# Cogeneration growth in Europe – smaller systems have better prospects

**What are the real prospects for cogeneration markets in Europe? Here, Michael Brown starts with the uncomfortable truth that overall markets have 'flatlined' (or worse) in recent years, but suggests that prospects for smaller, packaged CHP systems for homes and buildings, at least, look better for the future.**

There are two main highlights in Delta's latest short-term (to 2014) and medium-term (to 2020) outlooks for European cogeneration orders. Firstly, that we expect that the smaller end, sub 3 MWe non-industrial applications, to be more healthy than the larger end. And secondly, that our growing optimism for the smaller market is tempered by continuing uncertainties about two core market drivers: spark spread and policy incentives.

## THE MARKET TODAY – FLATLINING

Before we start, let's take a backward look at the market up to 2010. We know that the period which saw the most rapid market growth across all sectors in Europe was the early to mid 1990s, after which growth slowed sharply up to the mid 2000s.

What happened then? Figure 1 shows high level Eurostat data of how the overall market has developed since 2004, with Delta's 2010 estimates added. Overall, this has been a flat market, with the electricity output remaining level since 2005 (and very likely in decline since 2008).

While this data does not segment the market in any way, Delta's own data, in particular from the major markets including Germany, Italy, the UK, clearly indicates that where there has been growth, this has been in the smaller end of the market in largely non-industrial applications, mostly fuelled by natural gas but a steadily rising share also of renewable based systems (triggered by renewable energy, rather than cogeneration, incentives).

For this sector, growth has been moderate rather than startling, and based in large part on orders since 2009 in Germany, which has represented around 40%+ of the European market largely due to its CHP Law. But even this moderate growth has been sufficient to provide plenty of business for the project developers and packagers in this size range because there are relatively few of them. We see the 30 kWe – 2 MWe size range in particular as having considerable scope for new market entrants with new products and differentiated offerings.

## WHAT HISTORY TELLS US

To help inform our view of where the market is going, we need to understand why

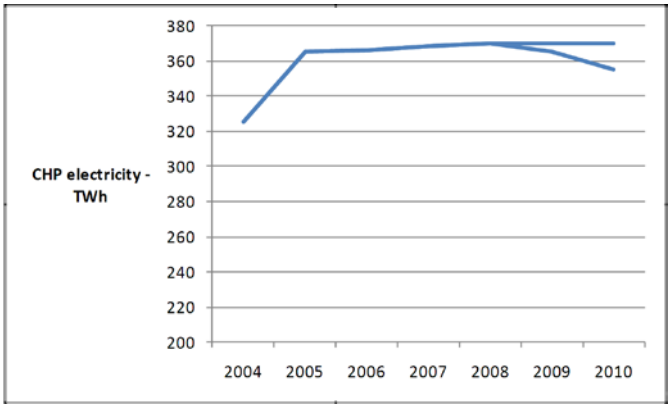


*Figure 1. EU CHP electricity generation*
*Source: Eurostat (up to 2008), Delta Energy & Environment (2008–10 range estimate)*

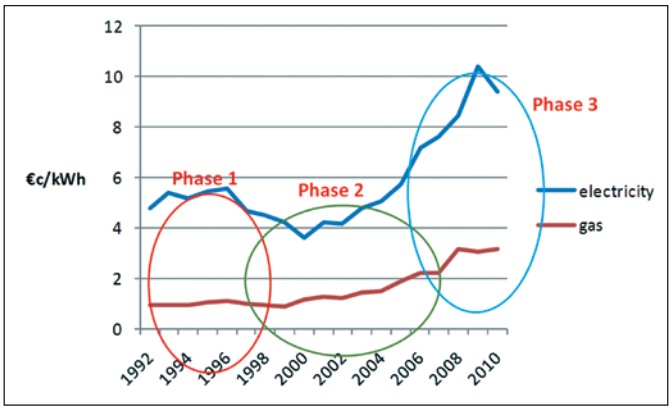


*Figure 2. EU-15 industrial energy prices (including taxes)*
*Source: Eurostat, International Energy Agency 2011*

the market to date has been so disappointing. Figure 2 shows the trend in industrial electricity and gas prices, taken as an EU average, over the last 20 years.

The ratio of the electricity price to the gas price is a highly important driver of CHP economics, and it is easy to see the direct impact of this factor:

- In phase 1 – very low gas prices and relatively high electricity prices. CHP investment returns are highly attractive across all market segments, industrial and non industrial. The CHP market grew very strongly during this period.
- In phase 2 – gas prices double and electricity prices fall or remain flat. Investment returns decline sharply. CHP market continues to grow, but growth rates decline steeply. Industrial CHP activity in particular diminishes strongly.
- In phase 3 – while gas prices have risen by around 50% and electricity prices have almost doubled, the spread is still not back where it was in phase 1. Overall market growth is flat, with industrial CHP flat or in decline - but non industrial CHP growing in some markets (based on higher electricity prices for smaller customers).

## FUTURE SPARK SPREAD TRENDS – UNLIKELY TO DETERIORATE

So to determine a view on future market growth, we need to take a view on spark spread trends going forward.

### We see gas prices remaining high or getting higher

While the conventional wisdom sees the world becoming increasingly awash in gas, in Europe (except the UK), and Asia for that matter, we see gas prices remaining anchored in long-standing industry pricing practices. These are based on long-term contracts linked to the cost of oil or refined oil products. In other words, gas prices will not reflect (growing) supply and demand of gas, but will continue to reflect (more limited) supply and demand of oil. In short, gas will remain over-priced in Europe.

### We see electricity prices becoming more volatile

On the one hand, there is growing evidence that the demand falls that resulted from the recession may take a long time – if ever – to return. And it will be several years before the new demand arising from heating (heat pumps) or transportation (electric vehicles) start to have a meaningful impact.

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On the other hand, many countries have ageing plants. The cost of new generation is increasing as the share of renewables grows and the cost impacts on new nuclear of the Fukushima incident kick in. Volatility will not only increase over a year to year time frame, but increasingly over month to month, day to day and minute to minute as the share of inflexible generation grows.

In short, we see spark spreads remaining unattractive for larger industrial users (where steam host risk is also an issue) and thus we see that market remaining generally flat, buoyed only now and then by surges of economic activity in specific sectors and countries. But our view for the smaller end of the market is different.

For smaller users, for example commercial buildings, hotels, light industry and the public sector, we also do not see it as at all likely that spark spreads will return to the hey-day era of the 1990s, but we do see electricity prices remaining sufficiently high to keep this market warm, if not hot. And warm is likely to be good enough for the small number of players in this market.

Thus, for larger scale CHP, spark spreads need to get better again. But for the small-scale market (micro/mini and small), they are ok as they are and, we believe, the upside risk is lower than the downside. How well the small-scale market fares will depend greatly on new incentive trends.

## POLICY – BETTER FOR SMALLER PROJECTS

Policy is another critical

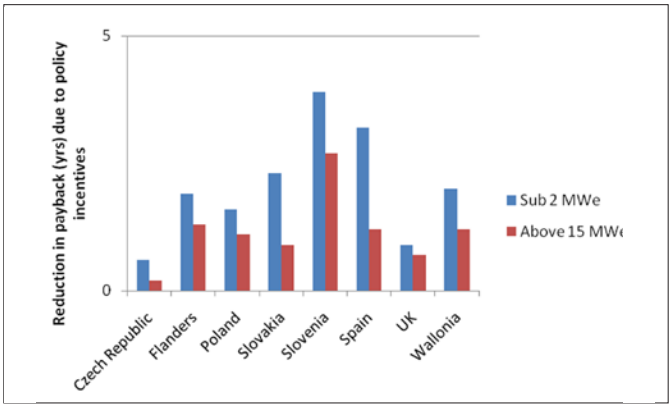


*Figure 3. The impact of incentives on CHP project paybacks*
*Source: Delta Energy & Environment 2011*

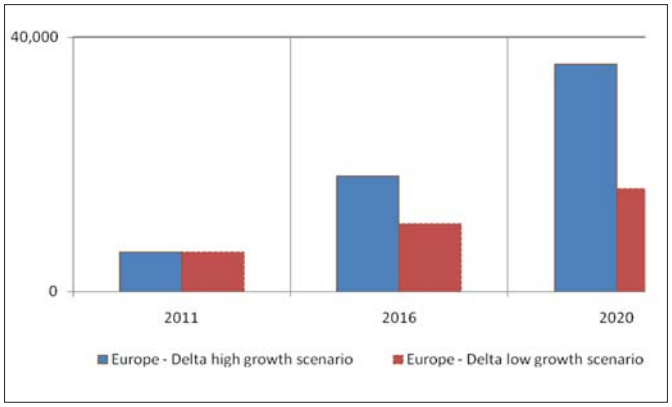


*Figure 4. European mini-CHP market growth 2011–20*
*Source: Delta Energy & Environment*

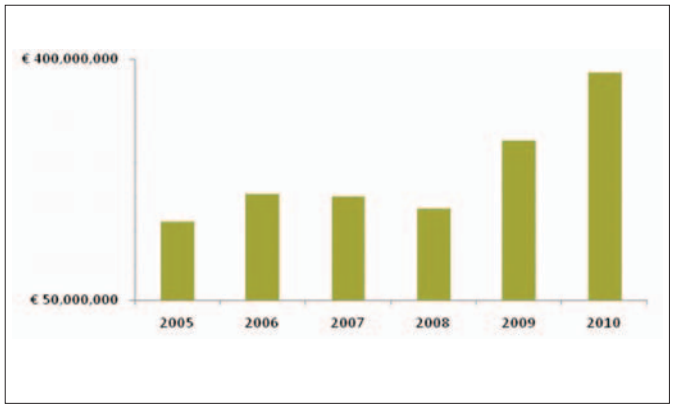


*Figure 5. Value of global micro-CHP sales*
*Source: Delta Energy & Environment 2011*

driver of CHP markets. There are several examples where, at national level, incentives have really driven market development, including:

- The German CHP Law
- The Flemish CHP Certificate system and the Wallonian Green Certificate system.
- The former Portuguese CHP tariff.

Today, such incentives are still thin on the ground. Significantly, however, our analyses of the IRR and payback impacts of incentives across the EU show a striking consistency: they have greater impact on smaller sub 2 MWe projects than on the larger ones. Figure 3, indicating the outputs of our CHP plant economic modelling, shows the degree to which policy incentives reduce project paybacks for two types of CHP scheme in several countries.

In the absence of any strong market triggering from spark spreads, policymakers appear to be taking the view that smaller projects deserve more support than bigger ones, perhaps for obvious reasons. This, we believe, is another important reason why current trends point firmly towards more buoyant markets for smaller scale CHP in the 0–3 MWe range – and towards continuing flatlining for larger projects.

We see no reason why this will change in the short or medium terms.

Let us now look more closely at two market segments within the smaller-scale CHP range: the 5–500 kWe market and the micro-CHP (0–5 kWe) market.

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## GAS-FIRED MINI CHP – 5–500 KWE

This consists of a proven and mature range of products, the majority of which are gas engine based. Today, there is only a small level of development in many markets in Europe (few tens to hundreds of units make up the total installed base in several markets), with only steady – rather than startling market growth. We don't expect this to change much before 2015.

Germany is the major European market with low thousands of sales per year, driven by its 2009 CHP Law. Indeed, policy is a key driver, alongside spark spread, which for this size range we do not expect to worsen in the short/medium terms.

Towards 2015, we expect the growing trend of incentives being more strongly targeted at this smaller end to continue and quite likely accelerate. Overall, we believe that the untapped economic potential is high (possibly exceeding hundreds of thousands of units), and is likely to get higher over time. What appears to be a missing factor today is greater customer awareness – is there scope for a stronger marketing push by the relatively small number of developers in this market segment, or by new entrants?

## MICRO CHP – 1–3 KWE, SINGLE FAMILY HOMES

In some ways, the micro-CHP market of single family homes is different to the larger segments, not least because it is essentially a

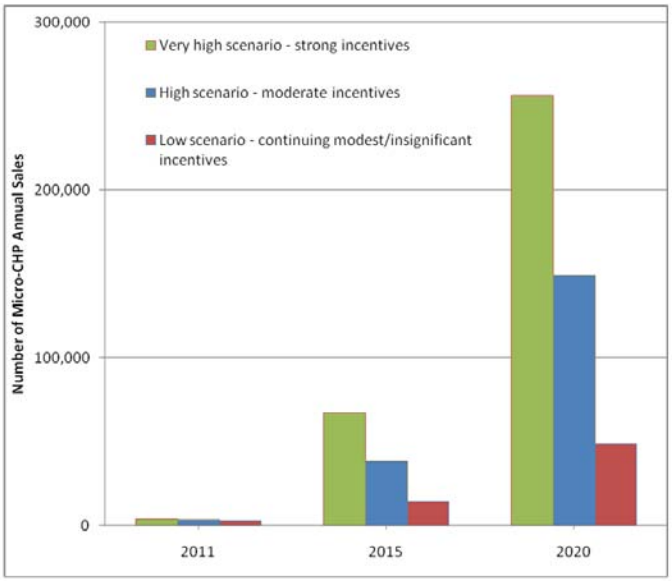


*Figure 6. Delta market forecasts for European micro-CHP sales*
*Source: Delta Energy & Environment 2011*

boiler replacement market. But spark spread and policy drivers are still important, especially the latter.

While Japan remains the main market for micro-CHP, we see the European market is potentially beginning to gather its first tentative signs of momentum. We estimate that the value of sales in the EU increased by 25% between 2009 and 2010 and we see this early trend continuing through 2011. Figure 5 summarizes our data relating to the value of global sales of micro-CHP, including all technologies (fuel cell – SO and PEM, reciprocating engine, Stirling engine and Organic-Rankine Cycle engines).

The fact remains, however, that the sector is still in its infancy, with combined sales in Europe of a few thousand to date. While previous market nervousness about product reliability and performance is diminishing, cost is high and there remains growing uncertainty about the degree to which policymakers will recognise the genuine benefits that this product can deliver. We believe that the sector now has a unique opportunity to convey these benefits to policymakers, both at EU and member state levels; if it can do so effectively, suitable incentives are likely to follow.

Significantly, a wave of new products is now coming to market. We therefore see the European market as potentially going in one of three directions, summarized in Figure 6. Policy – much more so than spark spread – will be the key determinant of which trajectory the market will follow.

## THE OUTLOOK LEADING UP TO 2020

The EU funded CODE project has aggregated the data from the national CHP potential studies required by the EU CHP Directive. This has identified a total European potential of 222 GWe of CHP by 2020, an increase from about 100 GWe today.

But achieving this figure will require a high number of new large industrial and municipal schemes. Based on our analysis of 15–20 years of past market development and of current market trends, we do not see either spark spreads or incentives improving anywhere near enough to drive the large-scale market to that extent.

However, we do see considerable upside potential for the small-scale market if the current trend towards stronger incentives for smaller schemes is maintained – and provided there is not a significantly adverse shift in spark spreads.

Not only is this a great opportunity for new entrants to the market, both product and project developers, but there will be some substantial reductions in emissions and primary energy consumption arising from the residential and commercial buildings sectors – two of the EU's key objectives.

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