

## John Jimison, Michael Brown e Simon Minett : Como trazer a co-geração e a geração distribuída para a agenda das discussões do setor de energia

Três importantes lideranças, da USCHPA, WADE e COGEN Europa, discutem as perspectivas no mundo  
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No artigo - Cogeneration and Decentralized Energy Worldwide - how to bring them to the mainstream - na revista COSPP, volume 5 no. 4, são discutidas as perspectivas para a co-geração e a Geração Distribuída (GD) na Europa, como podem ser melhoradas, e o que está acontecendo nos EUA e em outras partes do mundo. John Jimison, Michael Brown e Simon Minett vêm avaliando e influenciando nestas questões, como diretores da US Combined Heat and Power Association (US CHPA), World Alliance for Decentralized Energy (WADE) e COGEN Europa, respectivamente.

A revista COSPP ([http://www.jxj.com/magsandj/cospp/2004\\_04/cogen\\_decentralized.html](http://www.jxj.com/magsandj/cospp/2004_04/cogen_decentralized.html)) pediu que discutissem estas questões e outras mais sobre políticas para lidar com os impactos da mudança de clima, resiliência da rede e preços do gás. Seguem-se alguns dos temas abordados:

- Perspectivas para a co-geração e a Geração Distribuída (GD) nos EUA, Europa e resto do mundo e principais fatores impulsionadores e desafios em um período de 5 anos;
- A co-geração faz sentido mas a tecnologia permanece marginal pelo mundo afora. Não parece existir perspectiva para incluir a co-geração na agenda das discussões. Das duas uma, ou somos loucos ou o mundo está perdendo algo. Assumindo a última hipótese, são discutidos os fatores que ocasionam este fato;
- Como advogados da co-geração e GD os três entrevistados discutem o que fazer para colocar esta questão no modo correto;
- A resiliência da rede é agora um tema em evidência e um potencial impulsionador da co-geração. A vulnerabilidade da rede pode ser considerada como um problema contínuo ou não, e em caso positivo, como pode a indústria responder a esta questão;
- A segurança do fornecimento do gás e o preço são questões críticas para todos. A pressão no preço, para cima, é ou não um aspecto positivo para a co-geração;
- A mudança climática é um importante impulsionador da co-geração na Europa. Poderia ser assim em todos os lugares, inclusive nos EUA. São avaliadas as perspectivas de mudança na política dos EUA;
- Um importante cientista climático e herói do movimento ambiental do Reino Unido, James Lovelock, tem dito que a única resposta para a mudança climática cada vez mais acelerada, é o rápido desenvolvimento da energia nuclear. Os entrevistados discutem esta assertiva;

## COGENERATION AND DECENTRALIZED ENERGY WORLDWIDE how to bring them into the mainstream? (Revista COSPP – Cogeneration and On-Site Power Production – July-August 2004)



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*“What are the market prospects for cogeneration and decentralized energy (DE) in the US, Europe and the rest of world? What are the main drivers and challenges in a five-year timeframe, and why?”*

### John Jimison:

The market prospects for distributed energy and cogeneration (or CHP) in the US are being viewed with more optimism by the emerging industry that creates equipment and develops projects for onsite power generation. This is a sector that has always tended to lag behind the rest of the economy, but the ongoing recovery is now beginning to filter through in terms of new equipment orders and announced projects. Around 31 GW of CHP capacity were added between 1998 and 2002 despite the downturn, and the identified potential for CHP is in excess of 200 GW, with straight DE opportunities on top of that, so the problem is not lack of opportunity.

Last summer's north-east regional blackout, and the dire warnings of potential repeats if this summer is hot and dry, have focused users' attention on options to be self-sufficient. As the extraordinary costs and delays of significant grid enhancement become known, the relatively painless siting and lead-times of DE/cogen should draw more attention as well. But key regulatory and institutional obstacles remain, along with a general level of ignorance among potential users.

### Michael Brown:

Globally, I echo John's optimism. Several countries look exciting, including Brazil and China. South-east Asia as a whole is also bright. Experience of the last 10 years shows strongly that, when rates of new capacity development are high, cogeneration markets are also buoyant, even though the market share may not be that great. In general, it is the emerging markets which will show the greatest need for new plant for the foreseeable future, and I expect cogeneration to play a role in those countries - especially where natural gas or biofuels are available and where supply quality and reliability are poor.

Therefore, many of the drivers look positive, and much of the demand growth will be for energy-intensive industry and for cooling applications in commercial buildings - ideal for cogeneration. If we can ensure that developers are not faced by a regulatory stranglehold, then that role should be a big one.

### Simon Minett:

I too am optimistic at the moment; I just hope that it is not another false dawn. The main drivers in Europe for DE and cogen are Europe's response to the Kyoto Protocol, energy market liberalization, and specific EU legislation directed at renewables and cogeneration. The response to climate change is two-pronged: firstly an emissions-trading scheme (ETS) for all large emitters of carbon dioxide, which will put a modest price on carbon and will drive the market actors towards lower carbon solutions; and secondly direct policies aimed at sectors not in the ETS - this is still to be worked through.

There are more low-cost options than ever before for generating energy on-site at high efficiency, but the rule-makers have not caught up

However, the Directives on cogeneration, brought into force this year, and on renewable electricity, enacted three years previously, remove obstacles to the use of DE/cogen and force governments to improve the conditions for these options. In open energy markets, with provisions for DE/cogen and a carbon dioxide driver, I expect to see substantial changes in the next few years.

The long-term prospects in Europe are good, and I believe it is possible that cogeneration could reach market penetrations of 15%-20% in the next 10-15 years. This would equate to some 100 GWe of new capacity.

**The three of us know that cogen makes sense, but the technology remains marginal worldwide. There seems to be no prospect for mainstreaming cogeneration. Are we nuts - or is the world missing something? Assuming the latter - why is it?**

**John Jimison:**

The world is missing something: it has not recognized that the new model for providing electric power at the site of its use offers costs that are lower and benefits that are greater than the conventional central system, when one accounts for the transmission and distribution (T&D) grid necessary for that conventional system. Because it is the backbone of an advanced industrial society, electricity provision is not seen by the typical user as a 'do-it-yourself' project. But to hook up to the grid presumes that the capacity on the grid is adequate and reliable - not safe assumptions in the US, but still the common assumptions.

Since the regulatory system has traditionally entitled the utilities to spend the amounts necessary to achieve that capacity and reliability, passing the costs on to all rate-payers, there has never been an incremental price signal or a psychology that would lead users to think first of providing their own power, even while they have usually had to assume responsibility for providing their own thermal energy. Fundamentally, it's a problem of technological inertia.

**Michael Brown:**

It is also regulatory inertia. There are more low-cost options than ever before for generating energy on-site at high efficiency - but the rule-makers have not caught up, as they are at least 10 years behind the technology developers. So we have a major educational and awareness-raising challenge to confront, and that is what the three of us do.

But there is another issue. The power plant and grid network industry is one of the top three global business sectors. They are close to policymakers, regulators and utilities in every country and they are formidably well resourced and professional in their promotion and marketing efforts. I like to think that we are similarly professional, but our resources are a pin-prick in comparison. So there is inevitably a lag between the opportunity created by the abundant availability of technology and the point at which the policymakers finally 'get it'. We are right in the middle of this period.

**Simon Minett:**

Maybe we are nuts! But, nevertheless, cogeneration represents a disruptive technology, which does not fit the way the market or system was conceived. It also does not fit the corporate business models of the major players. Cogeneration is also quite a complex sell to policymakers, because it is a neat engineering solution. Policymakers do not always wish or care to understand this. We need to work on good, and simple, marketing of the concept, benefits and the road ahead.

I suggest we take inspiration from comparable market disruptors, such as personal computers versus mainframes in the early 1980s, mobile phones in the 1990s and the Ryanair/Easyjet revolution in airfares. In each case David eventually beat Goliath.

**What can, or should, we do as advocates of cogen and DE to put this right?**

**Michael Brown:**

Some of the most effective lobbyists are the environmental groups, notably the WWF, Friends of the Earth and Greenpeace. Certainly in Europe they have had great impact in moving energy policy strongly towards renewable energy - much more impact than the small renewable energy industry itself. For me this defies economic logic, since I am convinced that, over the next 20 years, a faster, stronger and lower-cost environmental gain can be made from cogeneration. Our industry, however, has not yet fully succeeded in getting the green groups solidly behind us. We need to address that.

**Simon Minett:**

Moving DE/cogen from the marginal to the mainstream is a tough question. Undoubtedly it will require a combination of strong government leadership, together with a change of focus of the existing market players. The central power model has served the world well in the 20th century; if the DE model is to be the route for the 21st century, then we need to integrate the whole system so that wires, generation and efficient end-use, plus external costs, are all considered together. We have a long way to go here.

As first steps on this road we need to work in alliances. I would suggest that the environmental NGOs become one such group. However, in Europe at least two other groups also may be helpful: the industrial groups such as the paper industry or the chemicals sector; and the urban networks such as Energie-Cités. Both of these groups could share a common vision if only the holistic approach were taken.

**John Jimison:**

I agree that allying with environmental interests that recognize the profound air-quality and land-use benefits of clean DE is a key strategy. But, in the US we also recognize that, for the same reasons that DE/CHP cannot pretend to replace the central power system in the foreseeable future, we must seek a win-win solution with the owners and operators of that system in order to develop a future where our projects can be fully integrated, accepted, and promoted in a general market for better energy solutions.

In most applications, CHP systems are designed for thermal energy production and do not produce all needed electricity, compelling an interconnection and some continuing reliance on the grid. We want that relationship to be co-operative and mutually beneficial, as it can be if the owners of the grid see the CHP system not as a threat but instead as a source of grid support and a means of avoiding painful and expensive grid expansions.

Unfortunately, as Michael notes, current regulatory policies maintain backward incentives for utilities to fight DG and push forward on capital-intensive central projects of their own. And end-users, fighting their own wars in their primary lines of business, are reluctant to open a separate battle with their local utilities - and possibly their local regulators - for uncertain gains in their energy costs and reliability unless they are strongly motivated to make a change. Generally, that motivation at present is limited to economic motivation, since users receive no compensation for the societal benefits of such a decision, and economic motivation tied to the fuel-electricity cost 'spark gap' is strong only in limited areas.

**Can our members help us to address this marketing challenge through their own marketing activities? How?**

**Michael Brown:**

Our members focus on their customers, naturally enough, when they do their marketing and promotion - and this is important. Perhaps if a major shift in cogeneration market share is to be achieved - more than the modest 7% or so it now holds - then the industry also needs to create a concerted, co-operative effort to change the fundamental ground rules of the market.

I think that our organizations deliver our members with great value, but probably our budgets are a small fraction of those whose interests may be more fostered by the status quo. Perhaps the industry needs to scale up its promotional activity significantly to achieve much stronger market growth.

**If a major shift in cogen market share is to be achieved, then the industry would also need to create a concerted effort to changing the ground rules of the market**

**Simon Minett:**

I agree with Michael, but it is not an easy call. Company budgets and expectations have short time horizons, while civil servants and government machines are much slower. Our organizations do a great job in bridging this gap, but we need to think more laterally than we may have done in the past. We will need to simplify the message and get it out more widely. Many of our members are household names or at least well known, and we should tap into their outreach abilities.

**John Jimison:**

Our members should play up the social benefits that their technologies achieve even if they are not compensated for those benefits at this point. In the US, we have launched a branding campaign with a compelling logo and the theme 'CHP: Recycling Energy', and a sub-theme 'It's time'. We are asking our

members and related industries to help us spread this brand in a ubiquitous fashion so that its positive message gradually penetrates the awareness of policymakers and the broader energy-consuming public. While we won't have the funding to splash our logo and message everywhere, we believe that over time we will build serious awareness of the positive aspects of CHP and open conversations and avenues to provide more detailed information on a positive note.

**Network resilience is now a hot issue and a potential driver for cogen. Do you see grid vulnerability as a continuing problem, and if so, how should our industry respond?**

**Michael Brown:**

This is probably the most pressing issue facing the electricity industry - but I don't yet see the nettle being grasped by policymakers, perhaps because blackouts come and go, and priorities change as events recede. DE is a major solution, and we need to consider how to ensure that message gets across most effectively. We've made a start, but we lack hard data for the moment. I have, however, heard of a recent analysis involving Strathclyde University and MIT that suggests greater use of DE could have reduced the impact of the North American blackout by around 25%.

**Simon Minett:**

The failure of the electricity systems last year in north-eastern US and Italy demonstrated to policymakers and the public just how dependent we are on electricity for our daily lives, much more so than almost anything else. Counter to our thinking, the knee-jerk reaction has been: 'we must build more grids'. This was the response of the Bush Administration and the European Energy Commissioner, Loyola de Palacio.

For DE to take its rightful place in making electricity networks more secure and reducing the strain on the current systems, we must encourage regulators and incumbent market actors to integrate DE into their system models and control philosophies. Too often DE is seen as a problem rather than a solution. The EU is supporting some projects in this area, such as DISPOWER and DGnet, and further work is necessary.

**John Jimison:**

I agree with Michael that more grid breakdowns are likely, and with Simon that DE is not yet seen as a key part of the response to this problem. This is due in part to the institutional obstacles to having the utilities themselves see DE as part of their own responses, in part to the wrong-headed rewards for new grid investment versus demand-side actions, and in part to the reality that many DE systems are not designed to function alone if the grid goes down around them, but instead to shut down as well.

There are numerous efforts under way in the US to demonstrate the value of DE to the grid, and I am confident that repeated blackouts this summer and thereafter will create enough desperation for solutions that attention will focus on DE. We need to be ready with proven technologies ready to be installed.

**Gas security and price is a critical issue for us all. Pressure on price is upwards. Is this good for cogen or not?**

**Simon Minett:**

The spark-spread is one of the fundamental economic indicators for the viability of cogeneration. In Europe, gas prices are to a large extent still linked to oil prices and I do not see this link being broken anytime soon. Thus, if power prices remain low and oil prices remain at their current high levels or higher, then cogeneration will be challenged by a narrow spark-spread. However, there are drivers forcing electricity prices to rise also.

First, emissions trading will increase power prices generally and push generators to use more natural gas, which will link power prices more closely to gas prices.

Secondly, Europe's power plant stock is in need of replacement or clean-up. New emission regulations for NOx and SOx will force the closure of a proportion of power plants, and demand growth will also drive the need for new capacity. This will mean that the price of electricity will rise to cover these investment needs. Thus higher gas prices are not necessarily as much of a threat as they first appear. Finally, in a European context the availability of gas does not appear to be a problem.

**John Jimison:**

In the US, the linkage between gas and oil prices seems to have been broken, with gas - the primary fuel for DG/CHP - spiking above oil price equivalents in several recent years. Gas prices appear to have reached a

new plateau, doubling to end a 20-year period dominated by surplus deliverability in North American markets.

The new price levels seem likely to last for several years as additional gas resources are developed. The resources are there, but at higher cost: smaller deposits, deeper gas, coal-seam and tight-sands gas, and the still remote resources of the Arctic. LNG projects too are proliferating, but the obstacles will probably prevent all but a few from going on-line. So, on balance, US consumers are looking at higher gas costs for some years as supply diversifies and finds new long-term sources.

In this environment, DG and CHP would normally be better able to accept such gas prices than conventional gas-fired power plants because they can count the extra value of thermal energy capture, higher reliability and power quality, absence of line losses, shorter lead times, and the absence of NIMBY battles.

But the times are not normal, with a huge overhang of existing gas turbine plants idle on the grid, their developers bankrupt or on the way, so that the 'sunk' capital costs are counted out of the decision whether to operate them or not. New DG/CHP would be able to compete well even at higher gas prices with new central station gas plants, but not when their capital costs have been written off. This makes the treatment of new T&D costs, and freeing DG/CHP plants from paying them when they do not require them, a more critical factor than gas prices alone.

**Michael Brown:**

On this basis, European gas poses less of a concern than in North America. From an international perspective, two issues stand out. First is the relative risk felt by investors to CCGT and to cogeneration. I believe that the trend here is in cogeneration's favour given the rocky ride for investors in many big power plant markets of the last few years, and also, as John has indicated, a cogen plant has at least two products - and this mitigates risk. In Brazil, the recent gas discoveries have presented this same choice, but the odds seem to be favouring a significant expansion of the gas cogen market - partly because of the caution of investors considering CCGT. This could be the pattern of the future.

Secondly, price movement risk can be as big a concern as a high absolute price and I would like to see price hedging solutions become much more widely available to the cogeneration end of the gas supply market.

**Climate change is an important cogen driver in Europe. It could be everywhere with the US on board. What are the prospects for change in US policy?**

**John Jimison:**

The Kyoto Protocol remains 'DOA' (dead on arrival) in the US. But the concern about climate change continues to grow in the general public and the body politic. The ongoing drought in the Pacific Northwest, record tornado and predicted record hurricane seasons, and a very hot spring in the north-east keep thoughts about climate change on many minds, even if Hollywood overstates the risks.

Much attention will be paid during the presidential campaign season, as there are few issues where the difference between President Bush and John Kerry is starker. But even a Kerry victory would not resurrect Kyoto as written.

A more palatable approach, such as the current Senate bill (sponsored by Republican John McCain and Democrat Joe Lieberman) requiring limitation of greenhouse gases to the 2000 level by 2010, and focusing on certain key sectors of industry, transportation, and commercial establishments, would be a much more likely way of gaining some official momentum toward meaningful GHG emission constraints.

**Michael Brown:**

I'm not an expert on domestic US politics but this all makes sense to me, and there seems to me to be so much going on there even with Kyoto off the agenda. There is a lot happening at state and regional levels, and when the US finally engages, it won't be from a standing start by any means. What Kyoto needs right now is Putin's signature in Moscow.

That would leave the US isolated on the issue and would bring Kyoto legally into force - then the momentum for emissions reduction efforts, including cogeneration, could build very fast. Russian ratification is therefore top of my wish-list of measures to boosting the market. My bet is that Putin will ratify in the final quarter of this year - so carbon reduction should become a much bigger priority in 2005.

**Simon Minett:**

I believe that there is sufficient evidence now that self-interest will dictate to the US that doing something on climate change makes sense. Even the Pentagon has identified global warming as one of the key threats

to global stability and thus a threat to the US. Thus, I think that the US, post the presidential election, whoever wins, will re-enter the international convention process. But it will not be with the label 'Kyoto'. In addition, high oil prices may help change attitudes as a greater focus could be placed on fuel conservation for security and economic reasons. This would of course also help with greenhouse gas emissions. I keep my fingers crossed!

**A leading UK climate scientist and hero of the environmental movement, James Lovelock, has said the only answer to the ever-accelerating climate change is rapid development of nuclear power. What do we think about this?**

**Simon Minett:**

I have a lot of respect for James Lovelock, he is an original thinker and over the last two to three decades has helped to stimulate the debate on the future of our planet. Nevertheless, on the question of the role of nuclear power, I think he is wrong. First, even if you replaced all power stations with nuclear reactors, this would only tackle about 25% of the carbon dioxide emissions, as the other 75% are the result of non-electricity activities. To replace part of the 75% non-electricity by nuclear-generated electricity is a dubious course of action.

Secondly, even if you could conceivably replace all fossil-fuel power stations with nuclear power, this would result in something in the region of 1500 GWe of capacity or 1500 power stations. This would prove impossible to implement due to costs - around US\$3-5 trillion, lack of technical skills, proliferation, and lack of solutions to the waste and decommissioning issues, let alone the supply of sufficient processed uranium. If we need to spend this much money, then a combination of energy efficiency, cogeneration and extensive use of renewables may be a more prudent way forward.

**John Jimison:**

There is little likelihood in the US of a nuclear industry renaissance in the next 20 years, so climate-change solutions will have to focus elsewhere at least during that period. What put the US nuclear industry into a vegetative state was not the opposition of environmentalists, nor a public-safety reaction to Three Mile Island or Chernobyl, nor the problem of long-term disposal of high-level radioactive waste. Instead, what froze nuclear in the US was the realization on Wall Street that a multi-billion-dollar investment could be lost and replaced with multibillion-dollar liabilities by the errors of a single careless operator. The risk-to-reward ratio was upside down, and could not justify the huge necessary investments compared to alternatives despite massive taxpayer assistance to the industry through waste programmes and insurance subsidies.

The nuclear industry now enjoys the best of times, with easy plant-licence renewals with minimal public opposition, and record plant availability with few significant problems, but still there are no prospects for growth in nuclear capacity in the US.

Renewed growth will require both succeeding with a new technology that defies human error, and obtaining a meaningful premium for helping with global climate change. The first will require 20 years; the second will require policy recognition of the threat of climate change, and the willingness to make the premium available to all potential responses such as renewables and CHP. There is no reason to wait 20 years to create that premium, and if the nuclear industry can grow to capture some of it when its new technology is ready, my view is 'more power to it' - literally. In the interim, CHP and clean DG should get the premium and capture much of the growth.

**Michael Brown:**

I too am sceptical about Lovelock's view, but I suspect his main point is not on nuclear, but rather that climate change is much more dangerous than he thought and that it requires a massive and urgent response. I'm sure he's right on that. However, in his view - and he is not as far as I know an energy specialist - nuclear provides the biggest and fastest solution.

There are two issues here. First, the time taken to provide such a nuclear hit would be 10-20 years - by which time the efficiency/cogen/renewables solutions that he describes as too slow would have had ample time to be main-streamed.

Second, keep in mind that many emerging economies, and a handful of industrialized ones, are already developing nuclear plants. They seem prepared to take the investment risks that we in Europe and North America do not, but, because demand for power in many of these countries is so great, I really do not see our industry being driven out of the market. Countries such as China seem to need all the power they can get.