	2.473	2.489
Generation, Hydropower, TWh	11.951	12.190	12.495	12.867	13.238	13.635

Total Electricity Generation Data And Forecasts (Iran 2013-2018) - Continued						
	2013	2014f	2015f	2016f	2017f	2018f
Generation, Hydropower, % change y-o-y	-1.431	1.998	2.504	2.977	2.888	2.992
Generation, Hydropower, KWh per capita	154.309	155.340	157.214	159.914	162.588	165.548
Generation, Hydropower, % total electricity generation	5.334	5.343	5.301	5.254	5.212	5.170
Hydro-Electric Pumped Storage, TWh	0.000	0.000	0.000	0.000	0.000	0.000
Hydro-Electric Pumped Storage, KWh per capita	0.000	0.000	0.000	0.000	0.000	0.000
Hydro-Electric Pumped Storage, % total electricity generation	0.000	0.000	0.000	0.000	0.000	0.000
Generation, Non-Hydropower Renewables, TWh	0.202	0.211	0.223	0.239	0.247	0.252
Generation, Non-Hydropower Renewables, % change y-o-y	8.928	4.653	5.739	7.130	3.299	2.064
Generation, Non-Hydropower Renewables, KWh per capita	2.601	2.687	2.805	2.968	3.030	3.057
Generation, Non-Hydropower Renewables, % of total electricity	0.090	0.092	0.095	0.098	0.097	0.096

f = BMI forecast. Source: National Sources/BMI

Table: Total Electricity Generation Data And Forecasts (Iran 2019-2023)					
	2019f	2020f	2021f	2022f	2023f
Generation, Total, TWh	275.841	283.950	291.912	301.582	313.270
Generation, Total, % y-o-y	4.596	2.940	2.804	3.313	3.875
Generation, Total, KWh per capita	3,312.634	3,374.391	3,434.450	3,514.625	3,617.931
Generation, Thermal, TWh	254.672	262.024	269.219	278.149	289.001
Generation, Thermal, % y-o-y	4.687	2.887	2.746	3.317	3.901
Generation, Thermal, KWh per capita	3,058.409	3,113.827	3,167.466	3,241.538	3,337.650
Generation, Thermal, % of total generation	92.326	92.278	92.226	92.230	92.253
Generation, Coal, TWh	0.447	0.452	0.441	0.423	0.400
Generation, Coal, % y-o-y	1.410	0.980	-2.500	-3.947	-5.393
Generation, Coal, KWh per capita	5.373	5.369	5.183	4.931	4.623
Generation, Coal, % of thermal electricity generation	0.176	0.172	0.164	0.152	0.139
Generation, Coal, % total electricity generation	0.162	0.159	0.151	0.140	0.128
Generation, Natural Gas, TWh	198.358	205.697	212.897	221.838	232.708
Generation, Natural Gas, % y-o-y	6.089	3.700	3.500	4.200	4.900

Total Electricity Generation Data And Forecasts (Iran 2019-2023) - Continued	2019f	2020f	2021f	2022f	2023f
Generation, Natural Gas, KWh per capita	2,382.127	2,444.452	2,504.807	2,585.294	2,687.535
Generation, Natural Gas, % of thermal electricity generation	77.888	78.503	79.079	79.755	80.522
Generation, Natural Gas, % of total electricity generation	71.910	72.441	72.932	73.558	74.284
Generation, Oil, TWh	55.866	55.875	55.882	55.888	55.892
Generation, Oil, % change y-o-y	0.021	0.016	0.013	0.010	0.008
Generation, Oil, KWh per capita	670.909	664.006	657.475	651.312	645.492
Generation, Oil, % of thermal electricity generation	21.937	21.324	20.757	20.093	19.340
Generation, Oil, % of total electricity generation	20.253	19.678	19.144	18.532	17.842
Generation, Nuclear, TWh	6.775	6.994	7.173	7.353	7.532
Generation, Nuclear, % y-o-y	3.200	3.240	2.560	2.500	2.440
Generation, Nuclear, KWh per capita	81.358	83.117	84.395	85.686	86.986
Generation, Nuclear, % of total electricity generation	2.456	2.463	2.457	2.438	2.404
Generation, Hydropower, TWh	14.135	14.668	15.251	15.807	16.455
Generation, Hydropower, % change y-o-y	3.672	3.768	3.977	3.642	4.104
Generation, Hydropower, KWh per capita	169.753	174.308	179.435	184.209	190.042
Generation, Hydropower, % total electricity generation	5.124	5.166	5.225	5.241	5.253
Hydro-Electric Pumped Storage, TWh	0.000	0.000	0.000	0.000	0.000
Hydro-Electric Pumped Storage, KWh per capita	0.000	0.000	0.000	0.000	0.000
Hydro-Electric Pumped Storage, % total electricity generation	0.000	0.000	0.000	0.000	0.000
Generation, Non-Hydropower Renewables, TWh	0.259	0.264	0.268	0.274	0.282
Generation, Non-Hydropower Renewables, % change y-o-y	2.964	1.904	1.469	2.169	2.870
Generation, Non-Hydropower Renewables, KWh per capita	3.113	3.140	3.154	3.192	3.254
Generation, Non-Hydropower Renewables, % of total electricity	0.094	0.093	0.092	0.091	0.090

f = BMI forecast. Source: National Sources/BMI

Table: Electricity Generating Capacity Data And Forecasts (Iran 2013-2018)

	2013	2014f	2015f	2016f	2017f	2018f
Capacity, Net, MW	59,902.8	61,254.3	62,677.0	64,957.2	66,586.5	68,419.7
Capacity, Net, % y-o-y	1.8	2.3	2.3	3.6	2.5	2.8
Capacity, Conventional Thermal, MW	51,007.9	52,262.7	53,642.4	55,824.3	57,337.1	58,976.9
Capacity, Conventional Thermal, % y-o-y	2.2	2.5	2.6	4.1	2.7	2.9
Capacity, Conventional Thermal, % of total capacity	85.2	85.3	85.6	85.9	86.1	86.2
Capacity, Nuclear, MW	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0
Capacity, Nuclear, % y-o-y	0.0	0.0	0.0	0.0	0.0	0.0
Capacity, Nuclear, % of total capacity	1.7	1.6	1.6	1.5	1.5	1.5
Capacity, Hydropower, MW	7,787.7	7,881.2	7,920.6	8,015.6	8,127.9	8,318.9
Capacity, Hydropower, % y-o-y	0.0	1.2	0.5	1.2	1.4	2.4
Capacity, Hydropower, % of total capacity	13.0	12.9	12.6	12.3	12.2	12.2
Capacity, Non-Hydroelectric Renewables, MW	107.2	110.4	113.9	117.3	121.6	123.9
Capacity, Non-Hydroelectric Renewables, % y-o-y	4.0	3.1	3.2	2.9	3.7	1.9
Capacity, Non-Hydroelectric Renewables, % of total capacity	0.2	0.2	0.2	0.2	0.2	0.2

f = BMI forecast. Source: National Sources/BMI

Table: Electricity Generating Capacity Data And Forecasts (Iran 2019-2023)

	2019f	2020f	2021f	2022f	2023f
Capacity, Net, MW	70,455.7	72,282.1	73,997.3	75,812.8	77,735.0
Capacity, Net, % y-o-y	3.0	2.6	2.4	2.5	2.5
Capacity, Conventional Thermal, MW	60,834.7	62,501.6	64,032.9	65,704.1	67,524.1
Capacity, Conventional Thermal, % y-o-y	3.2	2.7	2.5	2.6	2.8
Capacity, Conventional Thermal, % of total capacity	86.3	86.5	86.5	86.7	86.9
Capacity, Nuclear, MW	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0
Capacity, Nuclear, % y-o-y	0.0	0.0	0.0	0.0	0.0
Capacity, Nuclear, % of total capacity	1.4	1.4	1.4	1.3	1.3
Capacity, Hydropower, MW	8,493.6	8,650.7	8,832.4	8,973.7	9,072.4
Capacity, Hydropower, % y-o-y	2.1	1.9	2.1	1.6	1.1
Capacity, Hydropower, % of total capacity	12.1	12.0	11.9	11.8	11.7
Capacity, Non-Hydroelectric Renewables, MW	127.5	129.8	132.1	135.0	138.5

Electricity Generating Capacity Data And Forecasts (Iran 2019-2023) - Continued					
	2019f	2020f	2021f	2022f	2023f
Capacity, Non-Hydroelectric Renewables, % y-o-y	2.9	1.9	1.7	2.2	2.6
Capacity, Non-Hydroelectric Renewables, % of total capacity	0.2	0.2	0.2	0.2	0.2

f = BMI forecast. Source: National Sources/BMI

Iranian power generation in 2014 is estimated by **BMI** to have reached 228.1TWh, up an estimated 1.8% from the previous year. Overall thermal generation is expected to have fallen by 1.1% but is forecast to accelerate over the course of our forecast period to 2023. We forecast total generation to come in at 235.7TWh in 2015, up 3.3% on 2014 as new power projects come online.

During the period 2015-2023, Iran's overall power generation is expected to increase by an annual average of 3.3%, to 313.3TWh. Driving this growth in the near term is the output from the country's first nuclear power facility, which was connected to the national grid in early 2013, and which became fully operational in late 2013. An increase in natural gas generation is likely to be the main driver of generation growth, and is forecasted to account for 74.3% of total generation in 2023 versus an estimated 67.2% in 2013. Non-hydro renewables are expected to deliver average annual supply growth of 2.5% over the 2013-2023 period.

As a result of significant state investment in the generation sector, a number of new power plants (mainly hydroelectric and combined-cycle) have come online. Conventional thermal sources are expected to remain the dominant fuel for electricity generation, with many power projects under construction or planned set to utilise gas. In the first two months of 2013, Iran inaugurated three power plants, with the Shirkouh power plant, a 484MW combined cycle power plant in the central province of Yazd the most recent. The other two plants are the Shahid Bastami power plant in the city of Shahrood and Quds power plant in the city of Semnan, both of which have a production capacity of 324MW.

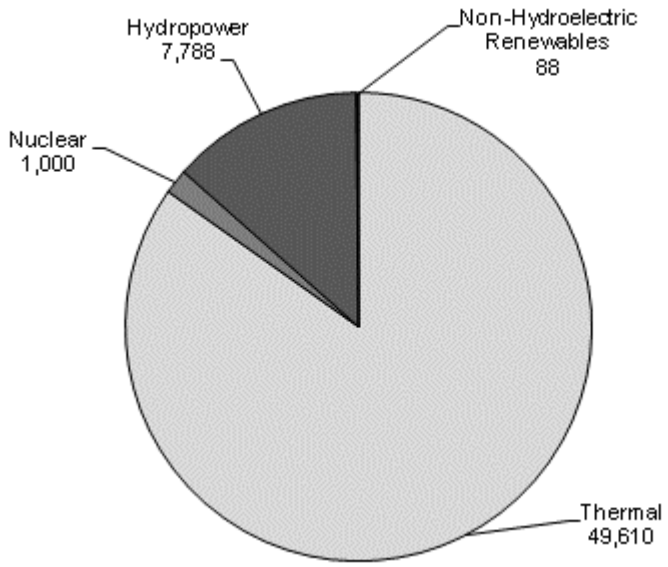
New gas-fired projects include two 1.04GW combined-cycle plants in the south, a 1.3GW combined-cycle plant at Arak, a 1GW facility in Bandar Abbas, and a 1GW combined-cycle plant being built by the **Tehran Regional Electricity Company** in Qom.

India has been assessing plans to build a 6GW gas-fired power plant in Iran. This would be connected to India via a 1,500km high-voltage transmission line. Indian power company NTPC and Indian transmission company **PGCIL** have been evaluating the project, which is estimated to cost USD10bn. The power plant

would be located in Iran, and the majority of electricity generated (approximately 4GW of the 6GW) would then be exported to India. While little has been heard from their Indian counterparts, Mehr news agency quoted Iranian Energy Minister, Majid Namjou, in November 2012, suggesting that India is likely to go ahead with the plan.

Iran Total Capacity (MW)

2012e



e = BMI estimate. Source: UN Data, EIA, BMI

In December 2012, Iran saw its first private combined cycle power plant, with a capacity of 968MW, inaugurated in Reshvanshahr. The former Iranian Energy Minister, Majid Namjou, announced in 2013 that the government is intending to begin more such projects, and plans to convert 12 more thermal plants to combined-cycle facilities. With its neighbours in need of electricity imports, the openness of the country's energy ministry for the private sector to build and export electricity will help grow this sector and meet its aim to export electricity to Lebanon, while expanding trade with several other economies in the region. Namjou stated that the necessary permissions for the building of 80 new power stations.

In September 2011, Iran connected its Bushehr nuclear power plant to the national electricity grid, according to the Atomic Energy Organization of Iran (AEOI). The plant had been operated jointly by

Iranian and Russian technicians since its inauguration, but was handed over to full Iranian management in October. The reactor entered full commercial operation at the end of 2013. Although the plant was forced to shut in late May in the aftermath of an earthquake, full operation resumed in June. Reports in December 2013 suggested that the Iranian and Russian authorities are in talks to begin the construction of a second reactor at Bushehr, with construction to begin in 2014. In September Iran announced that it will push ahead with the construction of two new plants in Bushehr. In a statement it claimed to have reached an agreement with **Rosatom** to build the plants, which will have an estimated capacity of 2,000MW, though the initial target of beginning construction in 2014 appears unlikely to be reached.

In November 2010, Iran opened a new gas power plant in Aliabad Katoul, IRNA reported. The 1GW Aliabad Katoul gas power plant was officially opened on November 17 2010, according to Mehdi Motevallian, the managing director of **Iran Power Plant Investment Company**. The gas power plant, near the northern Iranian city of Gorgan, Golestan province, is equipped with six 162MW units and can generate a total of 972MW. Given the international community's hostile reaction to Iran's nuclear ambitions, and stalling of international talks to reach an agreement over the future of the country's nuclear ambitions, there is a question mark over the timing and scale of Iran's decision to introduce nuclear capacity. We have assumed that the first plant will be scaled gradually up to its full design capacity during the forecast period, but have not included any additional nuclear power stations in our forecasts, despite the government announcing plans for another research reactor to be set up. This also leads us to forecast the increase in natural gas generation as the primary driver of capacity.

Given the tensions between Iran and the developed nations, Iran has often sought allies in other large countries, such as China and Russia. This has come in the form of awarding contracts to companies from these countries and the choice to use their technology and equipment, as opposed to Korean or Japanese. Yet, these relationships have not always been smooth. In late May 2012, Iran's government terminated a contract which had been awarded to China for the construction of the south-western Bakhtiari hydropower plant, according to Energy Minister Majid Namjou. China's proposed USD2bn financial package for the 1,500MW plant was rejected by the Iranian Central Bank, with the project having now been awarded to the Iranian Revolutionary Guard Corps' engineering arm, Khatam al-Anbiya. The cancellation of the contract could have an adverse impact on the economic relationship between China and Iran. Also in May 2012, a 1000MW unit 2 at Bushehr was announced, with construction involving foreign contractors due to begin by March 2014.

That said, the government announced in September 2014 that it had reached a deal with Russia for the construction of eight new power plants in the country. The preliminary contract, which is worth an

estimated USD10bn, will see two power plants built in Tabas in the South Khorasan, two in Tabriz in the East Azarbaijan province and four in Bandar Abbas in Hormuzgan. Russian companies will be invited to submit their proposals in the next stage of the process, with the plants expected to generate up to 2,800MW.

Apart from conventional generation sources, the country is also looking into expanding its renewable generation. The largest hydropower projects are the 2GW Karun 3 plant, the 2GW Godar-e Landar facility and a 1GW station in Upper Gorvand. In July 2006, Abbas Aliabadi, director of **Iran Power and Water Resources Development Company** (IWPCO), announced that Iran planned to add 6.4GW of hydroelectric power generating capacity over five years.

The Karoun-4 Roller-Compacted Concrete (RCC) dam, which sits across the Karoun River in Chaharmahal-Bakhtiari province in Iran, was inaugurated by former president Mahmoud Ahmadinejad on July 6 2011. The IRR12.8bn (USD1.19mn) dam will generate power and provide water for industrial and agricultural purposes in the province. The completion of the dam marks the fact that the country's dam-building industry has become self-sufficient.

Iran is believed to have the potential to produce some 6.5GW of electricity with wind energy. It also has solar power potential, but non-hydro renewables do not currently form a major part of Iranian energy policy. However, there are companies looking to capitalise on this opportunity by indigenise the technology and manufacture of various parts. MAPNA Generator Company is one such company, which is looking to construct nine wind turbines, and manufacture 2.5MW generators by mid-2014, according to Hamid Amini, the company's deputy managing director.

Iran has launched commercial operations at its biggest solar power plant in Mashhad, reports IRNA. The plant, likely to produce 72,000kWh of electricity annually, will produce enough power to meet the requirements of Razavi Khorasan province, according to the plant's CEO, Gholam Reza Karamian. The plant, which has 216 solar panels, has been designed and constructed by native experts. Moreover, the plant has been fitted with solar trackers to improve efficiency.

In May, the government unveiled the country's first materials production line for wind turbines, its first 2MW turbine, as well as its first crane for turbine repairs.

Electricity Consumption

Table: Total Electricity Consumption Data And Forecasts (Iran 2013-2018)

	2013	2014f	2015f	2016f	2017f	2018f
Consumption, Net Consumption, TWh	185.4	189.9	197.5	206.8	213.0	222.7
Consumption, Net Consumption, % y-o-y	1.3	2.4	4.0	4.7	3.0	4.6
Consumption, Net Consumption, KWh per capita	2,394.0	2,419.8	2,485.0	2,569.9	2,616.0	2,704.5

f = BMI forecast. Source: EIA/BMI Calculation

Table: Total Electricity Consumption Data And Forecasts (Iran 2019-2023)

	2019f	2020f	2021f	2022f	2023f
Consumption, Net Consumption, TWh	229.6	238.0	245.6	254.0	263.2
Consumption, Net Consumption, % y-o-y	3.1	3.6	3.2	3.4	3.6
Consumption, Net Consumption, KWh per capita	2,757.6	2,828.1	2,889.6	2,960.1	3,040.2

f = BMI forecast. Source: EIA/BMI Calculation

Iran's 2014 real GDP is estimated by **BMI** to have grown by 2.8%, following an estimated contraction of 2.9% in 2013. We forecast growth to recover to an average of 3.5% between 2014 and 2023. The population is expected to rise from an estimated 78.5mn in 2014 to 87.3mn by 2024, while net power consumption looks set to see far greater gains, increasing from an estimated 189.9TWh in 2014 to 263.3TWh in 2023. Over 2015-2023, electricity demand is forecast to grow at an average annual rate of 3.0%.

That said, significant reforms to the country's elaborate system of electricity subsidies have been introduced in recent years, with further reductions in government spending on subsidies possible in the near term. If the government succeeds in cutting spending on subsidies, our consumption forecasts could prove optimistic.

Transmission & Distribution, Imports & Exports

Table: Electric Power T&D Losses Data And Forecasts (Iran 2013-2018)

	2013	2014f	2015f	2016f	2017f	2018f
Electric power distribution losses, TWh	34.3	34.2	35.0	36.1	38.1	39.2
Electric power distribution losses, % of output	15.3	15.0	14.9	14.7	15.0	14.9

f = BMI forecast. Source: BMI Calculation

Table: Electric Power T&D Losses Data And Forecasts (Iran 2019-2023)

	2019f	2020f	2021f	2022f	2023f
Electric power distribution losses, TWh	40.8	41.8	42.2	42.6	43.2
Electric power distribution losses, % of output	14.8	14.7	14.5	14.1	13.8

f = BMI forecast. Source: BMI Calculation

Table: Trade Data And Forecasts (Iran 2013-2018)

	2013	2014	2015f	2016f	2017f	2018f
Total Net Imports, TWh	-4.3	-4.0	-3.2	-2.0	-2.9	-1.7

f = BMI forecast. Source: EIA/BMI Calculation

Table: Trade Data And Forecasts (Iran 2019-2023)

	2019f	2020f	2021f	2022f	2023f
Total Net Imports, TWh	-5.4	-4.2	-4.1	-4.9	-6.9

f = BMI forecast. Source: EIA/BMI Calculation

Owing partly to the projected rise in net generation, which falls short of the underlying demand trend, Iran's power supply surplus is likely to record slight increases - in line with the country's ambition to develop its power export capability. A decline in the percentage of transmission and distribution (T&D) losses from an

estimated 15.3% in 2013 to 13.8% in 2023 will help balance the market to an extent, though this proportion of losses remains high by international standards. The estimated net export capability in 2023 is put at 6.9TWh, and with many of the country's neighbours suffering from energy shortfalls and growing demand, this will present significant opportunities for the sector in the coming years.

Tavanir is responsible for electricity transmission. Iran has three main power distribution networks: the interconnected network, which serves all of Iran, apart from remote eastern and southern areas, using 440kV and 230kV transmission lines; the Khorassan network, which serves the eastern Khorossan province; and the Sistan and Baluchistan network, which serves the remote south eastern provinces of Sistan and Baluchistan. The government's goal is to join these three networks to establish one national grid.

In December 2004, a protocol was reached on synchronising the power grids of Iran, Azerbaijan and Russia, with 500MW being exchanged at the beginning of 2006. In August 2004, Turkmenistan had started power exports to Iran via a new transmission line (Sarahs). This line added to previous power export capacity from Turkmenistan to Iran via the Balkanat-Gonbad line, which was started in June 2006. Another line is also to be constructed. With more such infrastructure in place, Iran would be in a better position to grow its energy exports to its energy-hungry neighbours.

The government's current five-year investment plan for the power sector sees USD9.8bn spent on the transmission system and a further USD7.1bn ploughed into distribution. Iran has three main power distribution networks and the government's goal is to join these to form one national grid. Additional links to the power grids of neighbouring states are likely in order to facilitate greater regional supply flexibility and accommodate Iranian power exports.

Further extending their energy cooperation, Iran and Russia have signed a letter of intent to accelerate the construction of shared power grids, both between them and regionally, according to a report from the Iranian News Agency.

The Iranian government has entered into agreements with the governments of Russia and Turkey to jointly construct power plants in Iran, with the aim of exporting electricity to other countries, according to Iranian Energy Minister Majid Namjou. Under the terms of the agreement, the Turkish companies will be permitted to construct new power plants and invest in Iran's power sector. In addition, Tehran and Moscow have decided to form a joint venture (JV) to build new power plants. Iran's electricity exports exceeded 5.5TWh in the Iranian year ended March 20 2011.

News agency IRNA has reported that the **Lebanese Electricity Company** has decided to purchase electricity from Iran, as of April 15 2012. Lebanese Prime Minister Najib Mikati referred to a decision by his cabinet to permit the purchase of electricity from Iran and the subsequent participation of Lebanon's representative in a multilateral meeting to be attended by representatives from Syria, Iraq and Iran.

Lebanese sources wrote that Lebanon had started purchasing electricity from Iran - with the first consignment comprising 25MW, which will be increased to 100MW. The sources said that Iran's electricity will be exported to Lebanon via Iraq and Syria. They also noted that since Iran is facing US-imposed economic and financial sanctions, Lebanon's Electricity Company had received the necessary permits from Lebanon's Foreign Ministry.

In addition, Pakistan's Ministry of Power and Water has agreed to extend a contract to import electricity from Iran, it emerged in September. The contract, which runs until 2032, had previously involved the export of 32MW of electricity, but has been increased to 76MW. The decision is an indication of Iran's strengthening relationship with its eastern neighbour, and could signal further export deals in the years ahead.

Qatar, Oman and the United Arab Emirates (UAE) are likely to buy up to USD2bn of Iranian electricity once a gas field in the Arabian Gulf is operational, a senior Iranian energy minister has said, according to Al-Arabiya.

The gas field is to be developed under a USD3.8bn deal between **Iran Offshore Oil Company** and **Iran's Power Projects Management Company**. Exports to the Gulf states are probable.

'The field will result in 3GW of power production, largely available as exports to the UAE, Oman and Qatar,' Iranian deputy energy minister Mohammad Behzad told the Fars news agency in March 2012.

Iraqi news agency Aswat al-Iraq has reported that a new Iranian electricity supply line has started operations, carrying 100MW of imported electricity from Iran. The new line is aimed at meeting the 550MW of power demanded by Wasit province, in the centre of Iraq. The province currently only receives less than 150MW from Iraq's national grid, and consequently suffers from regular electricity blackouts.

Iran will establish two new power transmission lines to boost electricity exports to Turkmenistan, reported the Tehran Times.

Abdolhamid Farzam, an official with the Iranian Energy Ministry, said that the two 400kV lines will provide the opportunity to exchange electricity among Iran, Turkmenistan, Kyrgyzstan and Uzbekistan. Iran plans to connect its power grid to the six countries of the Caspian Sea and the Caucasus region.

Former Minister Namjou said in May 2012 that the government plans to turn the country into a centre for the transit of electricity in the region. The government is following up development plans outside the country pertaining to power and energy and seeks to emerge as the regional power transit hub. He added that Iran seeks to provide countries including, Iraq, Turkey, Afghanistan and Pakistan with electricity.

Namjou said that by the end of the Fifth Five-Year Economic Development Plan (2015), Iran will boost its electricity generation capacity by 25GW to reach 73GW.

Mohammad Behzad, deputy energy minister, said in April that the energy ministry will roll out power projects, which will increase Iran's electricity generation capacity by 5GW in the 2012 calendar year. Over 10GW should be added to the generation capacity of hydroelectric and thermal power plants by August 2013, the last month of former President Ahmadinejad's administration.

Industry Risk/Reward Ratings

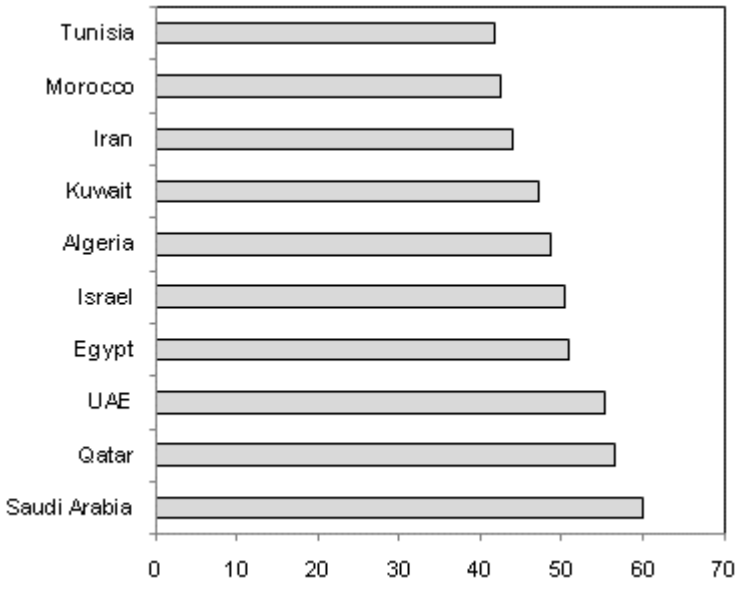
MENA Power Risk/Reward Index

BMI View: *GCC markets continue to outperform in our MENA Power Risk/Reward Index (RRI) - offering investors an appealing blend of low risks and high rewards. Nevertheless, the risks to our index and the broader MENA region have grown considerably this quarter. Security concerns about Islamic State and, over a longer timeframe, falling oil revenues present major challenges for the region.*

Our Middle East and North Africa (MENA) Risk/Reward Index (RRI) have remained stable this quarter but we remain cognisant of the threats to wider regional stability that stem from the security situation in Iraq. Gulf Cooperation Council (GCC) countries will continue to present the most attractive opportunities for investment in the MENA region over our 10-year forecast period. Our positive outlook for the power markets in Saudi Arabia, UAE and Qatar in particular is underpinned by their attractive combination of low risks and high rewards - especially relative to the North African countries in our matrix.

Saudi Set To Outperform

MENA Power Industry Risk/Reward Index, Scores Out Of 100



**higher score = lower risks. Source: BMI*

GCC: Relative Stability In A Volatile Region

Our buoyant view of the GCC is underpinned by our forecasts for robust economic growth, positive demographics, surging demand for electricity and high levels of government spending on power infrastructure. Saudi Arabia leads the region in terms of the value of projects in the pipeline and has outlined plans to draw USD109bn in investment into the solar power sector alone through 2032 - an ambitious target that we view as a statement of intent.

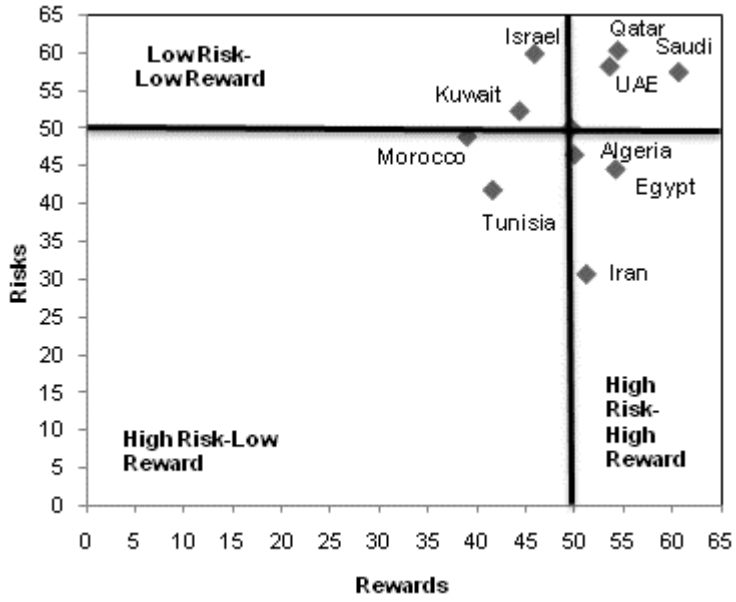
Significant capacity expansion plans across the region will continue to bolster the industry risk scores over the longer term, as will energy mix diversification efforts - as many countries attempt to ensure lucrative hydrocarbons are preserved for export rather than burned domestically.

Robust scores, however, should not be taken for granted. While we certainly expect the three aforementioned GCC countries to maintain their positions close to the top of our table - there are downside risks to these scores. Our Country Risk (CR) team has already highlighted that growth in the GCC will slow over the coming decade as weaker oil prices and only marginal gains in oil output weigh on the all important hydrocarbons sector. While our CR analysts believe economic diversification efforts and a greater emphasis on private consumption will reduce reliance on the oil-export model, this is unlikely to offset declines from the hydrocarbons economy - meaning growth will be slower. This has the potential to weigh on Country Risks scores.

We also highlight that the deterioration in political risk across the region is a major threat to our RRI scores. Political instability and social tensions will remain elevated across North Africa and the Levant (following turbulent political transitions), despite our increasingly optimistic views on both the political and economic prospects for Egypt and Iran. In addition, we now also believe that the escalation of the role played by GCC countries in tackling the threat of Islamic State (IS) could lead to retaliatory action from the jihadist group. In joining a coalition with the US to bomb IS targets in Iraq and Syria, the group is likely to view GCC countries as legitimate targets - potentially raising risk scores.

GCC - Low Risk, High Reward

MENA Risk/Reward Index, Scores Out Of 100



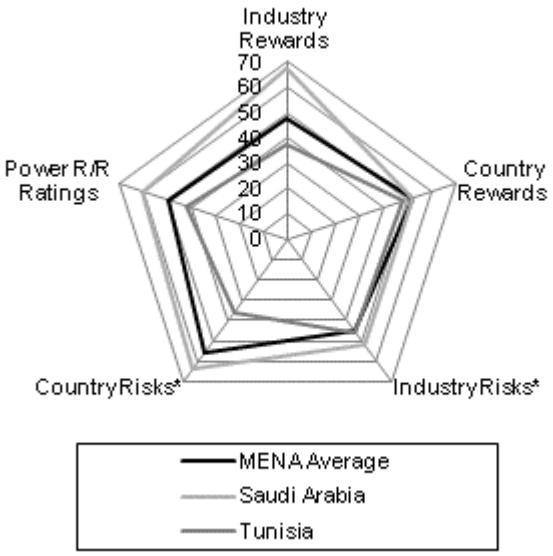
**Saudi Arabia, Qatar and UAE are located in the Low Risks-High Rewards segment of the chart. Source: BMI*

At a sub-regional level, the challenges facing countries in MENA are largely structural and a number of key trends continue to play out:

- **Saudi Arabia** remains the regional outperformer due to its relatively high Industry Risk and Industry Rewards scores. Saudi has the Middle East's most ambitious power sector expansion plans and attempts to diversify the energy mix (to include nuclear and renewables, particularly solar), so as to secure hydrocarbons for export rather than domestic consumption, will create major investment opportunities.
- **Qatar** and the **UAE** remain in second and third place respectively - with their scores unchanged this quarter. Qatar's robust scores are underpinned by government spending, strong economic growth and self-sufficiency in gas. Country Rewards scores will remain high despite downside risks relating to the country's hosting of the 2022 World Cup and ongoing diplomatic tensions between Qatar and several other members of the GCC.
- We forecast robust growth in the UAE economy, as the impact of the debt funding cliff continues to ease. The UAE is the leading renewables player in the GCC, with domestic renewable energy heavyweight **Masdar** (a subsidiary of state-owned **Mubadala Development Company**) using its expertise to drive the expansion of regional renewables capacity.

Stark Regional Contrasts

MENA Power Industry Risk/Reward Index, Scores Out Of 100



**higher score = lower risk. Source: BMI*

- The outlook for **Egypt** continues to improve and we expect a notable uptick in foreign direct investment (FDI) over the next few quarters as low base effects and relative political stability bring investors back into the country after three years of stagnation and decline - potentially boosting Country Risks scores. Furthermore, Infrastructure development will remain a top priority for the government and the introduction of feed in tariffs (FiTs) in September 2014 has the potential to galvanise interest in renewables. We hold a broadly optimistic view of the sector, although the broader issue of subsidy reform continues to cloud the long-term outlook.

- **Iran**'s economy will return to growth in 2014 and our CR team forecast real GDP growth of 3.2% in 2014 and 2.7% in 2015, following a 2.9% contraction in 2013. Better macroeconomic management and a stabilisation of price pressures will lead to an improved outlook for exports and increased business and consumer confidence - boosting Country Rewards scores. The improving economic outlook will give President Hassan Rouhani the political capital to continue negotiations with the West over the country's nuclear programme.

- In **North Africa and the Levant**, many governments are currently attempting to implement highly unpopular economic reforms, yet we note that widespread public opposition and elevated unemployment raise the risk of policy slippage or reversals. Such dynamics could have important ramifications for big ticket power projects, as well as for sub-segments such as nuclear and renewables, for which policy continuity is of paramount importance.

- Nevertheless, the economic outlook for North Africa is improving. Our CR team forecasts an acceleration in economic growth across North Africa in the period to 2018 - following three years of relative stagnation in the wake of the Arab Spring.

- **Morocco** and **Tunisia** will be the outperformers, registering strong growth in fixed investment and exports. We have seen growing amounts of investment into the Moroccan power sector as investors view the country as an export-oriented manufacturing hub that can supply the European market. This should bode well for underlying economic growth and drive demand for new power capacity.

Table: MENA - Power Risk/Reward Index (Scores Out Of 100)

	Limits of potential returns	Power Market	Country Structure	Risks to Realisation of Potential Returns	Market Risks	Country Risk	Power Score	Rank
Saudi Arabia	67.25	52.20	61.46	52.42	63.52	57.18	59.96	1
Qatar	49.50	62.40	54.46	54.04	68.46	60.22	56.48	2
UAE	56.00	49.80	53.62	49.53	69.63	58.14	55.20	3
Egypt	55.25	52.60	54.23	45.35	43.62	44.61	50.86	4
Israel	38.00	57.20	45.38	57.17	63.46	59.87	50.45	5
Algeria	46.00	55.80	49.77	39.08	56.26	46.44	48.61	6
Kuwait	40.00	51.40	44.38	38.48	70.64	52.26	47.14	7
Iran	54.75	45.60	51.23	23.44	40.51	30.76	44.06	8
Morocco	36.00	44.60	39.31	49.59	47.58	48.73	42.61	9
Tunisia	37.50	48.20	41.62	46.25	35.97	41.84	41.70	10

**higher score = lower risk. Source: BMI*

Iran Power Risk/Reward Index

Sizeable demand from its energy-hungry neighbours, coupled with a large and growing population, leave Iran with significant potential in terms of industry rewards. However, international sanctions on the economy, and on the energy industry in particular continue to weigh on its overall score, while risks are high in both industry and country terms.

Rewards

Industry Rewards

Iran's strongest asset in the Industry Rewards segment is its good market coverage, with almost all of the population having access to electricity. Moreover, it has access to other nearby markets, many of which suffer from net energy shortfalls, giving it the opportunity to export any surplus electricity that is produced. It fares less well in terms of overall power consumption, generation and capacity. The country has a below-average score for five-year growth in power generation, generating capacity and demand.

Country Rewards

Boosting the score for Country Rewards is the low level of electricity import dependency. There is above-average growth in population. However, a poor showing in terms of the inflation outlook and real GDP growth, coupled with persistent political unrest in the region, suggests the government may find it hard to raise prices, which will be necessary to stave off overconsumption and encourage new investment.

Risks

Industry Risks

The country's Industry Risk profile is generally unattractive. Iran scores badly for liberalisation levels, its financing, the transparency of the tendering process, as well as its poor outlook for the renewable sector. Weaknesses in these areas create much uncertainty for private sector firms and are likely to hinder the propensity of the private sector to contribute to growth.

Country Risks

Policy continuity helps support Iran's Country Risks score, but the country fares poorly in terms of short-term political stability, institutions and corruption. International opposition to the country's plans to develop its nuclear industry further weigh on the government's domestic power sector, although with international talks to broker an agreement on the issue still ongoing, risks in this regard are to the upside.

Market Overview

Key Policies And Market Structure

Regulation And Competition

Iran's power sector is primarily controlled by state-owned utility **Tavanir**. Power plant construction is handled by the **Iran Power Development Company** (IPDC), a wholly owned subsidiary of Tavanir, which is also responsible for electricity transmission and distribution. However, in recent years the government has taken steps towards privatisation, with a number of power plants having been sold off in IPOs, and further privatisations planned over the coming years. Eventually, Tavanir may be broken up as part of a broader privatisation package.

Iran has received several offers for investment in the form of loans and build-operate-transfer (BOT) contracts. BOT contracts allow the investors to build and operate the generating facility for a period of typically between 15 and 20 years, after which time the plant is turned over to the Energy Ministry. Negotiations have taken place with international energy firms on expansion plans for power plants at Bandar Abbas, Shaid Rajai, Alborz, Ramin and Kerman.

However, progress on moving forward with the BOT arrangements has been relatively slow - not aided by the challenging political climate that acts as a deterrent for foreign investors - with Western sanctions in particular constraining the ability of firms to invest. Following the agreement between Iran and the international community over the country's nuclear programme, which will see external sanctions on Iran reduced, there is potential for a rise in international investment over the coming years. That said, until a more substantive agreement is reached, such an outcome remains far from certain.

In June 2009, Iran's first BOT power plant became fully operational, when the last of six 159MW open-cycle gas turbine generating sets comprising the Chehelsotun power plant in South Isfahan were brought online. The 950MW gas-fired plant was developed by a 50:50 joint venture (JV) between the Iranian investment house **IHAG** and local power contractor **Mapna**. The first unit at the Chehelsotun plant was brought on line in 2005.

In addition to BOT plants, Iran has attempted to promote a build-own-operate (BOO) model for the 2GW Zanjan 1-4 independent power project (IPP). In September 2004, the BOO plan was dealt a setback due to a lack of bidders. Overall, Iran is planning 5.8GW of BOT projects and 7GW of BOO projects.

In June 2005, the World Bank was invited by the government of Iran to engage in a dialogue on reform of the power sector, as well as to identify areas of cooperation. In January 2006, a workshop was held in Tehran to discuss private sector participation in the power sector and the development of a power exchange. During this workshop, the World Bank presented international lessons learned and was further informed of the government's plans for power sector reform.

In February 2010, Iran began the process of privatising a number of the country's power plants. Iran's deputy energy minister, Mohammad Behzad, announced plans to privatise 20 power plants in the first half of the 2010/11 Iranian calendar year, and to date 18 plants have been sold off to the private sector.

The power plants have so far been privatised via IPO. This is the method which has been used to privatise stakes in other state-owned companies over the past few years. Iran has the financial infrastructure in place to successfully carry out the IPO, but there is concern as to the identities of potential subscribers.

An amendment to Article 44 of the Iranian Constitution, in 2004, allowed for the privatisation of state-owned companies and in 2007, Supreme Leader Ayatollah Ali Khamenei called for the process to be sped up. In spite of this constitutional mandate, privatisation has historically proceeded very slowly, perhaps in large part due to resistance among elements of the regime to ceding control of the state-dominated economy to the private sector.

Majid Salehi, the Managing Director of Iran Power Development Company, has revealed that around 28 new power plants will begin production by the end of the government's tenure in the next Iranian year, starting March 2013. Investment of approximately IRR50trn (USD4.1bn) will be required for the projects, which will be developed as part of the energy ministry's Mehr Mandegar programme. The 648MW Kermanshah Power Plant will be the first to start production, while the gas-fired units of the Zanjan, Semnan and Shahround power plants should become operational in the coming months. The ministry has granted permits for the private sector construction of renewable energy power plants, with a combined production capacity of 12GW, according to **Iran Renewable Energy Organisation**'s Managing Director, Yousef Armodeli.

Pricing

Electricity prices are heavily subsidised in Iran placing a heavy burden on the government's fiscal health. In 2008, the government enacted a subsidy reform plan in an effort to improve the government's financial position and curb consumption to leave room to boost electricity exports. Gas and petrol prices are also heavily subsidised, and in an effort to improve efficiency and conservation of energy, the government is likely to continue in its efforts to raise prices, which will leave more Iranian gas production for electricity generation purposes. A second phase of this subsidy reform plan was initiated in 2014, with Tavanir announcing a further 25% price hike in early 2014, which has gone some way towards restraining consumption in the sector, and raises the potential for the country to boost its export sector.

Iran Power Projects Database

Table: Key Power Projects Database

Project Name	Value (USDmn)	Capacity	Companies	Timeframe	Status
Gas-fired power plant	10,000	6,000MW	Power Grid Corporation of India Ltd (PGCIL), National Thermal Power Corporation (NTPC)	2009-	At planning stage (The project also includes a 1,500km high voltage transmission link to transfer power to India. 5,000MW may be transmitted to India and balance 1,000MW may be transmitted to Pakistan)
177 Dams Construction Project,Iran					Approved (November 2008- Government has approved construction)
Gas-fired power plant near to the Zahedan		1,000MW		2009-	Announced (2010)
8 electricity power plants in Khuzestan		6000MW		2008-	Announced
Bushehr Nuclear Power Plant	11,000	700MW	Rosatom, Atomstroyexpert	1994-2011	Completed (September 2011 - Connected to National grid)
Iran-Russia electricity grid link				2008-	Contract Awarded (Letter of intent signed, RAO UES

Key Power Projects Database - Continued

Project Name	Value (USDmn)	Capacity	Companies	Timeframe	Status
					seeking the project)
Cycle Power Plant, Heris, East Azerbaijan province	675	1,200MW	Zenel Company, Tavanir	2008-	Contract Awarded (Expected to complete within 2 years)
Iran-Turkey Transmission Line	1,500	2,000MW			Contract Awarded (Memorandum signed)
Rudbar-E-Lorestan Hydropower Project on Rudbar River, Zagros Mountain	9.52	450MW	PAPyry Infrastructure & Environment business group	2011-2014	Under construction (December 2011- Excavation of Rudbar-e-Lorestan Tunnel Spillways Began)
Ghadir Solar and Wind Power Plant	4,500	1,000MW			Contract Awarded (January 2011)
Iran-Armenia 3rd electricity transmission line	110	650MW			At planning stage (June 2011- At final planning stages)
Tehran Biomass Plant		2MW		2010-	Announced
Jarandaq wind power plant, Qazvin		60MW			Feasibility studies/EIA under way
Karachilare (Ghareh Chilar) Hydropower Plant, Aras River		130MW	Farab Company Iran		At planning stage (February 2013)
Electricity transmission line to Iran from Armenia		1,200MW	Sanir		Approved (A consortium of Iran's private sector companies to provide financial assistance of USD571mn)
Expansion of Aras River hydropower plant to 1.7GW					

**blank space = not available. Source: BMI*

Competitive Landscape

Iran's power sector is controlled by state-owned **Tavanir**, which has authority over power generation and electricity transmission. Plans to break up Tavanir as part of a broader privatisation package have long been in the pipeline and some steps towards greater levels of privatisation in the sector have been taken over the past year.

An amendment to Article 44 of the Iranian Constitution, in 2004, allowed for the privatisation of state-owned companies and in 2007, Supreme Leader Ayatollah Ali Khamenei called for the process to be sped up. In spite of this constitutional mandate, privatisation has historically proceeded very slowly, in large part due to resistance among parts of the regime to ceding control of the state-dominated economy to the private sector.

Nevertheless, move towards increased involvement of the private sector have gathered steam in recent years. In June 2009, Iran's first build, operate, transfer (BOT) power plant became fully operational, when the last of six 159MW open-cycle gas turbine generating sets in the Chehelsotun power plant in South Isfahan were brought online. The 950MW gas-fired plant, the first to be completed in Iran under a BOT agreement, was developed by a 50:50 joint venture (JV) between Iranian investment house **IHAG** and local power contractor **Mapna**. The first unit at the Chehelsotun plant was brought online in 2005.

In February 2010, Iran's deputy energy minister, Mohammad Behzad, announced plans to privatise 20 power plants by September 2010, the end of the first half of the 2010/11 Iranian calendar year. Behzad stated that a proposal for privatising six new power plants had been submitted to the Iranian Privatisation Organisation and that a further four would be proposed by the end of the year, according to the Mehr News Agency. These 10 joined 10 power plants that were already approved for privatisation.

The power plants were privatised via an initial public offering (IPO). This is the method which has been used to privatise stakes in other state-owned companies over the past few years.

Construction of 10 power plants has been transferred to the private sector, state-utility Tavanir stated in June 2010, according to a report in Iran Daily, although no further details were disclosed. The country needs 5GW of new electrical power every year, which requires private participation, according to Tavanir's deputy head, Gholam Reza Khoshkholq.

Regional Overview

MEA Power Regional Overview

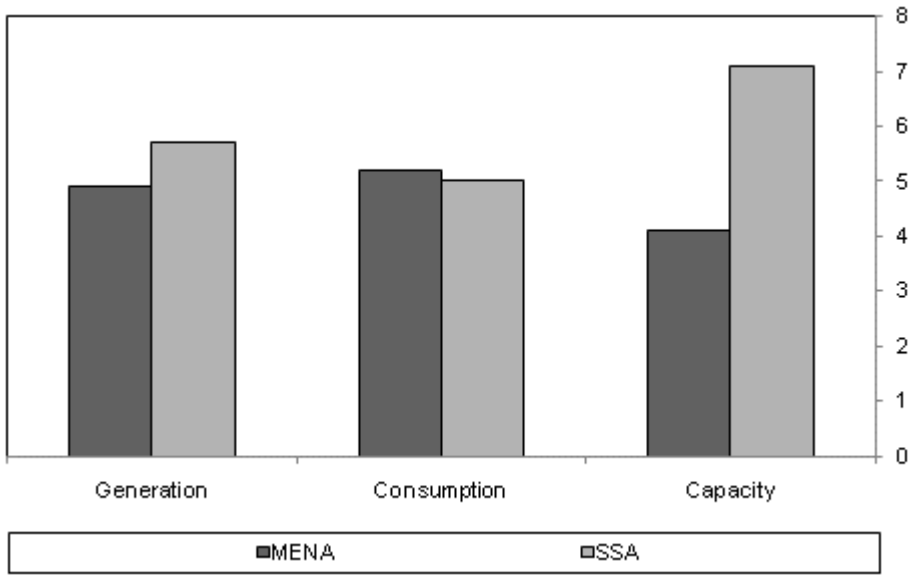
***BMI View**: We have maintained our forecasts for the majority of the power markets in the Middle East and Africa (MEA) this quarter, with the exception of Saudi Arabia. While we remain constructive towards the growth outlook of the sector, we are cognisant of the considerable risks to investment - such as political and social upheaval and falling commodity prices - across MEA.*

Intermittent electricity supply and inadequate power infrastructure are some of the most significant barriers to growth in the Middle East and Africa (MEA) region, with the dire state of the region's broader power sector often cited as a major issue that constrains economic growth and investment. This is particularly evident in Sub-Saharan African (SSA), with the region's 48 countries generating less electricity than Spain alone. The situation in the Middle East and North Africa (MENA) region is markedly better, which can be attributed in no small way to the six economies of the Gulf Cooperation Council (GCC) and Israel.

This quarter, we have maintained our forecasts for the majority of power markets in the MEA region, with the exception of Saudi Arabia. For Saudi Arabia, we revised up our long-term forecasts for renewable energy to reflect the country's ambitious renewable energy plan.

MENA To Outpace SSA

MEA - Regional Power Sector Growth In 2015 (% Change y-o-y)



Source: BMI, EIA

MENA: Stable, Slight Revisions On Renewables Growth

Our 2015 forecast for electricity consumption growth in MENA remains unchanged this quarter at 5.2%. This is higher than our consumption growth forecast for SSA, which is due to ambitious capacity expansion plans, easier access to financing, and stronger operating environments among the countries in the MENA region. We highlight that government spending and fixed investment in Middle Eastern countries are likely to remain robust over the short term. This is due to plans by the governments of Qatar, UAE and Saudi Arabia to spend heavily on infrastructure.

We note that political instability and social tensions in MENA are likely to remain elevated in 2015. This will be particularly evident in North Africa and the Levant, where political transitions have been turbulent. As such, the outlook for many of the countries outside the GCC is mixed - especially for some of the more volatile 'crisis states'.

Meanwhile, we have revised up our long-term forecasts for renewable energy generation in Saudi Arabia this quarter. The government has placed a strong emphasis on solar energy, and has announced a plan to

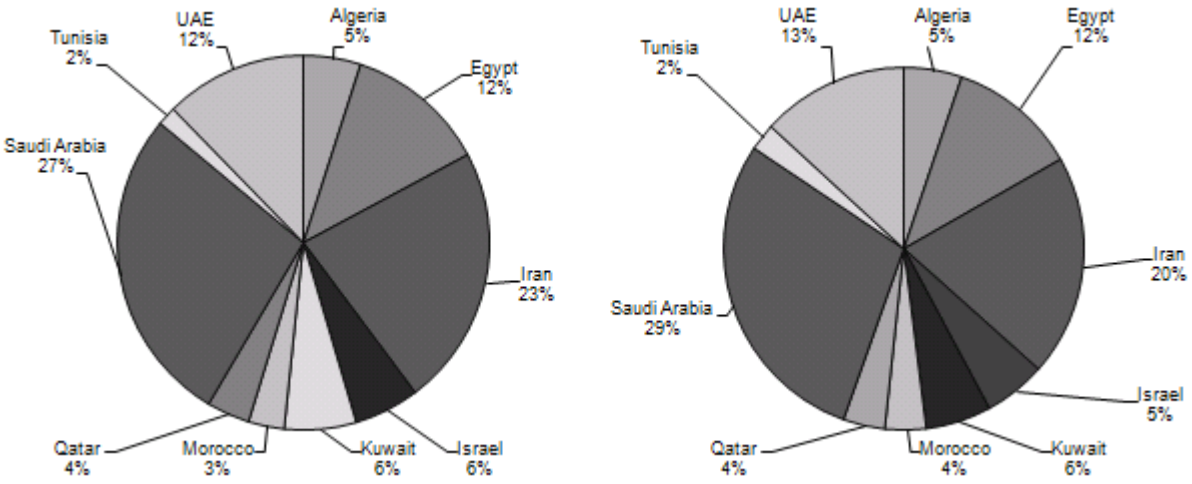
install 6GW of solar capacity by 2020 and 41GW by 2032 at a cost of around USD109bn. In fact, domestic oil giant **Saudi Aramco** had earlier this year, taken steps to strengthen its presence in the solar sector (*see 'Aramco's Commercial Expertise To Accelerate Solar Expansion', May 28*), while five plants (of undisclosed capacity) received regulatory approval from the government in September. As such, we believe that the Saudi Arabian government will be able to achieve its 2020 solar target, and have revised up our solar forecasts between 2016 and 2023 (*see 'Demand Powering Nuclear Ambitions, Solar Potential', September 26*).

Here are the major trends in the MENA power sector:

- Momentum for renewable energy continues to grow. Besides Saudi Arabia, several other countries have taken steps to encourage growth in the renewables sector. For instance, Algeria introduced a feed-in tariff programme for solar PV power plants in mid-2014 to help the country achieve its ambitious renewable energy (*see 'Solar Prospects Boosted But Sizeable Risks Ahead', May 7*). UAE-based renewable heavyweight **Masdar** has also launched a number of renewable energy projects in its domestic market (*see 'Masdar: Primed To Export Renewables Expertise', June 18*), and now appears poised to export its technical expertise to other less-advanced renewable markets in the GCC.
- The outlook for the economies of several countries in the region is improving. We expect a notable uptick in foreign direct investment in Egypt as low base effects and relative political stability bring investors back into the country after three years of stagnation and decline. Meanwhile, we expect Iran's economy to continue on its path of recovery in 2015, following a contraction in GDP in 2013.
- There is growing momentum for subsidy reform in the GCC. Electricity prices for the wealthiest citizens in Egypt increased by 20% in May, and we expect the country to introduce additional energy subsidy reforms in late-2014 and early 2015 as gas-supply shortages and crises in the power sector continue (*see 'Energy Subsidy Reform: Piecemeal But Proceeding', April 14*).

GCC Will Continue To Dominate

MENA - Capacity Mix 2014 (LHS) And 2022 (RHS), % By Country



Source: BMI, EIA

SSA: Potential Still Being Held Back

We have maintained our short- and long-term electricity consumption growth forecasts for the SSA region this quarter, and expect consumption to grow by 5.0% in 2015. We note that the power sectors of most countries in SSA still face many key obstacles. In particular, we highlight low domestic borrowing rates and weak government finances as key obstacles for fixed asset development in SSA.

We note that there is significant scope for political tensions to rise across SSA in 2015, with Nigeria, Cote d'Ivoire and Tanzania set to hold elections. Succession issues will continue to plague presidents in Zambia and potentially Zimbabwe. In Nigeria and Cote d'Ivoire, our Country Risk team believes that both incumbent presidents, Goodluck Jonathan and Alassane Quattara respectively, will win - but that both polls could be divisive and could serve to harden political divisions. This raises the political risk premium and is a downside risk to investment in these power markets.

Here are the major developments in the SSA:

- China is now SSA's largest export market, and the closer economic ties between China and the region are increasingly resulting in occasional tensions between the governments and businesses of both parties (*see 'China-Africa: Challenges Will Increase As Relationship Deepens', June 23*). We note that Chinese companies are extremely active in the power market in SSA, and the majority of large power projects in the region have a high degree of Chinese involvement.
- We have seen progress on a number of mega-hydropower projects across SSA in recent months. The Grand Renaissance dam in Ethiopia and the Inga III hydropower facility in the Democratic Republic of Congo (DRC) are the most ambitious. However, we remain cautious with regards to the timely realisation of such expensive and ambitious projects.
- We maintain a cautious stance on South Africa. The country's is experiencing some economic deterioration due to the slowdown in China and the ongoing retrenchment in the all-important gold mining sector. That said, we note that the government's decision to push back the proposed implementation of a carbon tax from 2015 to 2016 is likely to benefit the majority of electricity producers in the country given the country's reliance on coal.

We also expect to see a host of SSA countries continue to make attempts to attract independent power producers and encourage private investment. Nigeria is a case in point as it gradually moves to liberalise its power sector. That said, we highlight that difficult operating environments, concerns about corruption and transparency, as well as fuel supply shortages, will continue to hinder private investors and crimp electricity generation and capacity expansion.

Glossary

Table: Glossary Of Terms	
bn: billion	**IPP: independent power producer**
capex: capital expenditure	km: kilometres
CEE: Central and Eastern Europe	kW: kilowatt (10^3 watts)
CHP: combined heat and power plants	kWh: kilowatt hour
DoE: US Department of Energy	LNG: liquefied natural gas
e/f: estimate/forecast	MEA: Middle East and Africa
EBRD: European Bank for Reconstruction and Development	mn: million
EIA: US Energy Information Administration	MoU: memorandum of understanding
EM: emerging markets	MW: megawatt (electric) (10^6 watts)
EU ETS: European Union Emissions Trading System	MWh: megawatt hour
EU: European Union	na: not available/applicable
EWEA: European Wind Energy Association	NGL: natural gas liquids
FDI: foreign direct investment	OECD: Organisation for Economic Co-operation and Development
FiT: feed-in tariff	OPEC: Organization of the Petroleum Exporting Countries
FTA: free trade agreement	PV: solar photovoltaics
GDP: gross domestic product	RES: renewable energy sources
GHG: greenhouse gas	R&D: research and development
GW: gigawatt (10^9 watts)	t: metric ton = tonne (1 t = 1,000 kg)
GWh: Gigawatt hour (1 GWh = 3.6 TJ)	TPES: total primary energy supply
GWEC: Global Wind Energy Council	trn: trillion
IAEA: International Atomic Energy Agency	TW: terawatt (1012 watts)
IEA: International Energy Agency	TWh: terawatt hour (1 TWh = 3.6 PJ)
IMF: International Monetary Fund	
IPO: initial public offering	

Source: BMI

Methodology

Industry Forecast Methodology

BMI's industry forecasts are generated using the best-practice techniques of time-series modelling and causal/econometric modelling. The precise form of model we use varies from industry to industry, in each case determined, as per standard practice, by the prevailing features of the industry data being examined.

Common to our analysis of every industry is the use of vector autoregressions. They allow us to forecast a variable using more than the variable's own history as explanatory information. For example, when forecasting oil prices, we can include information about oil consumption, supply and capacity.

When forecasting for some of our industry sub-component variables, however, using a variable's own history is often the most desirable method of analysis. Such single-variable analysis is called univariate modelling. We use the most common and versatile form of univariate models: the autoregressive moving average model (ARMA).

In some cases, ARMA techniques are inappropriate because there is insufficient historic data or data quality is poor. In such cases, we use either traditional decomposition methods or smoothing methods as a basis for analysis and forecasting.

We mainly use OLS estimators and in order to avoid relying on subjective views and encourage the use of objective views, we use a 'general-to-specific' method. We mainly use a linear model, but simple non-linear models, such as the log-linear model, are used when necessary. During periods of 'industry shock', for example poor weather conditions impeding agricultural output, dummy variables are used to determine the level of impact.

Effective forecasting depends on appropriately selected regression models. **BMI** selects the best model according to various different criteria and tests, including but not exclusive to:

- R^2 tests explanatory power; adjusted R^2 takes degree of freedom into account;
- Testing the directional movement and magnitude of coefficients;
- Hypothesis testing to ensure coefficients are significant (normally t-test and/or P-value);
- All results are assessed to alleviate issues related to auto-correlation and multi-collinearity.

BMI uses the selected best model to perform forecasting.

Human intervention plays a necessary and desirable role in all of our industry forecasting. Experience, expertise and knowledge of industry data and trends ensure analysts spot structural breaks, anomalous data, turning points and seasonal features where a purely mechanical forecasting process would not.

Sector-Specific Methodology

- **Generation And Consumption Data**

A number of principal criteria drive our forecasts for each generation and consumption variable, with the following identity forming the basis of our forecast model:

"Total consumption = total generation + total net imports - transmission and distribution losses"

- **Total Generation**

Total generation is defined as the process of producing electric energy or the amount of electric energy produced by transforming other forms of energy, commonly expressed in kilowatthours (kWh) or related units.

While gross electricity production is measured at the terminals of all alternator sets in a station, and thus includes the energy taken by station auxiliaries and losses in transformers that are considered integral parts of the station, net electricity production is defined as gross production less own use of power plants.

According to the International Energy Agency (IEA), the difference between gross and net production is generally observed to be about 7% for conventional thermal stations, 1% for hydro stations and 6% for nuclear.

Historical figures for electricity generation are based on data published by the US Energy Information Administration (EIA) and the World Bank, and consider net electricity production. Whenever possible, we compare these data with accounts published by government/ministry sources and official data of the companies operating in each country.

BMI's electricity generation forecasts examine the sector with a bottom-up approach, forecasting electricity production for each resource in order to calculate the value of total generation. The regression model used

to calculate generation considers real GDP, industrial production, fixed capital formation, population and fiscal expenditure.

- **Total Consumption**

Total consumption is commonly expressed in kilowatt hours (kWh) or related units.

Historical figures for electricity consumption are based on data published by the EIA. Whenever possible, we compare these data with accounts published by government/ministry sources and official data of the companies operating in each country. Our electricity consumption forecasts are based on a regression similar to the model illustrated above for electricity generation.

- **Total Net Imports**

Historical figures for net imports are computed as total imports, minus total exports, based on data from the EIA. Our total net imports forecasts are calculated as total consumptions, minus total generation, plus transmission and distribution losses.

- **Transmission And Distribution Losses**

Transmission and distribution losses include electric energy lost due to the transmission and distribution of electricity. Much of the loss is thermal in nature.

Our historical figures for electricity transmission and distribution losses are computed as generation, plus net imports, minus consumptions. However, transmission and distribution losses are calculated using a regression model in the forecasts.

- **Electricity Generating Capacity Data**

Electricity generation capacity is defined as the maximum output, commonly expressed in megawatts (MW) or related units, that generating equipment can supply to system load, adjusted for ambient conditions.

Historical figures for electricity generation capacity are based on data published in UN statistical databases. Whenever possible, we compare these data with accounts published by government/ministry sources and official data of the companies in each country.

Our electricity generation capacity forecasts examine the sector with a bottom-up approach, forecasting capacity for each resource to calculate the total value of capacity in each country. Our electricity generation capacity forecasts are based on a regression similar to the model illustrated above for electricity generation.

Sources

BMI uses publicly available information to compile the country reports and collate historical data. Sources used in power industry reports include those from international bodies mentioned above, such as the EIA, the World Bank and the UN as well as local energy ministries, officially released company figures, national and international bodies and associations and news agencies.

Risk/Reward Index Methodology

BMI's Risk/Reward Index (RRI) provide a comparative regional ranking system evaluating the ease of doing business and the industry-specific opportunities and limitations for potential investors in a given market. The RRR system divides into two distinct areas:

Rewards: Evaluation of a sector's size and growth potential in each state, and also broader industry/state characteristics that may inhibit its development. This is broken down into two sub-categories:

- Industry Rewards. This is an industry-specific category taking into account current industry size and growth forecasts, the openness of market to new entrants and foreign investors, to provide an overall score for potential returns for investors.
- Country Rewards. This is a country-specific category, and factors in favourable political and economic conditions for the industry.

Risks: Evaluation of industry-specific dangers and those emanating from the state's political/economic profile that call into question the likelihood of anticipated returns being realised over the assessed time period. This is broken down into two sub-categories:

- Industry Risks. This is an industry-specific category whose score covers potential operational risks to investors, regulatory issues inhibiting the industry and the relative maturity of a market.
- Country Risks. This is a country-specific category in which political and economic instability, unfavourable legislation and a poor overall business environment are evaluated.

We take a weighted average, combining industry and country risks, or industry and country rewards. These two results in turn provide an overall Risk/Reward Index, which is used to create our regional ranking system for the risks and rewards of involvement in a specific industry in a particular country.

For each category and sub-category, each state is scored out of 100 (100 being the best), with the overall Risk/Reward Index a weighted average of the total score. Importantly, as most countries and territories evaluated are considered by **BMI** to be 'emerging markets', our score is revised on a quarterly basis. This

ensures the score draws on the latest information and data across our broad range of sources, and the expertise of our analysts.

Indicators

In constructing these scores, the following indicators have been used. Almost all indicators are objectively based.

Table: Power Risk/Reward Index Indicators

	Rationale
Rewards	
Industry Rewards	
Electricity capacity, MW, 5-year average	Objective measure of size of sector, based on BMI's power forecasts. The larger the sector, the greater the opportunities.
Electricity generation, GWh, 5-year average	Objective measure of size of sector, based on BMI's power forecasts. The larger the sector, the greater the opportunities.
Electricity generation, %, 5-year average	Objective measure of growth potential, based on BMI's power forecasts. Rapid growth results in increased opportunities.
Electricity consumption, GWh, 5-year average	Objective measure of size of sector, based on BMI's power forecasts. The larger the sector, the greater the opportunities.
Electricity consumption, %, 5-year average	Objective measure of growth potential, based on BMI's power forecasts. Rapid growth results in increased opportunities.
Access to electricity, % of population	Objective measure of size of sector. The larger the sector, the greater the opportunities. Low electricity coverage is proxy for pre-existing limits to infrastructure coverage.
Country Rewards	
Real GDP growth, %, 5-year average	Proxy for the extent to which structure of economy is favourable to the power sector. The more substantial the growth rate, the greater the demand and the need for additional generation.
GDP per capita, %, 5-year average	Proxy for the extent to which structure of economy is favourable to the power sector. The more substantial the growth rate, the greater the demand and the need for additional generation.
Population, % change y-o-y	Proxy for extent to which demographic dynamics are favourable to power sector. The more substantial the growth rate, the greater the demand and the need for additional generation
Imported raw material dependence	Objective measure taken from BMI's Oil & Gas service. It gives an indication of a renewables market's exposure to thermal fuel imports, namely gas.
Electricity import dependence	Objective measure of sector. Denotes underlying risks to the security of power sector. The lower the imports, the greater the energy security.
Inflation, 5-year average	Proxy for the extent to which structure of economy is favourable to the power sector. The lower the inflation, the better the financial outlook of power projects.
Risks	
Industry Risks	
Liberalisation level	Subjective evaluation against BMI-defined criteria. Evaluates barriers to entry.

Power Risk/Reward Index Indicators - Continued	
	Rationale
Financing	Objective measure from BMI's Infrastructure Project Finance scores. It quantifies the risks to both raising financing and repayment of project loans over the course of a project's life
Renewables outlook	Objective measure taken from our Infrastructure service. Used as a gauge to measure the potential and sophistication of renewable sector
Transparency of tendering process	Subjective evaluation against BMI-defined criteria. Evaluates predictability of operating environment.
Country Risks	
Short-term political stability	From BMI's Country Risk Index (CRI). Denotes health of political structure, including various indicators such as policy making-process, social stability and security/external threats and policy continuity.
Policy continuity	Subjective score from CRI. Denote predictability of policy over successive governments.
External risk	From CRI. Denotes vulnerability to external shock, which is principal cause of economic crises.
Institutions	From CRI. Denotes strength of legal institutions in each state. Security of investment can be a key risk in some emerging markets.
Corruption	From CRI. Denotes risk of additional illegal costs/possibility of opacity in tendering/ business operations, affecting companies' ability to compete.

Source: BMI

Given the number of indicators/datasets used, it would be inappropriate to give all sub-components equal weight. The following weighting has been adopted:.

Table: Weighting Of Indicators	
Component	**Weighting, %**
Rewards	65, of which
Industry Rewards	40, of which
Electricity capacity, MW, 5-year average	10
Electricity generation, GWh, 5-year average	5
Electricity generation, %	8
Electricity consumption, GWh	5
Electricity consumption, %	8
Access to electricity, % of population	4
Country Rewards	25, of which
Real GDP growth, %, 5-year average	5
GDP per capita, %, 5-year average	5

Weighting Of Indicators - Continued	
Component	**Weighting, %**
Population, % change	5
Imported raw material dependence	3.5
Electricity import dependence	3.5
Inflation, 5-year average	3
Risks	35
Industry Risks	20, of which
Liberalisation level	4
Financing	6
Renewables outlook	6
Transparency of tendering process	4
Country Risks	15, of which
Short-term political stability	4
Policy continuity	2
External risk	3
Institutions	3
Corruption	3

Source: BMI