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INCLUDES 10-YEAR FORECASTS TO 2024

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BMI Industry View

BMI View: *Iran's 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 fund 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 has 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, it 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. Moreover, with the recent dip in international energy prices - which has had a deleterious impact on government finances - forcing the government to cut back spending, there is a risk of greater political unrest in the coming months. As pressure on the government mounts, there is potential that it may decide to adopt a more belligerent position in international talks in an effort to boost its popularity.

Nevertheless, 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 government has announced a further 20% increase in electricity prices, to be implemented in early 2015, on top of the 25% increase that was announced last year. The move is a response to a quickly-worsening budget position (the result of the fall in oil prices), though remains in line with Tehran's broader goal of reducing its energy subsidy bill. 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. In recent months Iran has announced several deals with its neighbours for the export of electricity, including Turkey and Pakistan.
- During the period 2015-2024, Iran's overall power generation is expected to increase by an annual average of 3.3%, to 295.1TWh. 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.
- Iran's 2014 real GDP is estimated by **BMI** to have grown by 1.2%, following an estimated contraction of 1.9% in 2013. We forecast growth to recover to an average of around 3.5% between 2014 and 2024. 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 254.1TWh in 2024. Over 2015-2024, electricity demand is forecast at to grow at an average annual rate of around 3%.

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 13.4% by end-2024 will further support the widening of the surplus. The forecast net export capability in 2024 is put at around 7TWh.

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. ▪ The country's status in the international community has constrained its ability to pursue its nuclear ambitions, with suspicions about Tehran's desire to produce nuclear weapons causing Western countries to impose economic sanctions on Iran.
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 states, 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.

Industry Forecast

Iran Snapshot

Table: Country Snapshot: Economic and Demographic Data (Iran 2013-2018)

	2013	2014e	2015f	2016f	2017f	2018f
Nominal GDP, USDbn	504.7	483.3	409.5	428.1	467.8	504.7
Real GDP growth, % y-o-y	-1.9	1.2	1.4	3.1	2.8	3.0
GDP per capita, USD	6,516	6,159	5,152	5,321	5,744	6,128
Population, mn	77.4	78.5	79.5	80.5	81.4	82.4

e/f = BMI estimate/forecast. Source: National sources, BMI

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

	2019f	2020f	2021f	2022f	2023f	2024f
Nominal GDP, USDbn	543.1	575.4	606.4	643.8	678.2	715.6
GDP per capita, USD	6,521	6,838	7,134	7,502	7,832	8,193
Real GDP growth, % y-o-y	3.2	3.8	3.8	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	2014e	2015f	2016f	2017f	2018f
Generation, Total, TWh	223.561	227.561	231.152	236.491	241.792	247.700
Generation, Total, % y-o-y	1.300	1.789	1.578	2.310	2.242	2.443
Generation, Total, KWh per capita	2,886.626	2,899.967	2,908.444	2,939.230	2,969.593	3,007.524
Generation, Thermal, TWh	206.625	210.289	213.464	218.308	223.136	228.539
Generation, Thermal, % y-o-y	-1.070	1.773	1.510	2.269	2.212	2.421
Generation, Thermal, KWh per capita	2,667.950	2,679.861	2,685.883	2,713.239	2,740.465	2,774.880
Generation, Thermal, % of total generation	92.425	92.410	92.348	92.311	92.284	92.265
Generation, Coal, TWh	0.401	0.410	0.419	0.424	0.429	0.436
Generation, Coal, % y-o-y	0.300	2.205	2.230	1.100	1.250	1.720
Generation, Coal, KWh per capita	5.177	5.223	5.271	5.264	5.267	5.297
Generation, Coal, % of thermal electricity generation	0.194	0.195	0.196	0.194	0.192	0.191
Generation, Coal, % total electricity generation	0.179	0.180	0.181	0.179	0.177	0.176
Generation, Natural Gas, TWh	150.507	154.119	157.252	162.065	166.868	172.248
Generation, Natural Gas, % y-o-y	-1.500	2.400	2.032	3.061	2.964	3.224
Generation, Natural Gas, KWh per capita	1,943.350	1,964.046	1,978.596	2,014.226	2,049.406	2,091.410
Generation, Natural Gas, % of thermal electricity generation	72.841	73.289	73.667	74.237	74.783	75.369
Generation, Natural Gas, % of total electricity generation	67.323	67.727	68.029	68.529	69.013	69.539
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	26.516	26.137	25.569	25.025	24.440
Generation, Oil, % of total electricity generation	24.923	24.504	24.137	23.603	23.094	22.549
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	2.351	2.391	2.477	2.541	2.598	2.650
Generation, Hydropower, TWh	11.478	11.624	11.750	11.944	12.138	12.355

Total Electricity Generation Data And Forecasts (Iran 2013-2018) - Continued	2013	2014e	2015f	2016f	2017f	2018f
Generation, Hydropower, % change y-o-y	-1.448	1.269	1.086	1.651	1.621	1.787
Generation, Hydropower, KWh per capita	148.209	148.132	147.846	148.449	149.073	150.010
Generation, Hydropower, % total electricity generation	5.134	5.108	5.083	5.051	5.020	4.988
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	0.208	0.214	0.229	0.236	0.241
Generation, Non-Hydropower Renewables, % change y-o-y	8.928	3.199	2.784	7.098	3.291	2.058
Generation, Non-Hydropower Renewables, KWh per capita	2.601	2.649	2.689	2.844	2.903	2.929
Generation, Non-Hydropower Renewables, % of total electricity	0.090	0.091	0.092	0.097	0.098	0.097

e/f = BMI estimate/forecast. Source: National sources, BMI

Table: Total Electricity Generation Data And Forecasts (Iran 2019-2024)	2019f	2020f	2021f	2022f	2023f	2024f
Generation, Total, TWh	253.479	262.387	270.437	279.037	286.914	295.108
Generation, Total, % y-o-y	2.333	3.514	3.068	3.180	2.823	2.856
Generation, Total, KWh per capita	3,044.087	3,118.139	3,181.790	3,251.885	3,313.556	3,378.872
Generation, Thermal, TWh	233.731	241.905	249.345	257.470	264.856	272.544
Generation, Thermal, % y-o-y	2.272	3.498	3.075	3.259	2.869	2.903
Generation, Thermal, KWh per capita	2,806.924	2,874.740	2,933.632	3,000.545	3,058.803	3,120.516
Generation, Thermal, % of total generation	92.209	92.194	92.201	92.271	92.312	92.354
Generation, Coal, TWh	0.442	0.447	0.456	0.469	0.479	0.488
Generation, Coal, % y-o-y	1.410	0.980	2.000	3.000	2.000	2.000
Generation, Coal, KWh per capita	5.313	5.309	5.361	5.469	5.529	5.591
Generation, Coal, % of thermal electricity generation	0.189	0.185	0.183	0.182	0.181	0.179
Generation, Coal, % total electricity generation	0.175	0.170	0.169	0.168	0.167	0.166
Generation, Natural Gas, TWh	177.422	185.583	193.007	201.113	208.485	216.160
Generation, Natural Gas, % y-o-y	3.004	4.600	4.000	4.200	3.666	3.681

Total Electricity Generation Data And Forecasts (Iran 2019-2024) - Continued						
	2019f	2020f	2021f	2022f	2023f	2024f
Generation, Natural Gas, KWh per capita	2,130.702	2,205.425	2,270.796	2,343.763	2,407.783	2,474.949
Generation, Natural Gas, % of thermal electricity generation	75.909	76.717	77.406	78.111	78.717	79.312
Generation, Natural Gas, % of total electricity generation	69.995	70.729	71.369	72.074	72.665	73.248
Generation, Oil, TWh	55.866	55.875	55.882	55.888	55.892	55.895
Generation, Oil, % change y-o-y	0.021	0.016	0.013	0.010	0.008	0.006
Generation, Oil, KWh per capita	670.909	664.006	657.475	651.312	645.492	639.976
Generation, Oil, % of thermal electricity generation	23.902	23.098	22.412	21.707	21.103	20.509
Generation, Oil, % of total electricity generation	22.040	21.295	20.664	20.029	19.480	18.941
Generation, Nuclear, TWh	6.775	6.994	7.204	7.384	7.564	7.744
Generation, Nuclear, % y-o-y	3.200	3.240	3.000	2.500	2.440	2.380
Generation, Nuclear, KWh per capita	81.358	83.117	84.757	86.054	87.359	88.669
Generation, Nuclear, % of total electricity generation	2.673	2.666	2.664	2.646	2.636	2.624
Generation, Hydropower, TWh	12.725	13.234	13.632	13.921	14.224	14.541
Generation, Hydropower, % change y-o-y	3.000	4.000	3.000	2.120	2.183	2.224
Generation, Hydropower, KWh per capita	152.823	157.275	160.379	162.229	164.276	166.486
Generation, Hydropower, % total electricity generation	5.020	5.044	5.041	4.989	4.958	4.927
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	0.248	0.253	0.257	0.262	0.270	0.280
Generation, Non-Hydropower Renewables, % change y-o-y	2.951	1.899	1.476	2.177	2.878	3.582
Generation, Non-Hydropower Renewables, KWh per capita	2.983	3.008	3.022	3.058	3.118	3.202
Generation, Non-Hydropower Renewables, % of total electricity	0.098	0.097	0.095	0.094	0.094	0.095

f = BMI forecast. Source: National sources, BMI

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

	2013	2014e	2015f	2016f	2017f	2018f
Capacity, Net, MW	59,648.7	60,994.1	62,409.9	63,739.6	65,336.1	67,133.3
Capacity, Net, % y-o-y	1.8	2.3	2.3	2.1	2.5	2.8
Capacity, Conventional Thermal, MW	50,744.0	51,992.3	53,364.9	54,595.8	56,075.4	57,679.1
Capacity, Conventional Thermal, % y-o-y	2.2	2.5	2.6	2.3	2.7	2.9
Capacity, Conventional Thermal, % of total capacity	85.1	85.2	85.5	85.7	85.8	85.9
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	1.6	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	13.1	12.9	12.7	12.6	12.4	12.4
Capacity, Non-Hydroelectric Renewables, MW	117.0	120.6	124.4	128.1	132.8	135.4
Capacity, Non-Hydroelectric Renewables, % y-o-y	3.9	3.1	3.2	3.0	3.7	1.9
Capacity, Non-Hydroelectric Renewables, % of total capacity	0.2	0.2	0.2	0.2	0.2	0.2

e/f = BMI estimate/forecast. Source: National sources, BMI

Table: Electricity Generating Capacity Data And Forecasts (Iran 2019-2024)

	2019f	2020f	2021f	2022f	2023f	2024f
Capacity, Net, MW	69,128.9	70,918.9	72,600.6	74,379.5	76,262.0	78,256.0
Capacity, Net, % y-o-y	3.0	2.6	2.4	2.5	2.5	2.6
Capacity, Conventional Thermal, MW	59,496.0	61,126.2	62,623.8	64,258.3	66,038.2	67,973.1
Capacity, Conventional Thermal, % y-o-y	3.2	2.7	2.5	2.6	2.8	2.9
Capacity, Conventional Thermal, % of total capacity	86.1	86.2	86.3	86.4	86.6	86.9
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	1.4	1.4	1.4	1.3	1.3	1.3
Capacity, Hydropower, MW	8,493.6	8,650.7	8,832.4	8,973.7	9,072.4	9,126.8
Capacity, Hydropower, % y-o-y	2.1	1.9	2.1	1.6	1.1	0.6
Capacity, Hydropower, % of total capacity	12.3	12.2	12.2	12.1	11.9	11.7
Capacity, Non-Hydroelectric Renewables, MW	139.3	142.0	144.4	147.5	151.4	156.0

Electricity Generating Capacity Data And Forecasts (Iran 2019-2024) - Continued						
	2019f	2020f	2021f	2022f	2023f	2024f
Capacity, Non-Hydroelectric Renewables, % y-o-y	2.9	1.9	1.7	2.2	2.6	3.0
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

Iranian power generation in 2014 is estimated by **BMI** to have reached 227.6TWh, up an estimated 1.8% from the previous year. Overall thermal generation is expected to have risen by 1.8% and is forecast to accelerate over the course of our forecast period to 2024. We forecast total generation to come in at 231.2TWh in 2015, up 1.6% on 2014 as new power projects come online.

During the period 2015-2024, Iran's overall power generation is expected to increase by an annual average of 3.3%, to 295.1TWh. 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 became fully operational in late 2013. An increase in natural gas generation is likely to be the main driver of generation growth, and is forecast to account for 73.2% of total generation in 2024 versus 68% in 2015. Non-hydro renewables are expected to deliver average annual supply growth of 2.5% over the 2015-2024 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.

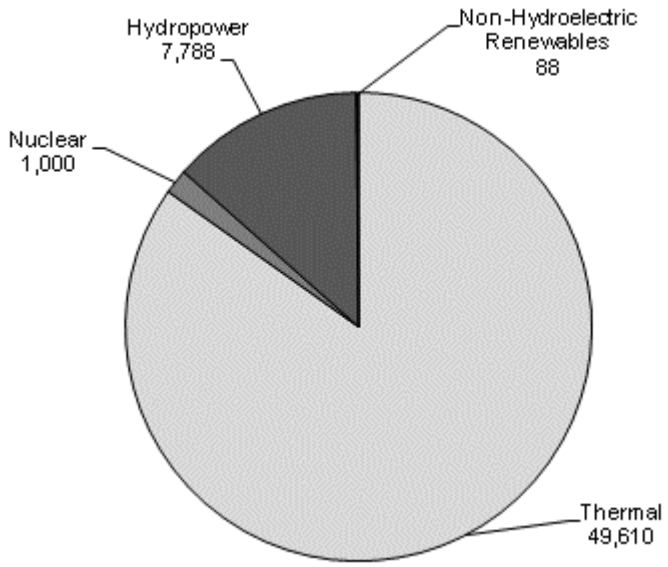
New gas-fired projects include two 1.04GW combined-cycle plants in the south, a 1.3GW combined-cycle plant at Arak, a 1GW facility in Bandar Abbas, and a 1GW combined-cycle plant being built by the **Tehran Regional Electricity Company** in Qom.

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. The plant has been shut for refuelling for two months in early 2015, however, this is a planned outage in order to prepare for peak of demand which occurs during the summer months. The government has also recently signed an agreement with Russia for the country to continue supplying services to the plant.

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.

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	2014e	2015f	2016f	2017f	2018f
Consumption, Net Consumption, TWh	185.4	189.9	193.3	198.5	204.5	210.3
Consumption, Net Consumption, % y-o-y	1.3	2.4	1.8	2.7	3.0	2.9
Consumption, Net Consumption, KWh per capita	2,394.0	2,419.8	2,431.9	2,467.1	2,511.3	2,553.9

e/f = BMI estimate/forecast. Source: BMI Calculation, EIA

Table: Total Electricity Consumption Data And Forecasts (Iran 2019-2024)

	2019f	2020f	2021f	2022f	2023f	2024f
Consumption, Net Consumption, TWh	216.0	223.5	230.5	238.0	245.9	254.1
Consumption, Net Consumption, % y-o-y	2.7	3.5	3.1	3.3	3.3	3.3
Consumption, Net Consumption, KWh per capita	2,593.7	2,656.0	2,711.8	2,773.6	2,839.7	2,909.4

f = BMI forecast. Source: BMI Calculation, EIA

The Iranian 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 254.1TWh in 2024. Over 2015-2024, electricity demand is forecast to grow at an average annual rate of around 3%.

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	2014e	2015f	2016f	2017f	2018f
Electric power distribution losses, TWh	34.2	34.2	34.4	34.8	36.2	36.9
Electric power distribution losses, % of output	15.3	15.0	14.9	14.7	15.0	14.9

e/f = BMI estimate/forecast. Source: BMI Calculation

Table: Electric Power T&D Losses Data And Forecasts (Iran 2019-2024)

	2019f	2020f	2021f	2022f	2023f	2024f
Electric power distribution losses, TWh	37.5	38.6	39.1	39.5	39.5	39.5
Electric power distribution losses, % of output	14.8	14.7	14.5	14.1	13.8	13.4

f = BMI forecast. Source: BMI Calculation

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

	2013	2014e	2015f	2016f	2017f	2018f
Total Net Imports, TWh	-3.9	-3.5	-3.5	-3.2	-1.1	-0.5

e/f = BMI estimate/forecast. Source: BMI Calculation, EIA

Table: Trade Data And Forecasts (Iran 2019-2024)

	2019f	2020f	2021f	2022f	2023f	2024f
Total Net Imports, TWh	0.0	-0.3	-0.9	-1.6	-1.5	-1.5

f = BMI forecast. Source: BMI Calculation, EIA

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 15.0% in 2014 to 13.4% in 2024 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.

Industry Risk/Reward Index

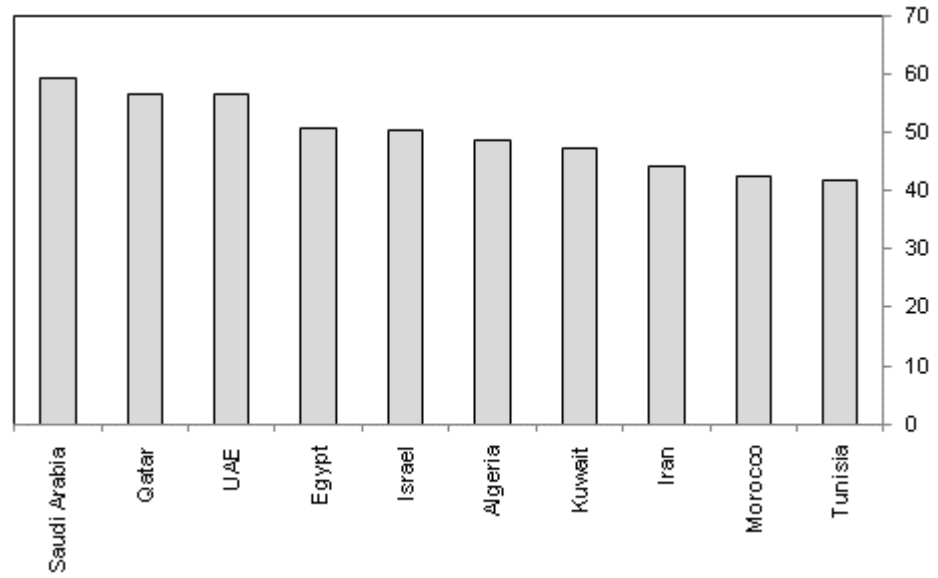
MENA Power Risk/Reward Index

BMI View: *The biggest risks to the MENA Power Risk/Reward Index (RRI) are falling global oil prices and heightened regional instability as a result of the ongoing security crises in Iraq and Syria. In this environment the GCC countries will continue to outperform, particularly Saudi Arabia, the UAE and Qatar, which are relatively insulated from oil price volatility and offer investors in the power sector an attractive combination of low risks and high rewards.*

Gulf Cooperation Council (GCC) countries will continue to outperform other countries in our Middle East and North Africa (MENA) Risk/Reward Index (RRI) thanks to an appealing blend of low risks and high rewards. Nevertheless, we remain cognisant of the threats to broader regional political and economic stability. We emphasise that the biggest risks facing investors in the MENA power sector stem from both oil price volatility - and the impact of lower oil prices on the fiscally vulnerable oil exporting countries - as well as the security threats posed by the ongoing crises in Iraq, Syria and Libya.

Saudi Set To Outperform

MENA Risk/Reward Index, Overall Power Risk/Reward Score (Scores Out Of 100)



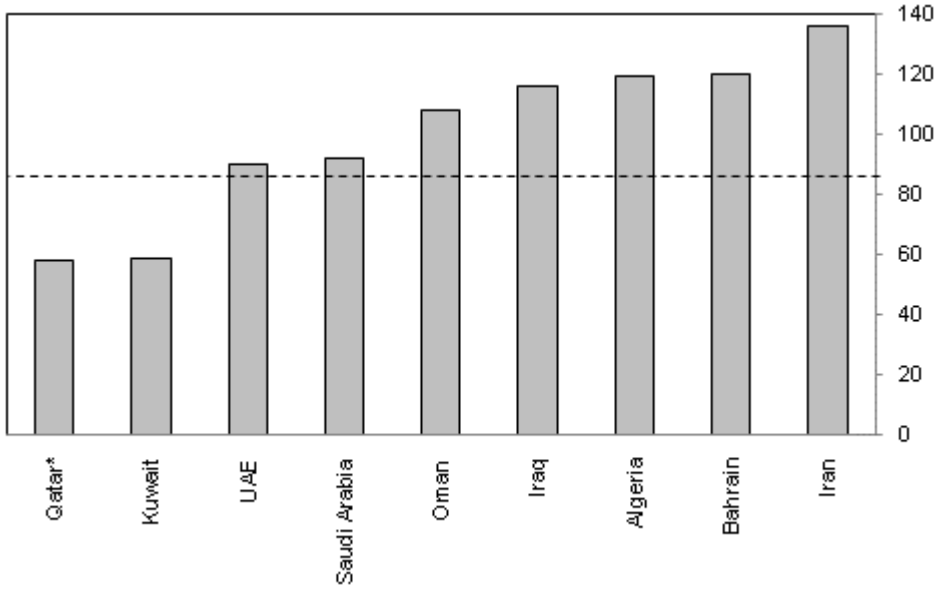
**Higher Score = Lower Risk. Source: BMI*

- **Oil Prices:** The trajectory of oil prices will be the key theme in MENA over 2015 and informs many of our core regional views and - by extension - the scores for the countries within out RRI matrix. Our Oil & Gas team forecast that Brent will trade at between USD60 and USD80 per barrel (bbl) in 2015 and will average USD75/bbl in an environment of weak global demand and rising non-OPEC supply. In this context, the differential in real GDP growth between the MENA's oil exporters and importers will narrow in 2015 as the oil price remains low. This could lead to greater convergence in Country Rewards scores.
- **Crisis States:** Political violence in the most fragile MENA countries will remain elevated in 2015. Although many of the markets included in our Power RRI are not crisis states themselves, the violent collapse of Syria and Libya and the resilience of Islamic State in Iraq (and Syria) raises risks to the political stability of the wider Middle East region. 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 groups - potentially raising risk scores. Additionally, our CR team highlight that there are other lesser-known risks that could surface in 2015, such as a GCC intervention in Yemen following the rise of the Houthis and concerns about growing Iranian influence in the Gulf region.

In this complex and shifting economic and political environment, we maintain that GCC countries present the most attractive opportunities for power sector investment in the MENA region. 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. We emphasise that the **GCC** states, with the exception of Oman and Bahrain, will easily withstand lower oil prices in 2015 given substantial financial reserves.

GCC - Insulated From Oil Price Volatility

Middle East - Fiscal Breakeven Oil Price (USD/bbl)



Source: BMI, Reuters Survey. NB dashed line illustrates current Brent prices.

As such, our buoyant view of the GCC power sector is firmly in play, underpinned by (still) robust economic growth, favourable demographics and surging demand for electricity. 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 - even in a low oil price environment.

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. We expect Saudi Arabia to remain relatively insulated from lower oil prices and do not anticipate any retrenchment in public spending that would jeopardise these plans. Nevertheless, Saudi Arabia's Industry Rewards and Risks scores have fallen this quarter due to slow progress in bringing planned thermal and solar capacity online - despite a huge project pipeline.
- **Qatar** and the **UAE** remain in second and third place respectively - although the difference has narrowed significantly as the UAE's Rewards scores have climbed. To this end, we forecast robust growth in the

UAE economy, driven largely by our bullish outlook for Dubai, particularly the real estate, shipping and construction sectors. Additionally, substantial fiscal buffers will shield the UAE from lower oil prices - boosting the Country Rewards score. In terms of Industry Rewards, the UAE is the leading renewables player in the GCC, with domestic renewable energy heavyweight **Masdar** using its expertise to drive the expansion of regional renewables capacity.

- Qatar's robust Rewards scores are underpinned by robust economic growth and the government's heavy public investment programme. Qatar is the least exposed out of the six GCC economies to falling oil prices (as the world's biggest LNG exporter), and we do not expect government spending or consumer confidence to be impacted over the coming quarters.

- The outlook for **Iran**'s economy has deteriorated in 2015 as the government is set to cut energy and food subsidies in a bid to reduce a widening fiscal deficit, a result of lower oil prices. This will result in higher inflation and a decline in popularity for President Hassan Rouhani, posing downside risks to nuclear talks with the West. Overall, this will have a negative impact on consumption and the broader economy and is likely to depress Rewards scores.

- Meanwhile, the economic outlook for North Africa is improving - led by **Egypt** and **Morocco**. Both will see household consumption bolstered by lower international food and oil prices and improvements in the external sector and investment outlook.

- The economic outlook for Egypt is the most positive since the onset of the Arab Spring in 2011 - with the country's reduced oil import bill paving the way for subsidy reform. Our Country Risk team believes the country is laying the foundations for sustained growth as political stability and policy continuity take hold - 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.

- Morocco will be the outperformer, registering strong growth in fixed investment and exports. We have seen growing amounts of investment into all areas of the Moroccan power sector and believe the country has the potential to establish itself as a North African renewables hub. Investors view the country as an export-oriented manufacturing base 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	66.00	52.20	60.69	51.72	63.07	56.58	59.25	1
Qatar	49.50	62.40	54.46	54.04	68.46	60.22	56.48	2
UAE	58.00	51.80	55.62	49.35	69.63	58.04	56.46	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 - an opportunity it has exploited well in recent years. 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, financing, the transparency of the tendering process, as well as the poor outlook for the renewables sector. Weaknesses in these areas create much uncertainty for private 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. Moreover, falling oil prices have hit the government's budget badly, forcing it to rein in its food and energy subsidy bill, which could cause political unrest.

Note: scores correct at time of publishing and subject to change.

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 Organization**'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 - and an additional 20% hike at the beginning of 2015, which has gone some way towards restraining consumption and raising the potential for the country to boost its export sector. With international oil prices falling, the government is unlikely to be capable of continuing to fund its regime of energy subsidies, and further reforms are likely in the coming months and years.

Iran Power Projects Database

Table: Key Power Projects Database

Project Name	Value (USDmn)	Capacity	Companies	Time-frame	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 seeking the project)
Cycle Power Plant, Heris, East Azerbaijan province	675	1,200MW	Zenel Company, Tavanir	2008-	Contract Awarded (Expected to complete within two years)
Iran-Turkey Transmission Line	1,500	2,000MW			Contract Awarded (Memorandum signed)

Key Power Projects Database - Continued

Project Name	Value (USDmn)	Capacity	Companies	Time-frame	Status
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, the move towards increased involvement of the private sector has 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 Privatization Organization and that a further four would be proposed by the end of the year, according to the Mehr News Agency. These 10 joined 10 other 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 was 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

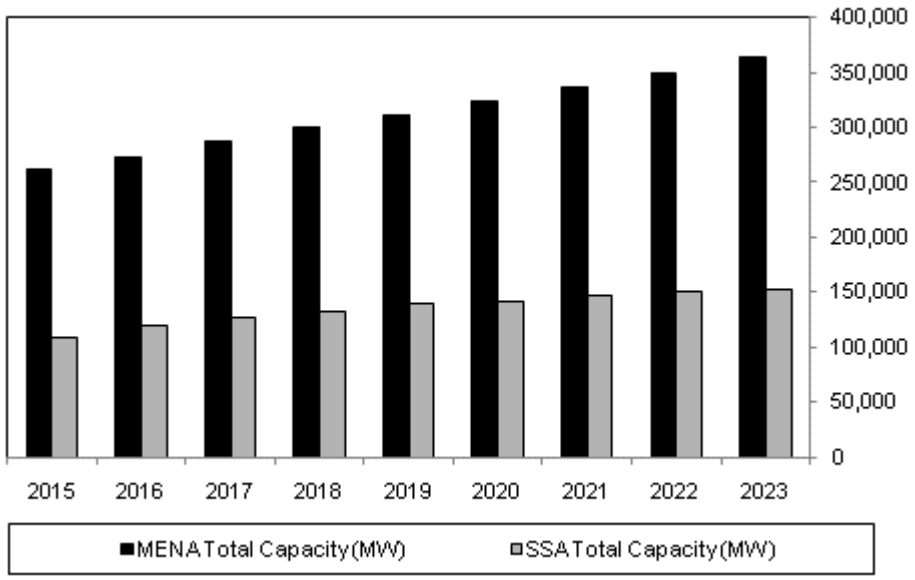
MEA Power Regional Overview

BMI View: *The MENA and SSA power markets are markedly different in their respective levels of development and growth trajectories. We expect the MENA region to retain its dominant position over SSA in terms of overall size, but growth in power consumption, capacity and generation across our 10-year forecast period to be stronger in SSA. Lower global oil prices is a key theme in both regions, having differing effects on the macroeconomic outlooks of individual countries.*

The power markets contained in our Middle East and Africa (MEA) regional coverage are markedly different in size, level of development and growth prospects on offer. The power markets within Sub-Saharan African (SSA) are characterised by inadequate power infrastructure, intermittent electricity supply and a lack of investment. The situation in the Middle East and North Africa (MENA) region is notably different, with more developed markets and strong project pipelines - particularly the Gulf Cooperation Council (GCC) countries.

MENA Dwarfing SSA

MENA and SSA Total Capacity (MW), 2015-2023

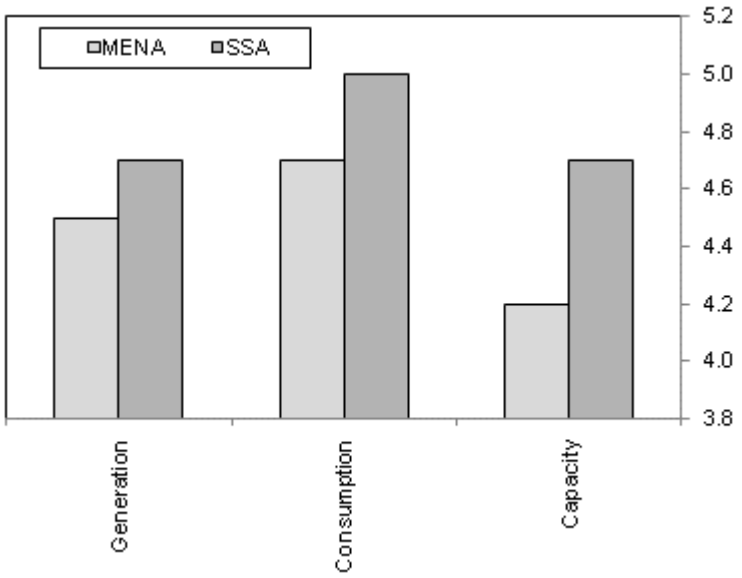


2015-2023 = BMI forecast. Source: EIA, BMI

Although the number of countries in our SSA coverage outnumbers those in our MENA coverage, by 17-to-10, the overall size of the MENA market in terms of capacity is over double of SSA. However in SSA, a lower base-level combined with robust economic growth trajectories and positive demographic trends will result in stronger growth in power consumption, capacity and generation across our 10-year forecast period, when compared to MENA.

SSA Growth Outpaces MEA

Power Sector Growth 2015-2023 By Region (Annual Average % Change y-o-y)



f = BMI forecast. Source: EIA, BMI

MENA Power: Key themes

- **Lower global oil prices:** Our Oil & Gas team forecast that Brent will trade at between USD60 and USD80 per barrel (bbl) in 2015 and will average USD75/bbl in an environment of weak global demand and rising non-OPEC supply. That said, we believe this will have a limited impact on government investment in the GCC power markets over the next two to three years. Saudi Arabia, the UAE and Qatar remain the top performers in the region and we expect considerable fiscal buffers and ambitious government spending plans to remain in place as these countries attempt to meet rapid growth in power demand. Outside of the GCC, we note that Iran is most vulnerable to weakening oil prices, as it has prompted the government to take steps to cut energy and food subsidies in a bid to reduce a widening fiscal deficit; which is likely to weigh on power consumption. In North Africa, the economic outlook for Morocco and Egypt is particularly bright, as both will see household consumption bolstered by lower

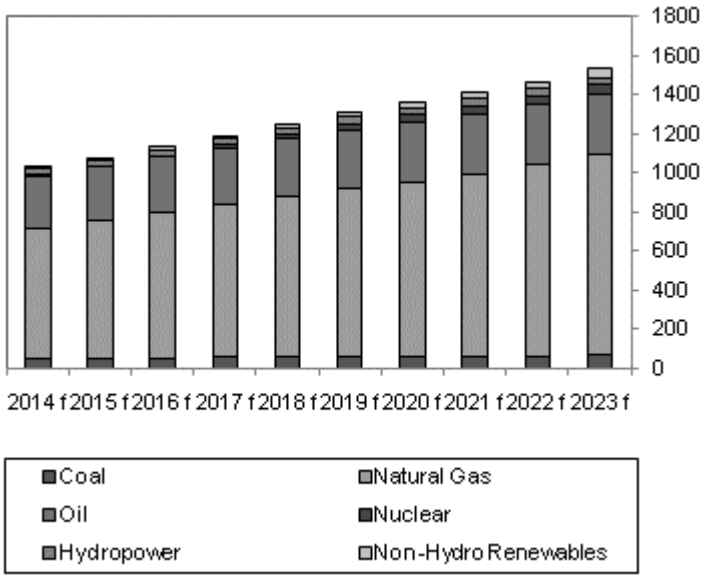
international food and oil prices and improvements in the external sector and investment outlook. This will drive growth in their respective domestic power and renewables sectors - as supply keeps a pace with the growing demand.

- **Political Risks Under The Radar:** The deteriorating political and security situations in Libya, Syria and Iraq have grabbed much of the attention on the Middle East in 2014; however, we believe that this has detracted from other risks which could become very pronounced in 2015. These include a possible GCC intervention in Yemen, the potential for a succession crisis in Oman, and risks of a breakdown in security in Lebanon. If any of these risks were to materialise, it would have a material impact on the respective power markets, hitting consumption and investor sentiment.

- **Momentum for renewable energy continues to grow:** Countries across the MENA region are looking to exploit their domestic renewables resources in a bid to improve energy security, diversify their power mixes and in some cases, conserve oil for export as opposed to burning domestically. While we think much of negative sentiment towards the global renewables industry is overdone in the current weak oil price environment (based largely on the fact that solar and wind do not often compete directly with oil in power generation), we do note that we could see renewables expansion lose some momentum in the Middle East. However, we continue to see positive project announcements across the region, including the commissioning of the 301MW Tarfaya wind facility in Morocco in December and the granting of 20-year licenses by Jordan's Energy and Minerals Regulatory Commission (EMRC) to **Jordan Solar One** and **Scatec Solar** to build solar power facilities worth a combined capacity of 33.5MW in Jordan. Furthermore, the **Dubai Electricity and Water Authority** (DEWA) is scheduled to announce the winner of the USD266mn tender for the 100MW phase II of the Mohammed bin Rashid Al-Maktoum solar project in January 2015.

Renewables Gaining But Thermal Still Dominant

MENA Power Generation By Type (TWh), 2014-2023



f = BMI forecast. Source: EIA, BMI

SSA Power: Key Themes

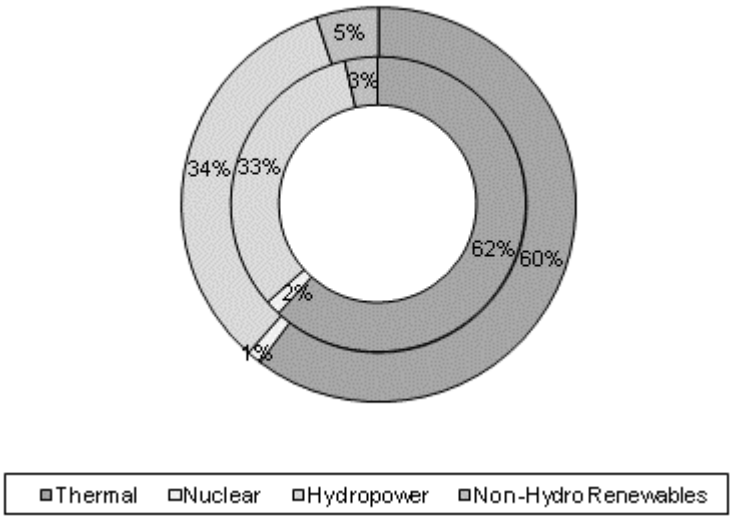
- **Political risk and weak oil prices**: There is significant scope for political tensions to rise across SSA in 2015, with Nigeria, Cote d'Ivoire and Tanzania set to hold elections. Succession issues will continue to plague presidents in Zambia and potentially Zimbabwe. This raises the political risk premium and is a downside risk to investment in these power markets. Lower oil prices will have a meaningful impact on the macroeconomic environment with net oil importers benefitting while exporters suffer.

- **SSA power markets on the road to reform:** We continue to see SSA countries make attempts to attract independent power producers (IPPs) and encourage private investment. Nigeria is a pertinent case in point, as the government takes steps to gradual liberalise the power sector - which is creating opportunities for private investors; international financial institutions (IFIs) and IPPs.

- **SSA's renewables prospects bright:** Countries in the Sub-Saharan Africa (SSA) region are increasingly turning to their largely untapped renewable energy potential, as the technology is presenting an attractive option for power generation. Unlike many developed markets, in which the growth of renewable energy is often driven by environmental concerns and regulations governing emissions, renewable energy in SSA is emerging as an economically feasible option. Furthermore, it can help combat some of the deep-rooted issues currently plaguing many SSA power markets. Ethiopia, Kenya and South Africa are set to be the regional outperformers.

Green Shoots Appearing

MENA Power Capacity By Type (MW), 2015f and 2023f



Inner circle/outer circle = 2015 forecast/2023 forecast. Source: EIA, BMI

- **Precarious supply plaguing Southern Africa, push for integration in the East:** South Africa's power sector is in turmoil as supply shortages and rolling blackouts continue to plague the country. However, many of the Southern African Power Pool (SAPP) members also face power supply issues themselves - for example Mozambique and Botswana. As such, we expect trade to become volatile throughout the region and the countries in Southern Africa to struggle to secure supply. The power markets in East Africa are faring better, and we believe momentum is building behind East African plans to bolster regional electricity trading and invest in cross-border grid interconnectivity. This view is reinforced by rapid growth in electricity demand that is driving individual countries that are heavily reliant on drought-prone hydropower - such as Ethiopia, Kenya, Uganda and Rwanda - to take regional grid integration more seriously. It is also underpinned by increased government support for electricity trading, especially in East Africa's most dynamic power markets - Kenya and Ethiopia.

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