



# GB Electricity Market Summary

**FIRST QUARTER 2016**  
**JAN TO MAR**

Recorded Levels of GB Generation by Fuel (based upon Ofgem & NG Embedded Forecasts & FUELHH data):

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**CCGT:** 13.7GW (32%)  
**COAL:** 6.3GW (-18%)

**RENEWABLES:** 8.7GW (0%)  
**INTERCONNECTIONS:** 2.7GW (29%)

**NUCLEAR:** 7.4GW (-8%)

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## EXECUTIVE SUMMARY

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The first quarter of 2016 saw gas-fired power stations generate more than twice the power output of coal stations despite Q1 2015 having seen almost 50% more coal than gas generation. This has come as gas prices have fallen with coal stations, such as Eggborough and Ferrybridge, now exiting the market due to a combination of tight margins and increased environmental requirements.

Gas-fired plants generated 32% more power than in the previous quarter as the weather conditions worsened, with coal generation falling by 18%. This reversal reflects poor economic conditions for coal generation due to the carbon price floor. Coal in the UK is now being priced out of the market due to the levy on carbon, putting UK coal generation at a disadvantage against coal-fueled power production in the rest of Europe.

This is in stark contrast to Q1 2015 when coal generated 13.3GW against a power output of 9.1GW for CCGT plants as low coal prices, high gas price and lower carbon costs meant that coal had continued to be the dominant fuel type in 2015. Those levels of generation in 2015 were already down from levels in previous years following closures at coal stations in recent years, and levels of coal-fired generation were down 66% from the levels in Q1 2012.

Despite limited subsidies, biomass conversions continued with the conversion of a third coal unit at Drax (to 85% biomass); this trend looks to continue for a short time as the capacity converting from coal to biomass rises. Other coal plants such as Eggborough that failed to secure biomass subsidies are set to close.

A decline in coal's share of generation in the market is seeing the market relying more and more on intermittent sources of power rather than baseload units, increasing the importance of ancillary services and storage. At times this has seen National Grid pay millions of pounds on tight days to ensure there is sufficient short-term margin within the system.

In this quarter, 35.4% of electricity generation came from gas-fired plants, 22.4% from renewable sources, 19.0% from nuclear plants, 16.2% from coal-fired plants and 7.1% via imports from Ireland and the continent.

The growth rate of renewable generation slowed due to lower levels of wind generation but overall the sector continues to grow with an 82% increase in solar and a 22% growth in hydro generation against the last quarter. In the quarter, 46.1% of renewable generation came from wind farms, 33.2% from biomass plants, 13.5% from hydro plants and 7.2% from solar farms.

The first quarter of 2016 saw levels of power demand climb by 18% from the previous quarter as while Q4 2015 had been unusually mild, temperatures were colder towards the beginning of 2016. Availability levels increased by 20% which facilitated higher levels of margin, with the average system margin up by 25%, though this tightened on certain days as large payments were made to generators to remain active on tight days and not go offline and be unavailable to the market.

In general, Q1 2016 saw a well-supplied system causing system prices to, on occasion; turn negative overnight, with a minimum system price of -£78MWh over the quarter.

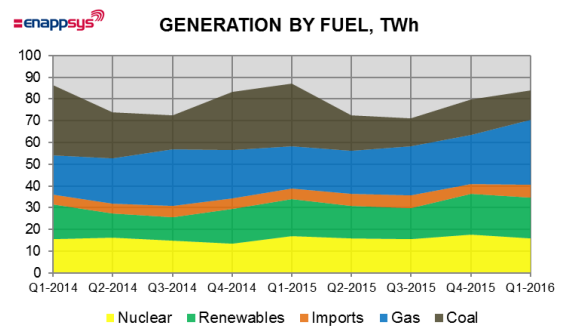
Wholesale prices dropped 15% compared with Q1 2015. This reflects the marginal cost of gas fueled power stations going down in line with falling gas prices, displacing more expensive generation such as coal.

## FUEL ACTIVITY

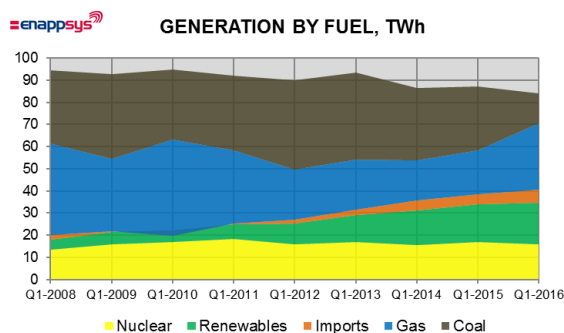
The first quarter of 2016 saw a large increase in gas generation levels coupled with a considerable reduction of coal generation. The quarter saw slight declines in both renewable and nuclear generation with interconnector activity increasing following a dip in imports during the last quarter.

Gas-fired plants generated the most power - contributing 29.68TWh (13.7GW) - with levels of output increasing considerably in comparison to the previous quarter. Gas plants were able to capitalise on a market that was at times in short supply as wind generation levels reduced on occasions and many of the existing large coal fleet began to prepare for closure or conversion to biomass.

The largest increases in levels of electricity production came again at gas-fired generator, generating 32% more power than in the previous quarter and 51% more than in Q1 2015. This steep increase highlights the decline of coal generation and a more aggressive pricing strategy adopted by the closing plants in their last few months that has seen them hold back and wait for higher prices.



Nuclear plants saw levels of generation totaling 15.98TWh across the quarter (7.49GW), this was a generation reduction of 8% compared to the last quarter and was caused by the closing of the Wylfa plant in Wales along with a planned outage at Hinkley Point B7 and a failed start at Hartlepool 1 after a lengthy outage.



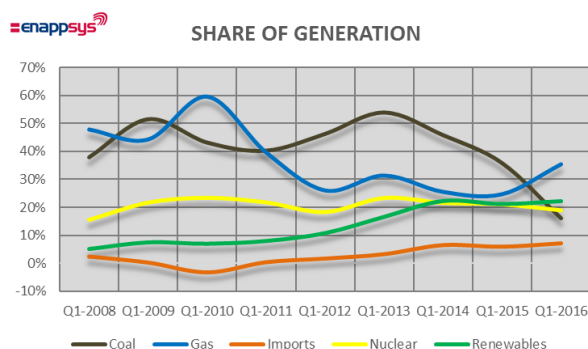
Levels of coal generation fell by 18% against the last quarter and were down 51% in comparison to last year, the coal fleet produced only 13.56TWh (6.3GW) of power in the last quarter. This reduction reflects poor economic conditions for coal generation due to the carbon price floor. Coal in the UK is being priced out of the market due to the levy on carbon, this puts

UK coal generation at a disadvantage against coal-fueled power production in the rest of Europe resulting in coal plant conversions to biomass becoming an increasingly popular trend in the UK.

Renewable generation levels reduced slightly in Q1 2016 compared to Q4 2015 but increased by 10% against the previous year. The levels of renewable generation are expected to rise

considerably towards the summer as the renewable obligations subsidy for solar PV terminated at the end of the financial year 2015/16 prompting a large buildout of sub 5MW solar farms.

A notable observation over the last 4 quarters has been the drastic decline in coal's share of generation in the market with only 16.2% of generation in the last quarter coming from coal fueled power stations. This is changing the dynamics of the market, with it relying more and more on intermittent sources of power rather than baseload units is increasing the importance of ancillary services and storage. National Grid is displaying a trend of creating additional spinning reserve (flexible margin) within the market through use of the balancing mechanism at costs rising at times to millions of pounds per day, this is creating peakier prices as generators are realising the potential to sell less power into the power markets ahead of delivery and instead waiting for National Grid to call them through other, potentially more lucrative mechanisms.



### Statistics

The following tables contain some of the key statistics relating to the quarter:

|                                       | 9            | 8            | 7            | 6            | 5            | 4            | 3            | 2            | 1            |
|---------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| *GB Only (Excludes Northern Ireland)  | Q1-2014      | Q2-2014      | Q3-2014      | Q4-2014      | Q1-2015      | Q2-2015      | Q3-2015      | Q4-2015      | Q1-2016      |
| <b>TOTAL GENERATION BY FUEL (TWh)</b> |              |              |              |              |              |              |              |              |              |
| Coal                                  | 32.61        | 21.11        | 15.87        | 27.07        | 28.70        | 16.60        | 12.63        | 16.53        | 13.56        |
| Gas                                   | 18.06        | 20.67        | 25.81        | 22.18        | 19.65        | 19.63        | 22.57        | 22.50        | 29.68        |
| Imports                               | 4.56         | 4.79         | 5.27         | 4.86         | 4.69         | 5.48         | 5.98         | 4.60         | 5.92         |
| Nuclear                               | 15.40        | 16.30        | 14.70        | 13.34        | 16.90        | 15.81        | 15.51        | 17.45        | 15.98        |
| Renewables                            | 15.93        | 10.87        | 10.95        | 16.00        | 17.05        | 15.15        | 14.31        | 18.83        | 18.78        |
| <b>TOTAL</b>                          | <b>86.55</b> | <b>73.74</b> | <b>72.60</b> | <b>83.44</b> | <b>86.99</b> | <b>72.67</b> | <b>71.01</b> | <b>79.91</b> | <b>83.93</b> |

|                                      | 9       | 8       | 7       | 6       | 5       | 4       | 3       | 2       | 1       |
|--------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| *GB Only (Excludes Northern Ireland) | Q1-2014 | Q2-2014 | Q3-2014 | Q4-2014 | Q1-2015 | Q2-2015 | Q3-2015 | Q4-2015 | Q1-2016 |
| <b>SHARE OF GENERATION (%)</b>       |         |         |         |         |         |         |         |         |         |
| Coal                                 | 37.7%   | 28.6%   | 21.9%   | 32.4%   | 33.0%   | 22.8%   | 17.8%   | 20.7%   | 16.2%   |
| Gas                                  | 20.9%   | 28.0%   | 35.5%   | 26.6%   | 22.6%   | 27.0%   | 31.8%   | 28.2%   | 35.4%   |
| Imports                              | 5.3%    | 6.5%    | 7.3%    | 5.8%    | 5.4%    | 7.5%    | 8.4%    | 5.8%    | 7.1%    |
| Nuclear                              | 17.8%   | 22.1%   | 20.2%   | 16.0%   | 19.4%   | 21.8%   | 21.8%   | 21.8%   | 19.0%   |
| Renewables                           | 18.4%   | 14.7%   | 15.1%   | 19.2%   | 19.6%   | 20.9%   | 20.2%   | 23.6%   | 22.4%   |

|                                       | 9            | 8            | 7            | 6            | 5            | 4            | 3            | 2            | 1            |
|---------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| *GB Only (Excludes Northern Ireland)  | Q1-2008      | Q1-2009      | Q1-2010      | Q1-2011      | Q1-2012      | Q1-2013      | Q1-2014      | Q1-2015      | Q1-2016      |
| <b>TOTAL GENERATION BY FUEL (TWh)</b> |              |              |              |              |              |              |              |              |              |
| Coal                                  | 32.89        | 38.06        | 31.41        | 33.68        | 40.33        | 39.26        | 32.61        | 28.70        | 13.56        |
| Gas                                   | 41.45        | 32.67        | 43.35        | 33.08        | 22.57        | 22.75        | 18.06        | 19.65        | 29.68        |
| Imports                               | 2.10         | 0.24         | -2.27        | 0.37         | 1.49         | 2.36         | 4.56         | 4.69         | 5.92         |
| Nuclear                               | 13.54        | 16.07        | 17.05        | 18.24        | 16.03        | 17.04        | 15.40        | 16.90        | 15.98        |
| Renewables                            | 4.45         | 5.55         | 5.09         | 6.69         | 9.43         | 12.14        | 15.93        | 17.05        | 18.78        |
| <b>TOTAL</b>                          | <b>94.42</b> | <b>92.58</b> | <b>94.63</b> | <b>92.07</b> | <b>89.84</b> | <b>93.57</b> | <b>86.55</b> | <b>86.99</b> | <b>83.93</b> |

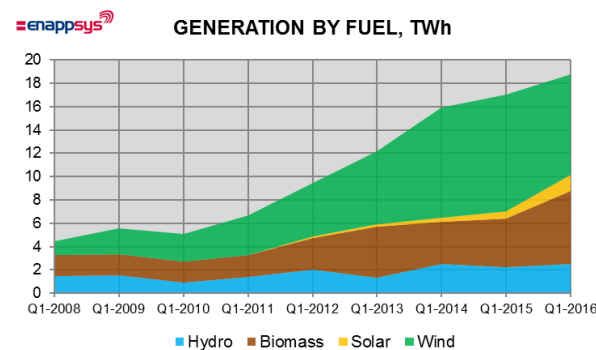
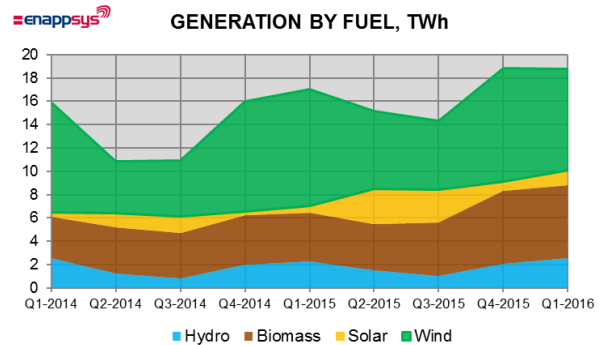
|                                      | 9       | 8       | 7       | 6       | 5       | 4       | 3       | 2       | 1       |
|--------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| *GB Only (Excludes Northern Ireland) | Q1-2008 | Q1-2009 | Q1-2010 | Q1-2011 | Q1-2012 | Q1-2013 | Q1-2014 | Q1-2015 | Q1-2016 |
| <b>SHARE OF GENERATION (%)</b>       |         |         |         |         |         |         |         |         |         |
| Coal                                 | 38.0%   | 51.6%   | 43.3%   | 40.4%   | 46.4%   | 54.0%   | 45.9%   | 35.9%   | 16.2%   |
| Gas                                  | 47.9%   | 44.3%   | 59.7%   | 39.6%   | 25.9%   | 31.3%   | 25.4%   | 24.6%   | 35.4%   |
| Imports                              | 2.4%    | 0.3%    | -3.1%   | 0.4%    | 1.7%    | 3.3%    | 6.4%    | 5.9%    | 7.1%    |
| Nuclear                              | 15.6%   | 21.8%   | 23.5%   | 21.9%   | 18.4%   | 23.5%   | 21.7%   | 21.2%   | 19.0%   |
| Renewables                           | 5.1%    | 7.5%    | 7.0%    | 8.0%    | 10.8%   | 16.7%   | 22.4%   | 21.3%   | 22.4%   |

## RENEWABLES

The growth rate of renewable generation slowed in Q1 2016 due to lower levels of wind generation, due to lower wind speeds, but overall the sector continues to grow with an 82% increase in solar and a 22% growth in hydro generation against the last quarter.

Wind continued to provide the majority of power from renewable sources at 46.1% of the renewable market share with levels of generation amounting to 8.66TWh (4GW), this is however an 11% decrease from the previous year.

The second largest share of generation came from biomass at 33.2% of generation as a third Drax unit converted to burn 85% biomass. Biomass showed minor levels of growth when compared to the previous quarter, but when compared with the previous year levels of generation have risen 50% from 4.17TWh (1.9GW) in 2015 to 6.24 TWh (2.9) in 2016. This growth reflects the conversion of coal units at Drax; this trend looks to continue for a short time as the capacity converting from coal to biomass rises.



Hydro units again provided the third largest share of renewable generation at 13.5% with total levels of generation at 2.53TWh (1.2GW), this is a 50% increase from Q1 2015 as the quarter saw higher levels of river flow.

Solar generators provided 7.2% of renewable generation with levels of 1.35TWh (0.6GW) for the quarter, levels of solar generation in Q1 2015 were 0.59 TWh (0.3GW) showing a 130% increase from the previous year. This steep growth rate in the quarter is a result of a major build out of by companies looking to obtain ROC's through sub 5MW solar PV sites.

In the quarter, 46.1% of renewable generation came from wind farms, 33.2% from biomass plants, 13.5% from hydro plants and 7.2% from solar farms.





## DEMAND, MARGIN AND PRICES

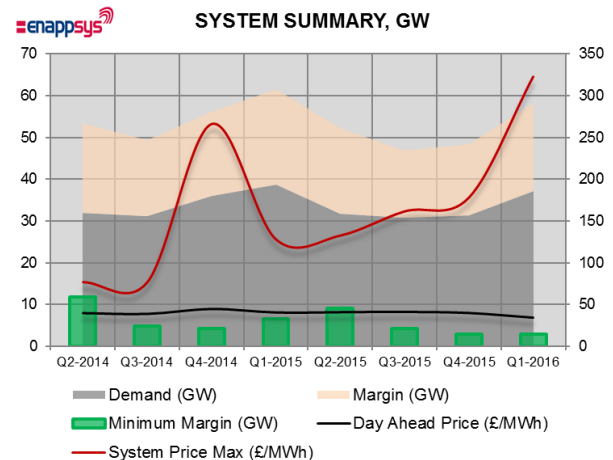
The first quarter of 2016 saw levels of power demand climb by 18% from the previous quarter as Q4 2015 had been unusually mild, but with temperatures being colder towards the beginning of 2016 the quarter saw increased demand. This is however a drop of 4% from the previous year; the drop in demand from the same quarter in 2015 is a result of an ongoing trend of increased embedded generation coupled with continually improved efficiency.

Although demand increased by 18% in Q1 2016 availability levels also increased - by 20% - which in turn saw higher levels of margin, with the average system margin up by 25%. The margin was however 8% shorter than Q1 2015 identifying the reduced availability within the market.

Levels of availability throughout the quarter were overall relatively high with the exception of March 10<sup>th</sup> during a period of low wind where the margin reduced to 2.06GW creating a system price of £517MWh and resulting in large payment to generators providing additional capacity to the system in the evening.

The well supplied system caused system prices to, on occasion, turn negative overnight, with a minimum system price of -£78MWh over the quarter.

Wholesale prices dropped during Q1 2016 by 13% in the day ahead market and 14% in the within day market from the previous quarter; an overall 15% reduction in price compared with Q1 2015. This reflects the marginal cost of gas fueled power stations going down in line with falling gas prices, displacing more expensive generation such as coal.



### Statistics

The following table contains some of the key statistics relating to the quarter:

| *GB Only (Excludes Northern Ireland)      | Q1-2014 | Q2-2014 | Q3-2014 | Q4-2014 | Q1-2015 | Q2-2015 | Q3-2015 | Q4-2015 | Q1-2016 |
|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| <b>WHOLESALE PRICES (£/MWh)</b>           |         |         |         |         |         |         |         |         |         |
| Day Ahead Price                           | 44.27   | 39.18   | 38.65   | 45.21   | 40.88   | 41.97   | 41.41   | 39.92   | 34.63   |
| Within Day Price (MDP)                    | 45.44   | 39.65   | 38.77   | 44.62   | 40.47   | 40.80   | 41.19   | 39.85   | 34.28   |
| <b>WITHIN DAY PRICE BREAKDOWN (£/MWh)</b> |         |         |         |         |         |         |         |         |         |
| Off-Peak Hours                            | 36.87   | 33.86   | 32.06   | 35.10   | 33.62   | 34.38   | 35.28   | 36.02   | 28.72   |
| Peak Hours (excl Superpeak)               | 46.92   | 42.30   | 41.48   | 45.46   | 41.09   | 43.64   | 43.62   | 41.40   | 33.86   |
| Superpeak Hours                           | 59.99   | 43.46   | 44.46   | 63.20   | 53.91   | 45.33   | 46.06   | 43.07   | 48.26   |
| <b>SYSTEM BUY PRICE (£/MWh)</b>           |         |         |         |         |         |         |         |         |         |
| Maximum                                   | 118.76  | 77.31   | 77.31   | 266.11  | 128.33  | 132.90  | 161.80  | 178.22  | 322.57  |
| Average                                   | 51.99   | 44.28   | 43.69   | 52.62   | 46.47   | 45.79   | 47.22   | 42.77   | 36.67   |
| Minimum                                   | 19.42   | 25.06   | 5.44    | 6.45    | 3.65    | -2.61   | 17.54   | -73.48  | -73.48  |
| <b>SYSTEM SELL PRICE (£/MWh)</b>          |         |         |         |         |         |         |         |         |         |
| Maximum                                   | 118.76  | 77.31   | 77.31   | 266.11  | 128.33  | 132.90  | 161.80  | 178.22  | 322.57  |
| Average                                   | 40.59   | 34.57   | 33.23   | 40.34   | 36.54   | 35.46   | 36.86   | 35.17   | 36.67   |
| Minimum                                   | 5.56    | 10.93   | -78.00  | -57.23  | -35.33  | -36.96  | 17.54   | -73.48  | -78.00  |
| <b>DEMAND (MW)</b>                        | 37,992  | 31,977  | 31,251  | 36,049  | 38,682  | 31,791  | 30,854  | 31,401  | 37,147  |
| <b>AVAILABILITY (MW)</b>                  |         | 53,400  | 49,308  | 56,160  | 61,561  | 52,292  | 46,785  | 48,348  | 58,247  |
| <b>MARGIN (MW)</b>                        |         | 21,422  | 18,057  | 20,111  | 22,879  | 20,501  | 15,930  | 16,947  | 21,100  |
| <b>MIN MARGIN (MW)</b>                    |         | 11,747  | 4,869   | 4,233   | 6,638   | 9,125   | 4,217   | 3,007   | 3,007   |
| <b>DEMAND (TWh)</b>                       | 82.1    | 69.8    | 69.0    | 79.6    | 83.6    | 69.4    | 68.1    | 69.3    | 80.2    |
| <b>AVAILABILITY (TWh)</b>                 |         | 116.6   | 108.9   | 124.0   | 133.0   | 114.2   | 103.3   | 106.8   | 125.8   |
| <b>MARGIN (TWh)</b>                       |         | 46.8    | 39.9    | 44.4    | 49.4    | 44.8    | 35.2    | 37.4    | 45.6    |
| <b>MIN MARGIN (TWh)</b>                   |         | 25.7    | 10.8    | 9.3     | 14.3    | 19.9    | 9.3     | 6.6     | 6.5     |

## **NOTES ON THE REPORT**

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The figures used in the report refer to GB only, against DECC figures that refer to GB and Northern Ireland. This selection has been made since Northern Ireland is separated from GB and is more closely linked to the electricity grid of the Republic of Ireland.

Generation levels by fuel from 2009 are based upon National Grid FUELHH data, which gives the operationally metered totals by fuel, down to a 5 minute resolution.

Prior to 2009, individual plant data has been aggregated from our databased matching of National Grid fuel-type relationships.

To account for embedded wind and solar, the National Grid forecasts for these generators have been used as if they were output figures. Embedded hydro and biomass have been accounted for using analysis of Ofgem data on certificate awards.

Within this report, levels of offshore wind have not been split apart from the wind total. This is because this can only be reliably done using metered volumes at a generating unit level. This is not a publically available data stream and figures can only be estimated and not distributed. FPNs at wind farms do not correlate well with metered volumes and so cannot be used reliably.

Price and demand data primarily comes from Elexon (as does the FUELHH data), with the exception of the APX day-ahead prices.

Availability levels are calculated by totaling levels of recorded availability at all plants in the market.

## **ABOUT ENAPPSYS**

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EnAppSys provides services to companies in the energy and power markets, specifically by providing data, information and consultancy services.

The company has a GB power market database stretching back to 2003 and an online platform that provides readily available information ranging from forwards market prices to historic generator operations.

Enappsys is focused on providing information and analytical services covering the energy sector and is actively growing the business to provide products with enhanced analysis and forecasting capabilities and extending the geographic and sector coverage beyond the UK and the electricity market.

The company's business objective is to make available timely, optimal and insightful information, analysis and systems to the energy sector to ensure all sizes of company have the best available tools and information to make informed decisions and to optimise their business strategy.

To find out more about EnAppSys contact the company at [about@enappsys.com](mailto:about@enappsys.com) or visit the company's website at [www.enappsys.com](http://www.enappsys.com).