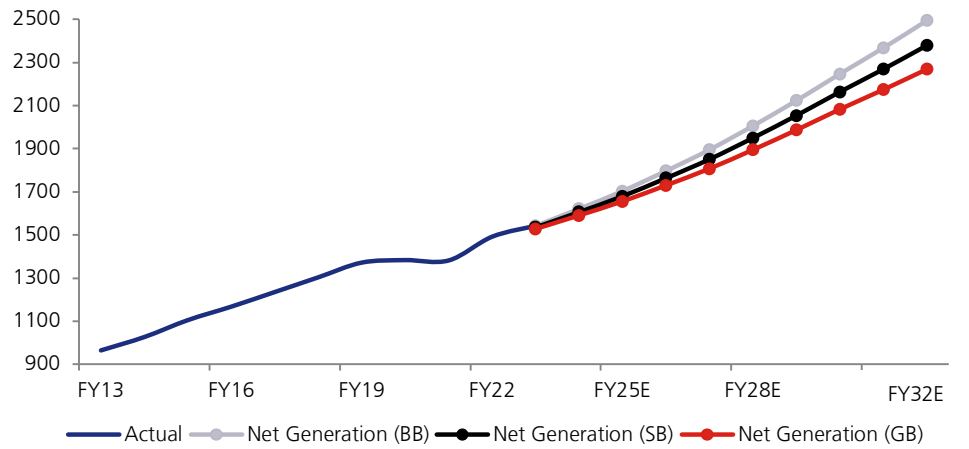


As per our estimates, for 'nil' demand-supply deficit, power generation will have to grow at a 5-year CAGR of 5-6% up to 2027, moderating to 4.5-5.5% by 2032 due to productivity and efficiency gains. Net generation at the bus bar will have to increase from 1,390BU in FY22 to 1,800-1,900BU by FY27 and 2,250-2,450 BU by FY32 under various scenarios.

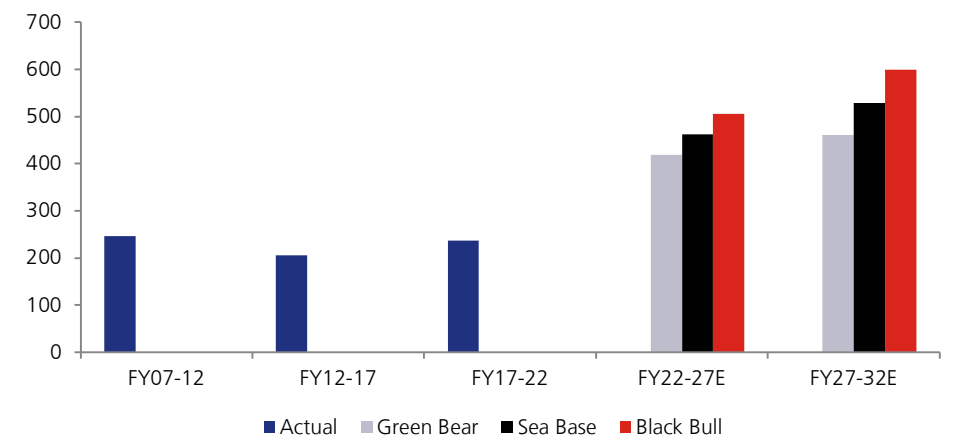
**Exhibit 10. Net generation under three scenarios, BU**



Source: CEA, CMIE, JM Financial

India has seen a net incremental power demand of 247BU during FY07-12, 206BU during FY12-17 and, 237BU during FY17-22. Given the growth momentum in India, we estimate an incremental demand of 418-500BU during FY22-27 and 460-600BU during FY27-32 during various scenarios (497BU during FY22-27 and 665BU during FY27-32 as per CEA's NEP 2022).

**Exhibit 11. Incremental net generation in blocks of 5 years, BU**

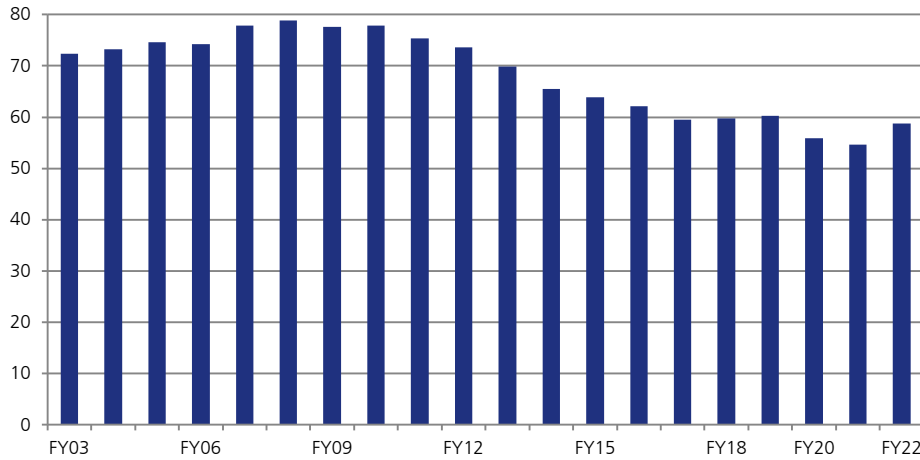


Source: CEA, CMIE, JM Financial

## How is India going to meet its demand?

The PLF of coal-based thermal power plants has mostly been less than 60% in recent years, largely attributed to subdued demand and increasing generation from renewables.

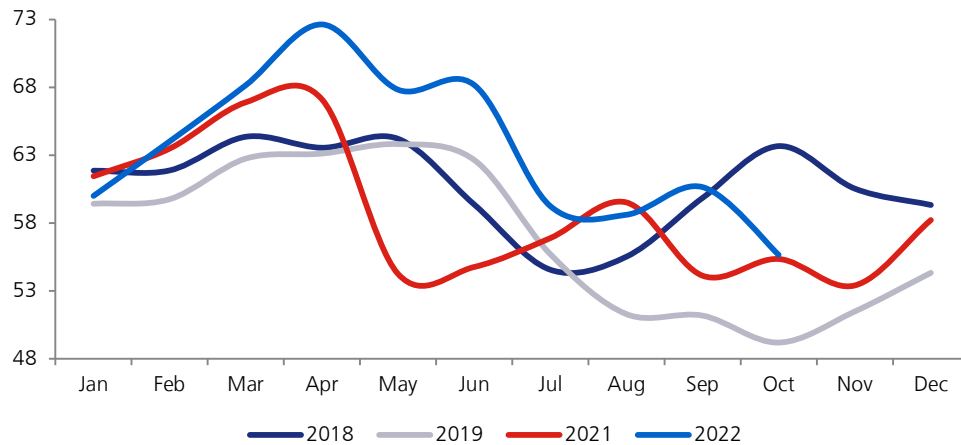
**Exhibit 12. PLF of thermal power plants, yearly, %**



Source: CMIE, JM Financial

During the Q1FY23 power crisis, the PLF of coal-based power plants increased to 70% against the PLF of 59/46/63% in FY21/20/19, indicating the potential generation the existing capacities can add.

**Exhibit 13. PLF of thermal power plants, monthly, %**



Source: CMIE, JM Financial

A total of 26GW of Coal, 11GW of Hydro, 1.6GW of Pump Storage, 25GW of Wind, 93GW of Solar, 7GW of Nuclear and around 2.5GW of Gas and biomass-based power generation plants are under construction.

As per our channel checks, all the coal-based thermal power plants that are under construction will be commissioned in all probability by FY27.

#### Exhibit 14. Power stations under construction

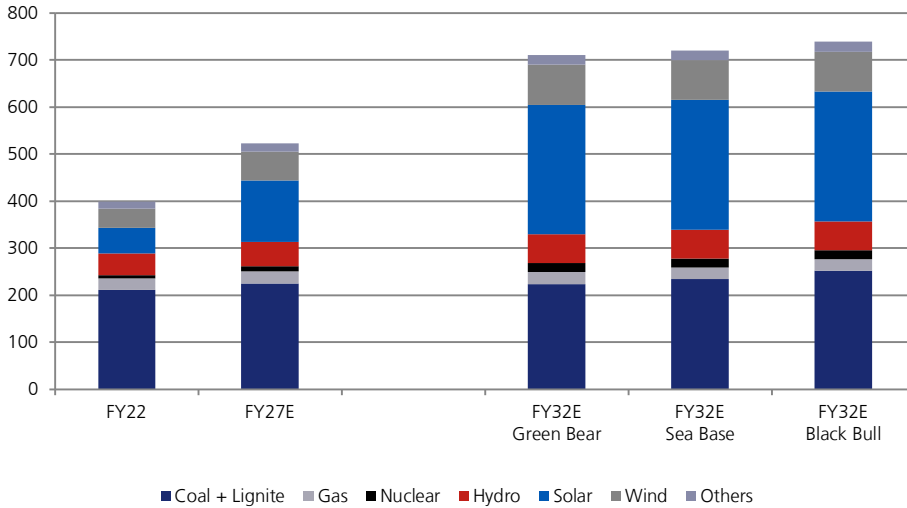
| N  | State | Project Name                            | Zero Date | Capacity, MW | Anticipated Commissioning |
|----|-------|---|-----------|--------------|---------------------------|
| 1  | AP    | APGENCO Sri Damodaram TPS -II           | Nov-15    | 800          | Dec-22                    |
| 2  | JH    | NTPC North Karanpura STPP-I             | Feb-14    | 660          | Dec-22                    |
| 3  | TS    | NTPC Telangana TPP-I                    | Mar-11    | 800          | Dec-22                    |
| 4  | KN    | KPCL Yelahanka CAPP                     | Mar-15    | 370          | Jan-23                    |
| 5  | BR    | NTPC Barh STPP-1 U2                     | Mar-05    | 660          | Mar-23                    |
| 6  | TN    | TANGEDCO North Chennai TPP St -III      | Jan-16    | 800          | Mar-23                    |
| 7  | UP    | NLC & UPRVUNL Ghatampur TPP-I           | Jul-16    | 660          | May-23                    |
| 8  | BR    | SJVNL Buxar TPP-I                       | Jun-19    | 660          | Jun-23                    |
| 9  | MH    | MAHAGENCO Bhusawal STPP-I               | Jan-18    | 660          | Jun-23                    |
| 10 | TS    | NTPC Telangana TPP-II                   | Mar-11    | 800          | Jun-23                    |
| 11 | TS    | TSGENCO Yadadri TPP-I                   | Oct-17    | 800          | Jun-23                    |
| 12 | UP    | Obra-C 2X660 MW TPP, UPRVUNL            | Dec-16    | 660          | Jun-23                    |
| 13 | UP    | UPRVUNL Jawaharpur STPP-I               | Dec-16    | 660          | Jun-23                    |
| 14 | AP    | APGENCO Dr. Narla Tata Rao TPP Stage -V | Dec-15    | 800          | Aug-23                    |
| 15 | TS    | TSGENCO Yadadri TPP-II                  | Oct-17    | 800          | Aug-23                    |
| 16 | UP    | NLC & UPRVUNL Ghatampur TPP-II          | Jul-16    | 660          | Aug-23                    |
| 17 | JH    | NTPC North Karanpura STPP-II            | Feb-14    | 660          | Nov-23                    |
| 18 | UP    | NLC & UPRVUNL Ghatampur TPP-III         | Jul-16    | 660          | Nov-23                    |
| 19 | BR    | SJVNL Buxar TPP-II                      | Jun-19    | 660          | Dec-23                    |
| 20 | TS    | TSGENCO Yadadri TPP-III                 | Oct-17    | 800          | Dec-23                    |
| 21 | UP    | Obra-C 2X660 MW TPP, UPRVUNL            | Dec-16    | 660          | Dec-23                    |
| 22 | UP    | UPRVUNL Jawaharpur STPP-II              | Dec-16    | 660          | Dec-23                    |
| 23 | UP    | UPRVUNL Panki TPS Ext                   | Mar-18    | 660          | Jan-24                    |
| 24 | UP    | THDC Khurja STPP-I                      | Aug-19    | 660          | Feb-24                    |
| 25 | BR    | NTPC Barh STPP-1 U3                     | Mar-05    | 660          | Mar-24                    |
| 26 | JH    | NTPC North Karanpura STPP-III           | Feb-14    | 660          | Mar-24                    |
| 27 | TN    | TANGEDCO Ennore STPP-I                  | Sep-14    | 660          | Mar-24                    |
| 28 | TN    | TANGEDCO Udangudi STPP-I                | Jul-17    | 660          | Mar-24                    |
| 29 | TS    | TSGENCO Yadadri TPP-IV                  | Oct-17    | 800          | Apr-24                    |
| 30 | TN    | TANGEDCO Ennore STPP-II                 | Sep-14    | 660          | May-24                    |
| 31 | JH    | NTPC & JBVNL Patratu STPP-I             | Mar-18    | 800          | Jun-24                    |
| 32 | TN    | TANGEDCO Udangudi STPP-II               | Jul-17    | 660          | Jun-24                    |
| 33 | TS    | TSGENCO Yadadri TPP-V                   | Oct-17    | 800          | Aug-24                    |
| 34 | UP    | THDC Khurja STPP-II                     | Aug-19    | 660          | Aug-24                    |
| 35 | WB    | WBPCL Sagardighi TPP-III                | Jan-20    | 660          | Sep-24                    |
| 36 | JH    | NTPC & JBVNL Patratu STPP-II            | Mar-18    | 800          | Dec-24                    |
| 37 | JH    | NTPC & JBVNL Patratu STPP-III           | Mar-18    | 800          | Jun-25                    |
| 38 | TN    | Uppur STPP-I                            | Feb-16    | 800          | Plant on Hold             |
| 39 | TN    | Uppur STPP-II                           | Feb-16    | 800          | Plant on Hold             |

Source: CEA, Elekere, JM Financial

After success in Solar power, the government is strongly pushing for aggressive capacity additions in Wind, Hydro, and Nuclear power generation. Considering the past performance and policy support, 4,000MW each of Hydro and Nuclear capacity additions are expected up to FY27. We believe that momentum for Solar power will further increase with an average annual run rate of 12-15GW of additions up to FY27 and much more beyond that.

With this, a generation capacity of 523-526GW is estimated by FY27 vis-à-vis 399GW in FY22 considering a retirement of 6-7GW of thermal capacities also; this is expected to further increase to 710-740GW by FY32.

**Exhibit 15. Power generation capacities, GW**

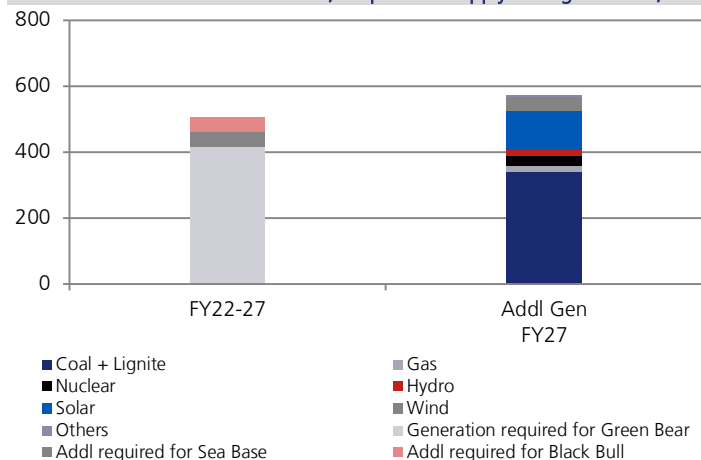


Source: CEA, CMIE, JM Financial

## Generation mix, going forward

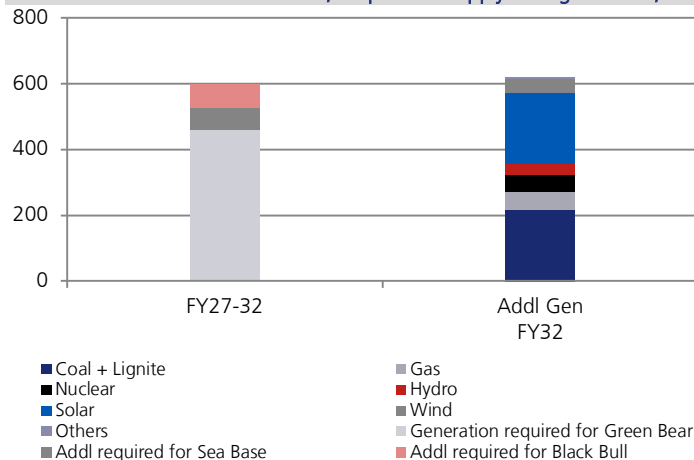
The improvement in the utilisation (PLF) of existing thermal power plants in addition to capacity under construction can add around 570BU of incremental generation to the grid, which is sufficient for incremental demand up to FY27 across all three scenarios.

**Exhibit 16. Incremental Generation, Required & Supply during FY22-27, BU**



Source: JM Financial

**Exhibit 17. Incremental Generation, Required & Supply during FY27-32, BU**



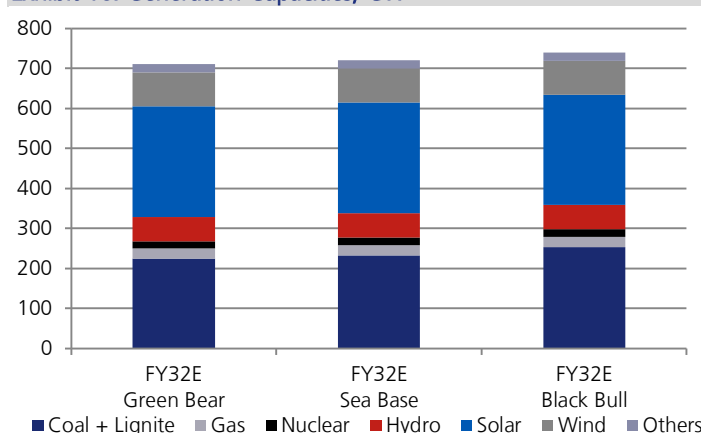
Source: JM Financial

If the future unfolds something similar to our **Green Bear scenario** and demand for power grows as per the historical trend, then incremental annual demand during FY27-32 can be sufficiently met by non-coal-based power generation capacity additions and existing projects under construction.

India's economy continues to gradually improve primarily on domestic demand. With various policies like PLI in place, the share of manufacturing is expected to increase. In the **Sea Base scenario**, power demand is estimated to grow by around 5.4%, as estimated in WEO 2022. This will lead to an incremental demand of around 520BU by FY32 over FY27. We estimate that 9-10GW of coal-based additional generation capacity will be required to be commissioned by FY29 to meet this demand (out of which 2X660 MW Talcher TPP has already been ordered by NTPC and 4X600 MW NLC Talabira is in the advanced stage of tendering).

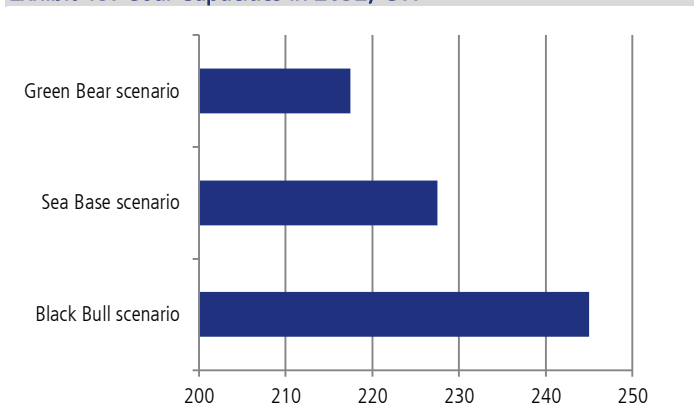
As the name suggests, the **Black Bull scenario** is characterised by sustained economic growth of India of 7% and will call for aggressive capacity additions of coal-based power plants. An incremental generation of 600BU will be needed by FY32 over FY27 with a focus on reliability and affordability for which an additional coal-based generation capacity of 20-22GW will have to be gradually commissioned by FY31.

**Exhibit 18. Generation Capacities, GW**



Source: JM Financial

**Exhibit 19. Coal Capacities in 2032, GW**



Source: JM Financial

In addition to the thermal capacity under construction, another 20GW of projects are under discussion or are at various stages of tendering.

#### Exhibit 20. Thermal Power Plants under discussion/ tendering for future

| Project               | Expected zero date | Units | MW    | Status              |
|-----------------------|--------------------|-------|-------|---------------------|
| NTPC / Talcher        | FY23               | 2X660 | 1,320 | Order placed        |
| NLCIL / Talabira      | FY23               | 4X600 | 2,400 | Under tendering     |
| NTPC Singrauli        | FY24               | 2X800 | 1600  | NIT issued          |
| DVC / Raghunathpur    | FY24               | 2X660 | 1,320 | Board approved      |
| MPPGCL / Amarkantak   | FY24               | 1X600 | 660   | EC given            |
| SCCL Mancherial       | FY24               | 1X800 | 800   | DPR approved        |
| Adani/ Godda          | FY24               | 2X800 | 1600  | In process          |
| NTPC / Lara           | FY24               | 2X800 | 1,600 | NIT issued          |
| GSECL / Ukai          | FY26               | 1X800 | 800   | Under discussion    |
| NTPC / AUSC           | FY26               | 1X800 | 800   | Under approval      |
| DVC/ Durgapur         | FY26               | 1X800 | 800   | Board approved      |
| NLCIL / Neyveli       | FY26               | 2X660 | 1,320 | Board approved      |
| NTPC / Katwa          | FY27               | 2X660 | 1,320 | Under discussion    |
| OTPC / Palatana (Gas) | FY27               | 2X360 | 720   | EC given            |
| UPRVUNL / Obra        | FY27               | 2X800 | 1600  | Under discussion    |
| RVUNL Chhabra         | FY24               | 2X800 | 1600  | State Govt approved |
| DVC Koderma           | FY26               | 2X800 | 1600  | Board approved      |

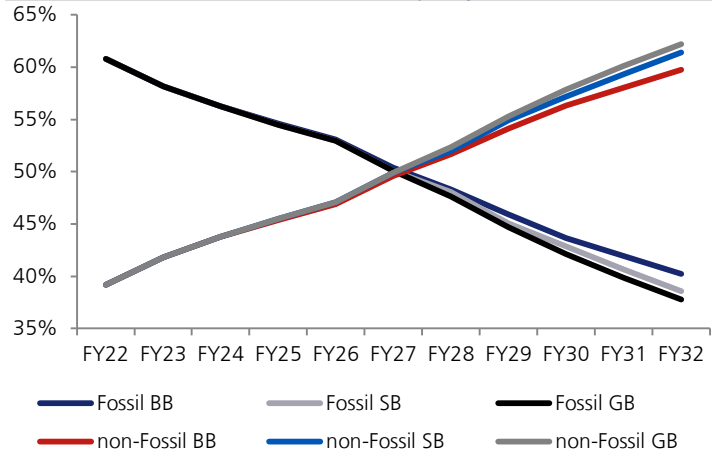
Source: non-exhaustive, Industry, Media, JM Financial

Though coal-based power generation capacity is expected to slow down, coal will continue to make the largest contribution to power generation even by 2032. We believe that the above projects will undergo rigorous scrutiny with a view on demand and sustainability before construction begins. Hence, opportunities from coal remain uncertain and limited.

Therefore, renewables, particularly Solar will continue to offer huge opportunities. The current annual capacity addition rate of more than 10GW is set to increase to 12-15GW with the realisation of domestic manufacturing capacities and policy support.

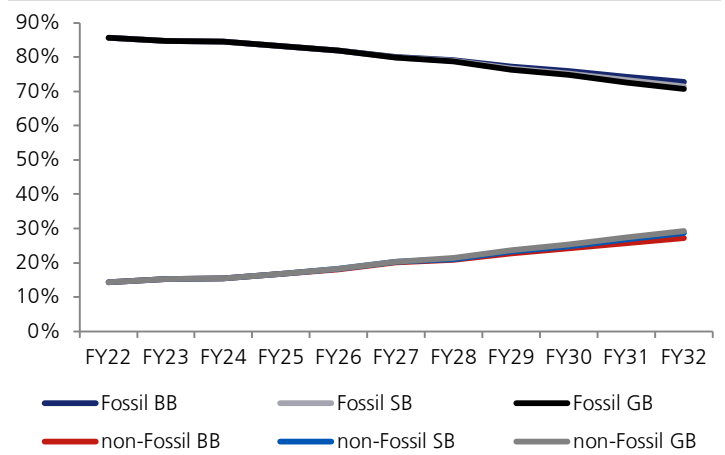
With this, the contribution of fossil fuel-based generation capacity will reduce from 61% in FY22 to 38-40% by FY32. Accordingly, generation from non-fossil (renewables & hydro) will increase from 14% in FY22 to around 30% by FY32.

**Exhibit 21. Share in total Generation Capacity, %**



Source: JM Financial

**Exhibit 22. Share in total Generation, %**



Source: JM Financial

Any step change in the performance of Nuclear and Hydropower capacity additions will further limit opportunities in coal.

Hence, utilities with a balanced portfolio remain our preferred stocks as they will see significant upside going forward with coal supporting stable earnings and renewables giving growth.

## Case Studies



## Orsted A/S

### From black to green- a Danish energy transition story

Orsted (USD 38.5bn) is the largest Danish multinational power company, and it is based in Fredericia, Denmark. With c.30% of the global offshore wind power capacity being installed by Orsted (excluding mainland China), it is also the world's largest developer of offshore wind power. Amidst the efforts of energy utilities for business transformation in sync with the energy transition, Orsted stands out as an example.

Orsted, previously known as DONG (Danish Oil and Natural Gas), was formed in 2006 through the merger of six Danish electrical power generating companies and had a portfolio of 85% based on fossil fuels, making it one of the most coal-intensive companies in Europe, and responsible for around one-third of Danish emissions. The company also operated an Oil & Gas exploration business that accounted for 15% of total revenue as of 2010.

In 2009, the management announced a major strategic shift with 85:15 Vision - the company targeted to generate 85% of heat and power from renewable sources by 2040.

To achieve this, the company raised capital by aggressive divestment of eight of its businesses, including all gas firms, hydro and waste-fired power plants, as well as innovating a new 'farm-down' financing model. This involved selling a stake in the project after the development phase, which ensures future cash flows and, hence, results in the project getting a higher valuation. The capital realised was then recycled into new projects. With the capital available, it acquired the wind turbine installation company A2SEA and entered into the world's largest offshore wind turbine agreement with Siemens, consisting of 500 turbines being manufactured in an assembly line concept and installed across Northern Europe.

On 6<sup>th</sup> Nov'17 the company changed its name to Orsted – after the Danish Physicist Hans Christian Ørsted – before its IPO.

By 2019, it had become the world's largest producer of offshore wind energy. The company also raised its renewable generation share to 86%, hitting its target 21 years ahead of schedule.

Orsted currently produces 90% of its energy from renewable sources and has an objective of exceeding 95% by 2023 and 100% by 2025 - becoming the first and finest example of a utility transitioning from a business based almost entirely on conventional fossil fuels to a financially successful utility based almost entirely on renewable energy.

During the transition, the financial performance of the company has been rewarding with stable revenue and improving profitability (excluding COVID times). EBITDA grew with a 15% CAGR over FY15 to FY18 with contributions from renewables increasing from 34% to 93%.

The company has successfully been increasing its share of generation from renewables without any major leverage.



#### Exhibit 23. Financial Highlights (USD mn)

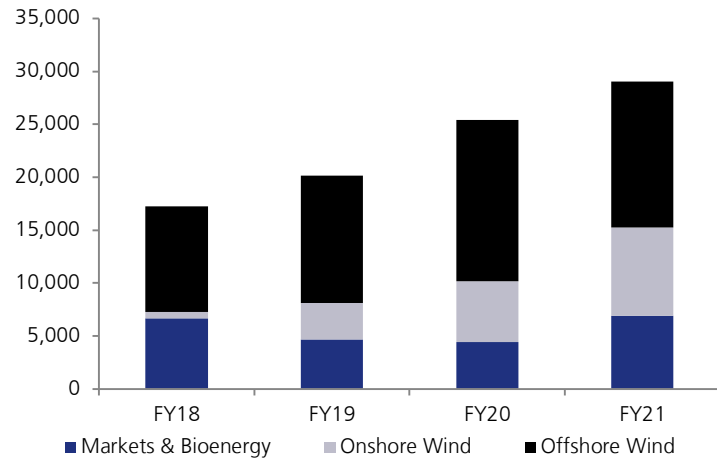
| Particulars           | FY 2015 | FY 2016 | FY 2017 | FY 2018 | FY 2019 | FY 2020 | FY 2021 |
|-----------------------|---------|---------|---------|---------|---------|---------|---------|
| Market Capitalization | —       | 15,957  | 22,984  | 28,071  | 43,526  | 85,813  | 53,730  |
| - Cash & Equivalents  | 3,813   | 2,761   | 4,761   | 4,451   | 3,562   | 5,150   | 4,773   |
| + Preferred & Other   | 2,860   | 2,609   | 2,753   | 2,550   | 2,477   | 2,621   | 3,225   |
| + Total Debt          | 5,300   | 3,430   | 4,786   | 4,187   | 6,337   | 6,870   | 8,961   |
| Enterprise Value      | —       | 19,236  | 25,762  | 30,357  | 48,779  | 90,154  | 61,144  |
| Revenue               | 9,928   | 8,532   | 9,037   | 12,194  | 10,939  | 7,682   | 12,353  |
| Gross Profit          | 2,257   | 2,939   | 2,879   | 3,651   | 4,669   | 3,732   | 3,906   |
| EBITDA                | 1,690   | 2,337   | 1,666   | 2,575   | 2,691   | 2,254   | 2,395   |
| EBITDA Margin %       | 17      | 27      | 18      | 21      | 25      | 29      | 19      |
| Net Income            | 150     | 997     | 642     | 1,219   | 835     | 697     | 366     |
| EPS                   | 0.3     | 2.4     | 1.5     | 2.9     | 2.0     | 1.7     | 0.9     |

Source: Company, Bloomberg

# Key Charts

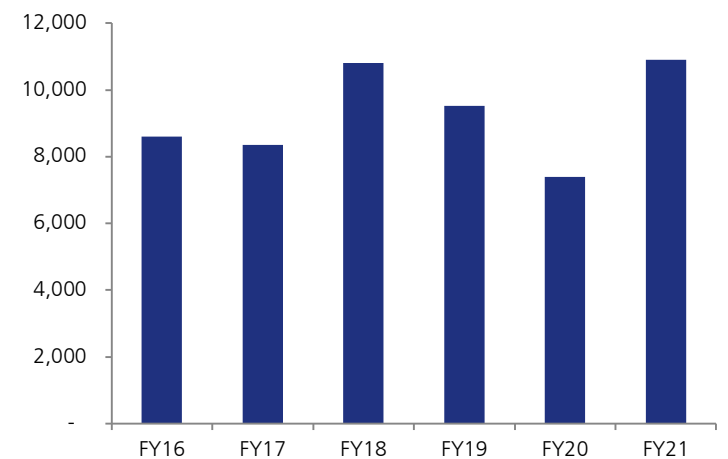
## Financial Summary

**Exhibit 24. Power Generation, GWh**



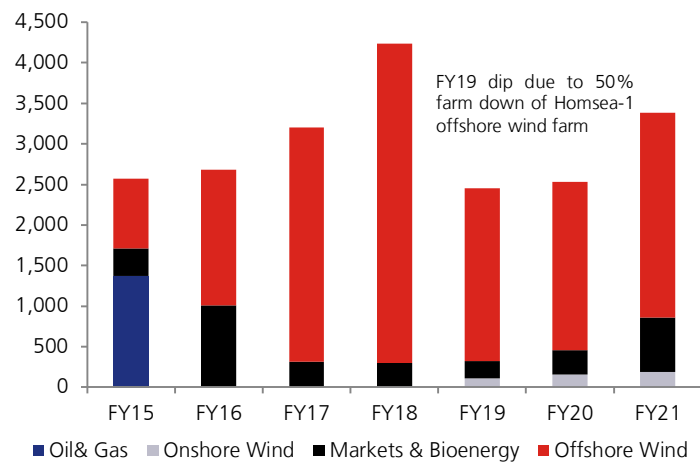
Source: Company, Bloomberg | Bioenergy constitute Biomass, CNG, Coal, Oil

**Exhibit 25. Revenue Trend, USD mn**



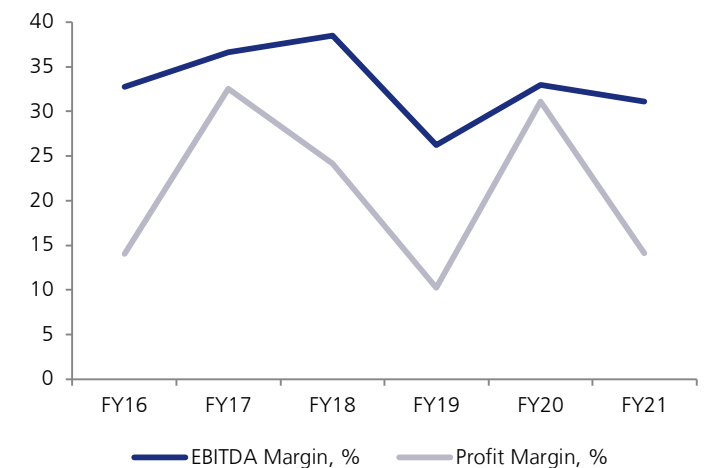
Source: Company, Bloomberg

**Exhibit 26. EBITDA Breakup, USD mn**



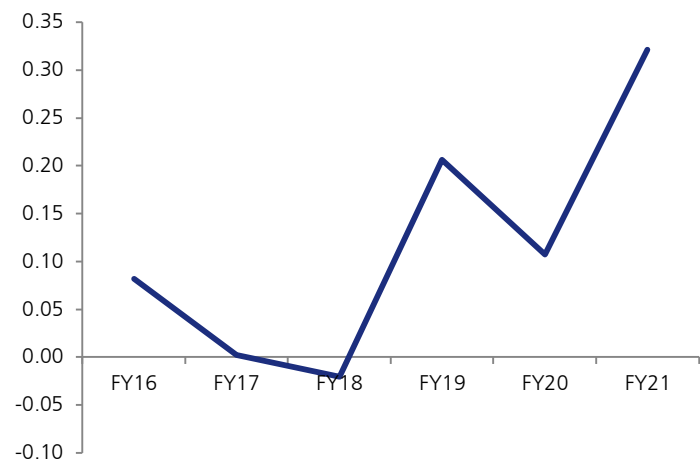
Source: Company, Bloomberg

**Exhibit 27. Margin Profile**



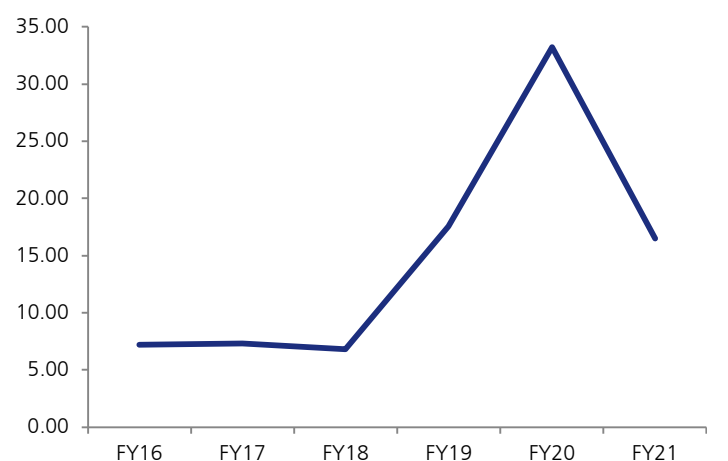
Source: Company, Bloomberg

**Exhibit 28. Net Debt to Equity**



Source: Company, Bloomberg

**Exhibit 29. EV/EBITDA**



Source: Company, Bloomberg

## NextEra Energy Inc.

### Largest green growth utility from the US

NextEra Energy Inc. (NEE) is the world's largest utility company (USD 100bn) headquartered in Florida, USA. The company operates primarily across two businesses: its fully regulated electric utility, Florida Power & Light Co. (FPL), and its unregulated power asset operator, NextEra Energy Resources (NEER). With a generation capacity of 56GW, it generated 221BU in 2021. In 2019, it bought Gulf Power Company, the largest electricity producer in Northwest Florida, expanding its combined residential customer base in Florida to c51% of the state's population.

NextEra tracks its origins to 1925, with the merger of several smaller companies, such as Florida Power and Light Co. (FPL) operating in the generation, transmission and distribution of electric power generated majorly from fossil fuels and nuclear for Florida and other areas. In 2010, FPL Group was renamed to NextEra Energy with a desire to become a leader in efficient and clean energy generation. Since then, it has been investing in smart grid technologies and, renewable energy sources such as wind and solar. It has invested more than USD 20bn in building a renewable energy portfolio in recent years, particularly through acquisitions.

NEER is the world's largest developer of renewable energy assets (wind and sun) throughout the US and Canada, as well as a world leader in battery storage. NEER also owns a majority 54.7% stake in NextEra Energy Partners, LP (NEP), a yieldco that acquires, manages and owns long-term contracted clean energy projects and gas pipelines with stable cash flow. Based on the sheer size of NEE's renewable development business in concert with its yieldco financing vehicle NEP, NextEra is in a class by itself among integrated utilities.

NEE recycles capital through the strategic sale of assets and subsequent reinvestment in new projects. During 2015-2017, NEE overall received more than USD 5bn from asset sales, including USD 3.6bn at NEER through the divestiture of generation assets to NEP (yieldco dropdowns) and third parties.

In 2020, NEER accounted for more than 30% of NEE's consolidated EBITDA. With largely stable revenue the company has seen a steady margin profile and profitability.



#### Exhibit 30. Financial Highlights (USD mn)

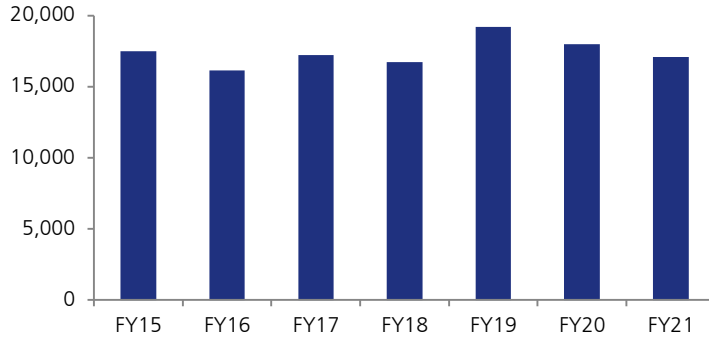
| Particulars           | FY 2015 | FY 2016 | FY 2017 | FY 2018 | FY 2019 | FY 2020 | FY 2021 |
|-----------------------|---------|---------|---------|---------|---------|---------|---------|
| Market Capitalization | 47,893  | 55,907  | 73,565  | 83,086  | 118,416 | 151,214 | 183,266 |
| - Cash & Equivalents  | 571     | 1,292   | 1,714   | 638     | 600     | 1,105   | 639     |
| + Preferred & Other   | 538     | 990     | 1,295   | 3,737   | 4,842   | 8,416   | 8,467   |
| + Total Debt          | 29,687  | 30,840  | 35,025  | 37,712  | 43,081  | 48,632  | 55,382  |
| Enterprise Value      | 77,547  | 86,445  | 108,171 | 123,897 | 165,739 | 207,157 | 246,476 |
| Revenue               | 17,486  | 16,138  | 17,173  | 16,727  | 19,204  | 17,997  | 17,069  |
| Gross Profit          | 12,159  | 12,146  | 13,102  | 12,995  | 14,841  | 14,458  | 12,542  |
| EBITDA                | 7,921   | 7,582   | 7,235   | 8,391   | 9,682   | 10,814  | 7,272   |
| EBITDA Margin %       | 45      | 47      | 42      | 50      | 50      | 60      | 43      |
| Net Income            | 2,571   | 3,137   | 3,078   | 3,531   | 4,062   | 4,273   | 4,899   |
| EPS                   | 1.4     | 1.7     | 1.6     | 1.8     | 2.1     | 2.2     | 2.5     |

Source: Company, Bloomberg, JM Financial

# Key Charts

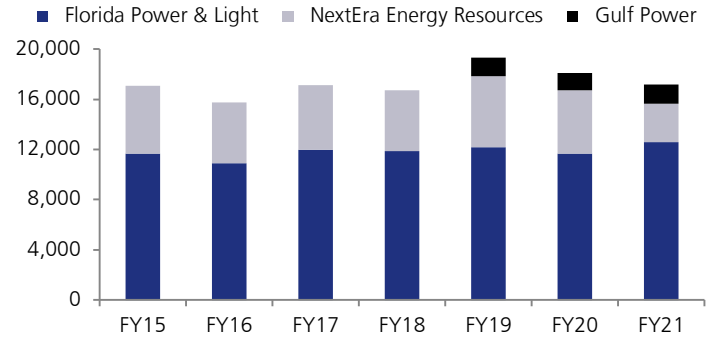
## Financial Summary

**Exhibit 31. Revenue Trend, USD mn**



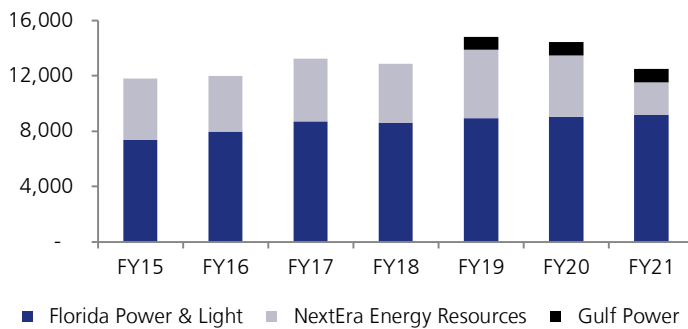
Source: Company, Bloomberg

**Exhibit 32. Revenue Breakup, USD mn**



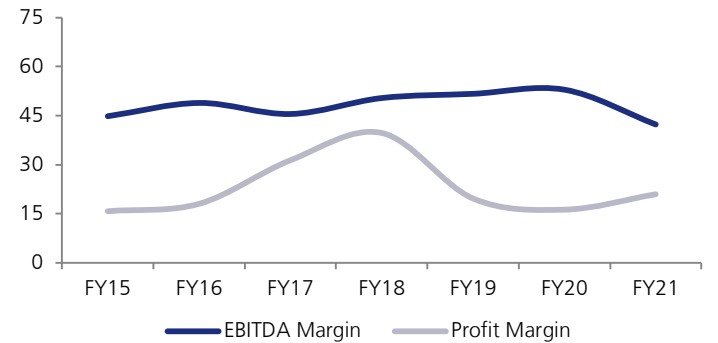
Source: Company, Bloomberg

**Exhibit 33. Gross Profit, USD mn**



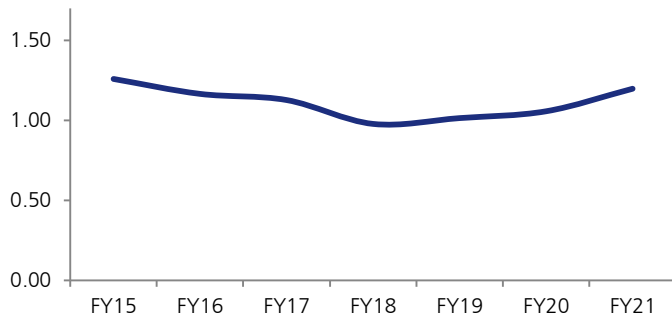
Source: Company, Bloomberg

**Exhibit 34. Margin Profile**



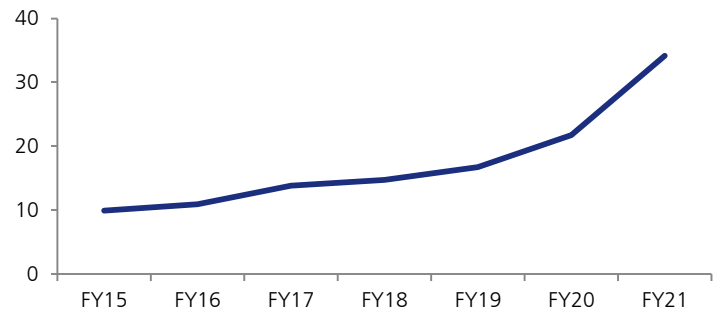
Source: Company, Bloomberg

**Exhibit 35. Net Debt to Equity**



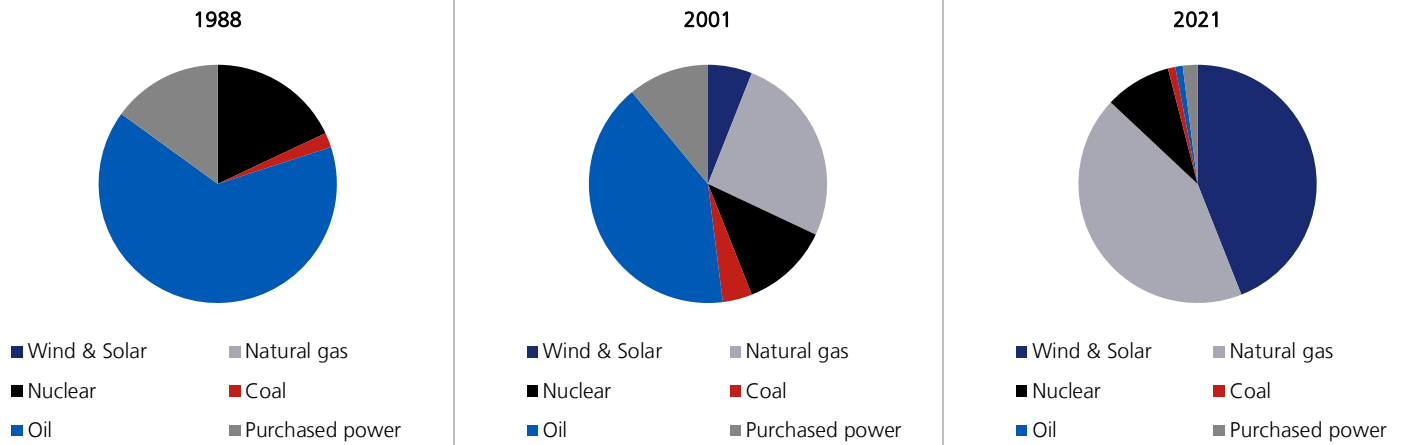
Source: Company, Bloomberg

**Exhibit 36. EV/EBITDA**



Source: Company, Bloomberg

**Exhibit 37. Fuel Mix Transition**



Source: Company, Bloomberg

## Engie SA

### French utility leading the transition with data

Engie SA is a USD 57.9bn French integrated energy conglomerate engaged in the generation, transmission and distribution of electricity; and offers a comprehensive range of services including energy efficiency with a presence in around 70 countries and 101,000 employees.

Just a decade back, the 200-year-old company owned Europe's biggest natural gas pipeline and was a major global producer and supplier of natural gas and other energy sources. Known as GDF Suez until 2015, ENGIE was created to meet the challenges of the energy transition and accelerate the group's development.

Subsequently, Engie in early 2016 announced a strategy shift to promote; i) decarbonised energy (oil and coal replaced by renewables and natural gas that emit fewer greenhouse gases), ii) decentralised energy (energy produced and stored as close as possible to its place of consumption), and iii) digitised energy (big data and digital tools for energy efficiency and network management).

The company developed "energy transition as a service" for large companies and metropolises by helping them reduce their energy consumption and, hence, carbon emissions using Artificial Intelligence (AI). Some examples of services that ENGIE developed are Clara Domus in Italy, which is a smart building application for customers to control their electricity consumption, and Delta, which analyses the behaviour of power stations to increase output and carry out predictive maintenance.

To finance its strategy, Engie began a € 21bn asset portfolio rotation programme in 2016 and made over 100 acquisitions since 2014. Between 2016 and 2018, Engie invested € 15bn in a new strategy primarily financed by the divestment of coal and upstream oil and gas assets.

Engie continues to work on its strategic plan, involving the building of a renewable portfolio at an annual run rate of 3-4GW, and is committed to phasing out coal by 2025 in Europe and by 2027 in the rest of the world.

Since its strategy shift, the share of coal in the generation capacities mix has gradually reduced from 23% in FY17 to 8% in FY21 accompanied by improvement in profitability and a stable margin profile.



#### Exhibit 38. Financial Highlights (USD mn)

| Particulars            | FY 2015 | FY 2016 | FY 2017 | FY 2018 | FY 2019 | FY 2020 | FY 2021 |
|------------------------|---------|---------|---------|---------|---------|---------|---------|
| Market Capitalization  | 42,500  | 30,651  | 41,161  | 34,588  | 39,020  | 36,991  | 35,862  |
| (-) Cash & Equivalents | 11,252  | 11,880  | 13,151  | 12,586  | 14,671  | 19,026  | 18,656  |
| + Preferred & Other    | 6,163   | 6,191   | 7,021   | 6,174   | 5,558   | 6,004   | 5,677   |
| + Total Debt           | 41,810  | 38,199  | 39,739  | 36,389  | 43,281  | 46,378  | 46,737  |
| Enterprise Value       | 79,222  | 63,161  | 74,770  | 64,565  | 73,188  | 70,347  | 69,620  |
| Revenue                | 77,570  | 71,767  | 67,304  | 67,285  | 67,234  | 50,586  | 68,442  |
| EBITDA                 | 12,204  | 9,632   | 11,802  | 11,387  | 13,802  | 9,651   | 11,551  |
| EBITDA Margin %        | 16      | 13      | 18      | 17      | 21      | 19      | 17      |
| Net Income             | 2,728   | 3,076   | 3,385   | 1,978   | 2,896   | 1,626   | 3,914   |
| EPS                    | 1.1     | 1.2     | 1.4     | 0.8     | 1.1     | 0.7     | 1.6     |

Source: Company, Bloomberg, JM Financial