

10 November 2011

# China New Energy<sup>#</sup>

## A hybrid approach to biofuel engineering

China New Energy ('CNE') is an established technology, process and engineering solutions provider to the biofuels, edible ethanol and chemical industries with operations based in China. Since incorporation in 2006 CNE has been involved in over 100 projects around the world with an aggregate contract value of over RMB1.7bn (c.£170m).

CNE's modular technology is adaptable and encompasses the entire biofuel production process from start to finish. Coupled with the company's market-leading position in China (with around 60% market share of new ethanol capacity since 2007), the business is in a strong position to benefit from the next generation of biofuels from both CNE's own technology and EPC capabilities.

- ◆ **An integrated business model.** CNE has expanded upon its experience and track record in the design and construction of ethanol plants (involved in over 50% of ethanol capacity in China) to create an 'integrated business model', which focuses on value added services and products to existing operators. Through these new initiatives, CNE can now supply the technology needed to improve yields and maximise efficiency in existing operational plants. Once established, the company hopes that this new model will be exported outside China.
- ◆ **Collaborations with third parties.** Several collaborations have been signed to develop biobutanol production using cellulosic biomass (agricultural waste). Together with in-house R&D, this key growth area has the potential to add significant value outside the core business offerings.
- ◆ **Significant contract award.** During Q311 CNE was designated as the sole engineering solutions provider to Jilin Ethanol Industry, which is expected to become the largest ethanol producer in Asia. Although details are yet to be finalised, there will likely be significant input from CNE's Energy Management Conservation business, which will provide visibility and a constant revenue stream.
- ◆ **Macro drivers.** The Chinese government is targeting 10 million tonnes of annual ethanol production by 2020 versus approximately two million tonnes at present.
- ◆ **Trading update.** Positive developments relating to new business initiatives have been announced including the establishment of a yeast management service and signing of collaboration agreements with third parties. CNE remains on course to achieve profitable growth in 2011 and 2012.

<sup>#</sup> This company is a research client of Arden Partners.

Alternative Energy

CNEL.L

6.0p

### Key Data

Market Cap	£18.3m
Shares in Issue	304.6m
Free Float	100%
Average Daily Volume	70,349
12 Month Trading Range	6.0p to 14.5p

### Financial Forecasts\*

Yr to Dec	2010A	2011E	2012E
Sales	£13.63m	£15.44	£19.3m
Operating Profit	£2.29m	£2.42m	£4.01m
PBT pre-ex	£2.33m	£2.66m	£3.83m
EPS	0.65p	0.71p	1.03p
EPS Growth	-	9.2%	44%
P/E Ratio	9.2x	8.4x	5.8x
EV/EBITDA	7.0x	6.7x	4.8x
Net Dividend	-	-	-
Yield	-	-	-
Dividend Cover	-	-	-
Cash/(Debt)	£1.4m	£1.3m	£1.7m
Interest Cover	-	-	-

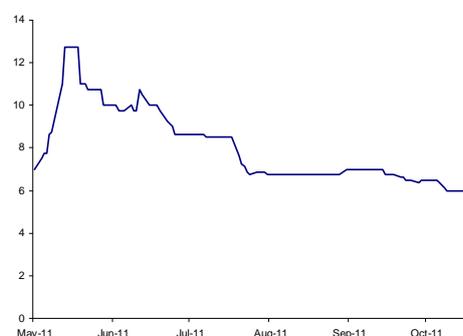
\*Note: Reporting Currency is RMB; GBP FX Rate = 10.15.

### Market Relative Price Performance\*

1 Month	-28.8%
3 Months	-15.8%
12 Months	n.a.

\*Relative to the FTSE All Share.

### Price Performance (p)



Source: Bloomberg.

In accordance with FSA Handbook COBS 12.3.2 (post-MiFID) this information is categorised as Marketing Material

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## Introduction

In this research report we analyse the current market position of CNE as it has evolved from being a pure EPC contractor for the bioethanol industry into being more technology driven with a focus on value added products for existing operators. We begin by contextualising the biofuels market, in particular in China, and then we provide an overview of developments which are likely to drive the industry over the next few years. We highlight CNE's track record as an EPC provider, and argue that that through its own expansion and research and development, the company has created an integrated business model, or 'hybrid approach', which enables CNE to build on its successes to date as the biofuels market advances.

# Biofuels

## Market analysis

Biofuels have increasingly gained acceptance as a viable alternative to fossil fuels. There are several factors driving demand for biofuel production, such as energy security, reduced greenhouse gas emissions, government mandates and oil price volatility. The use of biofuels is expected to continue to increase rapidly over the coming years; according to the IEA's World Energy Outlook 2010 global biofuel usage will increase from about 1 mb/d today to 4.4 mb/d by 2035.

Due to the substantial costs involved, biofuel production requires government support; this totalled \$20bn globally in 2009, the bulk of which came from the EU and the US. Support is expected to rise to about \$45bn per year by 2020, and about \$65bn per year by 2035 as biofuel production is ramped up across the world (source: World Economic Outlook, 2010). In China the biofuels production industry had total revenue of \$1.47bn in 2010, representing a compound annual growth rate (CAGR) of 16.2% for the period spanning 2006 to 2010 (ibid.).

### Ethanol in China

Ethanol is commonly used as a source of energy (biofuel) and in the cosmetic and beverage industry. The US is currently the world's largest producer of ethanol, running with annual production of over 10 billion gallons, or some 60% more than the second largest producer, Brazil.

Corn and sugarcane are typically used as the main feedstock in ethanol production, with some 40% of the US corn harvest dedicated to ethanol production (US DoA). Initially, Chinese ethanol production sought to replicate the US model with large projects emerging in the corn areas in the north east. At the same time, the Chinese government issued licenses for ethanol plants and brought in subsidies and tax breaks for producers. This caused production to explode between 2004 and 2006, with China soon becoming the world's third largest ethanol producer behind the US and Brazil.

The domestic price of corn rose 30% in 2007, and in 2008 China actually became a net importer of corn. Naturally, this caused problems; farmers had switched from growing other grains such as wheat to growing corn, causing rapid domestic food inflation, while at the same time Chinese imports of corn swelled to three million tonnes by 2010. On the backdrop of rising food prices in China, the Chinese government implemented a moratorium on all new ethanol production capacity expansion that uses grain (such as corn) as feedstock in 2007. Notwithstanding this moratorium, the government is still targeting 10 million tonnes of annual capacity by 2020; hence the focus going forward is to incrementally increase capacity using non-grains (such as cassava and sugarcane cellulosic materials) as feedstock.

### Food versus fuel

The rise in soft commodity prices in recent years is well documented, as highlighted by the chart for the US Foodstuffs index, which has increased 150% since 2003. This is a particular concern in less developed economies where food accounts for a greater proportion of income. Developed countries spend an average of 10% of income on food compared with 30% or more in emerging countries such as India and China (source: US Census Bureau). Not surprisingly, rising food prices has led to significant political and social tensions in those countries most exposed.

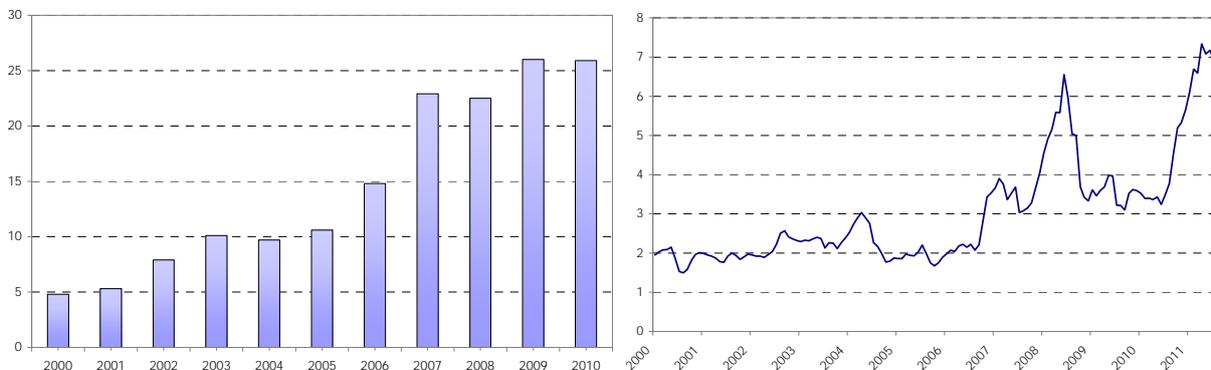
**US Foodstuffs Index**



Source: Commodity Research Bureau.

There has inevitably been much debate over the impact of the increasing usage of crops for biofuels. This is perhaps best illustrated by looking at the corn market in the US. The use of corn for ethanol has increased from 5% of annual production to c.25% in less than a decade, and is expected to reach as high as 30% by 2020. At the same time, prices have risen dramatically, albeit with such an internationally-traded commodity this cannot be fully blamed on the rise in US ethanol.

**Percentage of US Corn Used for Ethanol      US Corn Price (\$/Bushel)**



Source: US Department of Agriculture.

Source: US Department of Agriculture.

Overall, there is an increasing realisation of an inherent conflict between growing crops for food or for fuel. This issue can only escalate given the anticipated growth in the world's population, wealth and changing dietary habits – it is estimated that population figures will rise from 6.1 billion in 2000 to 8.9 billion in 2050 (source: UN World Population to 2300).

As it stands today, the corn ethanol market in China is hamstrung by the unfavourable economics behind first generation (fuel from food) bioethanol production. Demand for bioenergy, however, is still strong and it is clear that supply needs to come from alternative sources other than corn or any other human consumable mainstream foodstuff.

### Chinese domestic market demand for energy

China is a net importer of oil and the world's second largest oil consumer after the US. The latest data from the General Administration of Customs indicates that the country consumes around nine million barrels a day, with approximately five million of that being imported. Other oil demand catalysts include:

- ◆ Domestic power consumption is forecast to grow at 20% p.a.;
- ◆ New car sales numbers have overtaken the US and car ownership is expected to double by 2020;
- ◆ China's manufacturing output accounted for 19.8% of the world's total in 2010, surpassing the US by 0.4%.

The Chinese demand for energy is unrelenting and we believe it is inevitable that a larger portion of this demand will be met by bioenergy. A study report by Novozymes and McKinsey predicts that cellulosic bioethanol could be substituted for 31mt (million tonnes) of gasoline by 2020, cutting the nation's oil imports by 10%.

### Biobutanol: Another biofuel

Biobutanol is an advanced biofuel which is generated by 'ABE fermentation' (Acetone-Butanol-Ethanol) and provides greater options for sustainable renewable transportation fuels. It has a range of applications such as use in solvents, plastics, coatings, textiles and gasoline. Due to its many advantages over ethanol, it commands a higher price of between RMB10k/t and RMB11k/t compared with RMB6k/t and RMB7k/t.

#### Comparing Fuels

Fuel		Butanol	Ethanol	Gasoline
Heating Value	MJ/L	26.9-27	21.1-21.7	32.2-32.9
Research Octane Number (RON)		94	106-130	95
Motor Octane Number (MON)		80-81	89-103	85

Source: BP.

Advantages of biobutanol include:

- ◆ Mixes better with gasoline, due to low vapour pressure;
- ◆ Less volatile – c.30% more energy accumulated per volume;
- ◆ Compatible with current cars;
- ◆ Less hydrophilic than ethanol;
- ◆ More compatible with oil infrastructure pipelines and storage tanks, unlike other biofuels.

Biobutanol can be produced from the same feedstocks as ethanol (such as cassava, sugarcane and corn). Existing ethanol capacity can be retrofitted to biobutanol production with only minor changes needed in fermentation and distillation; indeed, CNE has carried this process out several times.

## Technology road map

### First generation (1.0)

These are biorefineries converting traditional feedstock such as corn into biofuels. The technology has been around for a long time in regions such as Brazil (the world's largest producer of sugarcane). However, problems, such as those inherent in the 'food versus fuel' argument, have arisen as the technology spread throughout the rest of the world.

The costs of production are, therefore, very sensitive to changes in food prices, and, as commodity prices have soared, in many cases, it has been uneconomical to carry out production.

### Generation 1.1

These are 'enhanced' bioethanol refineries, which are modified to become more efficient in terms of operations whilst increasing value through generation of marketable co-products such as Dried Distillers Grains with Solubles (DDGS). The Energy Management Conservation (EMC) aspect of CNE's business is geared towards this area, carrying out upgrades which make existing plants more efficient, for example, by using enhanced steam management and through the processing of waste water.

First generation-style biofuel plants are not going to disappear in the near term. However, we believe that it is a must for both large and small-scale operators in the biorefinery sphere to increase their plant efficiencies and keep yields at worthwhile profitable levels.

### Second generation (2.0)

Second generation refineries convert cellulosic or non-edible feedstock, such as corn stover, woodchips and pulp, to biofuels. Existing biofuel manufacturing plants can be converted to produce biofuels using cellulosic feedstock in combination with hydrolysis and fermentation processes.

Unsurprisingly, second generation biofuel production has been hailed as an area of significant growth potential. Once proven to be viable on a commercial scale, it is likely that there will be a sharp transition from first to second generation biofuel operators (with the exception of sugarcane ethanol, which is produced sustainably in several countries). Due to the elimination of the 'food for fuel' hazard, there has been an influx of participants into the capital markets in the US, with each competing against one another in an attempt to be the first to drive down the costs of production commercial levels. The table below shows new entrants and potential entrants to the capital markets.

#### US Entrants to the Capital Markets

Already Listed	Filed for IPO on NASDAQ
- Codexis (Apr 10)	- PetroAlgae
- Amyris (Sep 10)	- Myriant
- Gevo (Feb 11)	- Ceres
- Solazyme (May 11)	- Genomatica
- KiOR (Jun 11)	- Mascoma
	- Elevance Renewable Sciences
	- Fulcrum Bioenergy
	- Cathay Industrial Biotech Ltd

*Source: Bloomberg and China New Energy.*

In China the Biofuels Digest reported, in October 2011, that Henan Tianguan Fuel Ethanol Co., Ltd (Henan Tianguan) announced plans to build up to 12 cellulosic ethanol plants in China in the next three years. Henan Tianguan has a cellulosic ethanol pilot production line with capacity of 10,000 t/a, which has been in operation since 2009. However, to date it has not been proven that such technology is profitable on a large-scale commercial production. There are significant obstacles to negotiate before full-scale commercial production will be achieved. The IEA points out that in the near term growth will be held back by the length of time it takes to meet agreed environmental, sustainability and economic policy goals.

# CNE

## Background

The origins of China New Energy can be traced back to 2002 with the formation of Guangdong Zhongke Tianyuan Regeneration Resources Engineering Co. ("GZTY") which was formed as a result of a spin-off from the Guangzhou Institute of Energy Conservation, Chinese Academy of Science ("GIEC CAS" or "the Institute") by certain CNE directors. The business was established from within the Institute, and today the founders remain current directors in CNE.

The company was established as a means of commercialising the specialist research undertaken by the Institute in Guangzhou (GIEC CAS). The business has since established a strong track record in the design and engineering of biofuel plants within China and abroad, with over 100 projects complete, with an implied production of 9mt/y and aggregate contract value of RMB1.7bn.

Since inception until now, the company has been leveraging on its engineering skills and experience to expand offerings in the biogas and Energy Management Conservation (EMC) areas. In the longer run CNE plans to supplement the existing business by taking a 'hybrid approach' to capitalise on growth in the cellulosic market, by supplementing core design and fabrication activities with value adding products and by developing cellulosic biofuel and biochemicals through R&D with the potential to become more involved in production.

## History

**2002:** GZTY received its first contract to provide Engineering, Procurement and Construction ("EPC") services to the Chinese ethanol industry.

**2003:** Guangzhou Baojie Electromechanical Co. was founded in order to focus on the manufacturing of specialist process technologies relating to downstream ethanol products.

**2006:** China New Energy ("CNE") incorporated in Jersey and obtained 100% ownership of ZKTY. ZKTY acquires assets, contracts and patents from Guangzhou Baojie and GZTY.

First European contract awarded with InterAgro S.A. in Romania.

**2007:** \$12m investment by Citadel Equity Fund ("Citadel") through the issuance of convertible bonds.

**2008:** CNE wins first contract with Indonesian Ethanol industry and gains CE accreditation that pressure equipment conforms with EU regulation.

**2010:** ZKTY acquires Guangdong Bolou Jiuneng High-New Technology Co. in Bolou, a fabrication plant located about 50 miles east of Guangdong.

**2011:** Listed on AIM in May. Significant awards also include Thai Ubon Project in Northern Thailand, and designated as technology and engineering solution provider to Jilin Alcohol Industry

## Engineering, Procurement and Construction (EPC) Activities

CNE has a strong track record in providing specialist engineering, procurement and construction services to operators in the biofuel industries, having carried around 100 projects across the world. Within China, CNE has worked on more than 60% of China's total incremental ethanol capacity that came on in the last three years. In addition,

management believes that the constructed c.50% of the biobutanol capacity in China. This 'nuts and bolts' business continues to form the core of CNE's operations and performance remains strong despite challenging market conditions over the past two years.

The company's main clients are operators of bioethanol and biobutanol plants. CNE's strength in this area derives from its proprietary engineering designs for feedstock treatment, fermentation, distillation, dehydration and waste treatment systems. CNE designs and constructs new plants as well as retrofitting existing machinery and factories depending on client needs.

The group's key competitive strengths include:

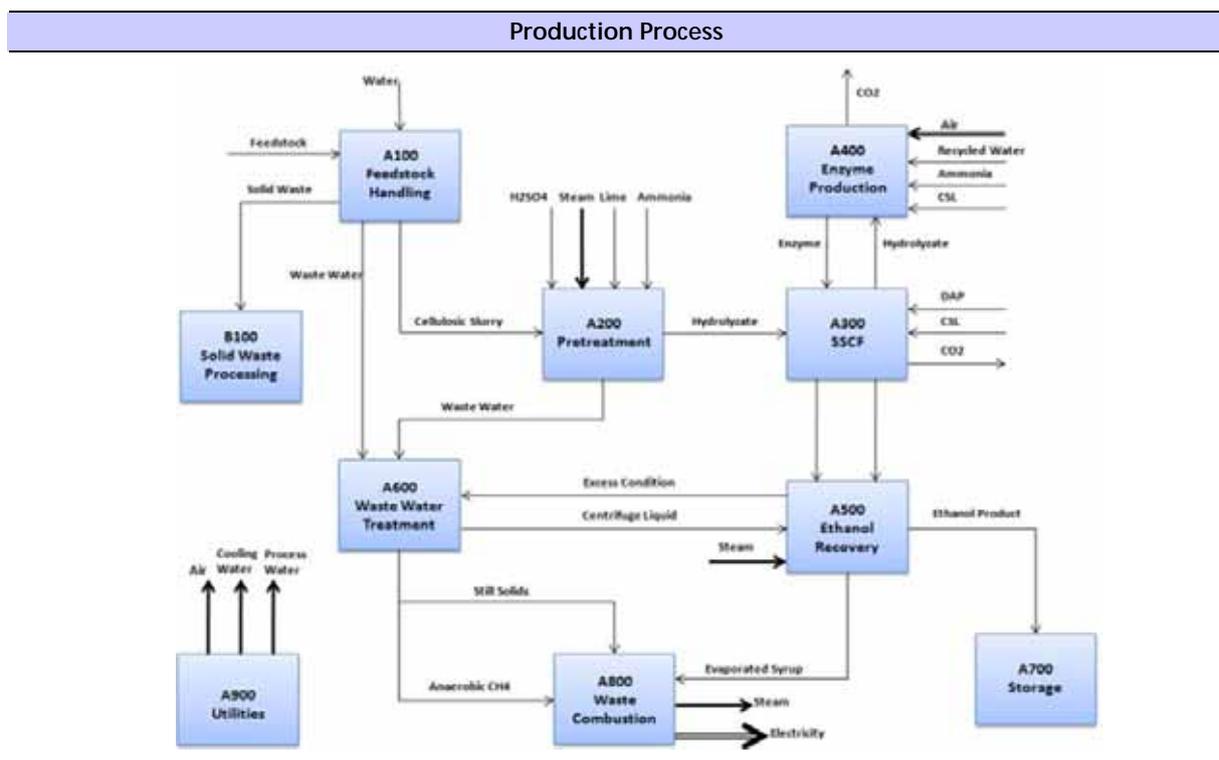
- ◆ Engineering, including owning its own technology (including 22 patents);
- ◆ Possesses technology, which is flexible and adaptable to any input feedstock/treatment process;
- ◆ Strong product offering as an integrated solutions provider;
- ◆ Modular technology which covers the entire production process from start to finish;
- ◆ Ability to provide a turnkey service;
- ◆ Visibility with a strong bid pipeline of RMB260m and JV with Jilin Ethanol Industrial.

We believe that CNE's impressive track record in the EPC business puts it in a strong position to ride out turbulence and uncertainty in the biofuels market.

CNE's adaptable technology in the EPC sphere can be easily integrated into new and existing biofuel factories, which gives the potential for significant new business as technological breakthroughs in second generation biorefining propels market activity.

**Operations review**

CNE designs, fabricates and constructs systems throughout the biorefining process, from start to finish, as illustrated below.



Source: China New Energy.

### Boluo fabrication factory

The factory in Boluo was acquired in 2010 for a consideration of RMB6m. The factory had been fabricating equipment for CNE over the past five years; therefore the logic behind the acquisition was to reduce the need for outsourcing. The factory has around 20 permanent staff with the ability to contract up as required.

The designs are carried out in the main CNE office in Guangzhou while the factory chief and production engineers ensure that construction and fabrication adheres to the specifications of the drawings.

We are comfortable that the factory operates to a satisfactory quality testing standard. For example, after each piece of metal is welded the seams are tested using X-rays in a Non-Destructive Testing Room to check for problems, while every batch of materials is tested upon arrival.

Products fabricated in Boluo include:

- ◆ Components for the five column distillation equipment;
- ◆ Floating valves which separate steam, ethanol and water during distillation;
- ◆ Heat exchangers.

An example of several projects is detailed below.

### A Sample of Various CNE Projects

#### Corn-based Ethanol

<b>Client</b>	Meihokou Fukang Alcohol Co., Jilin Province
<b>Activity</b>	One of China's top ten producers, with an annual turnover of over RMB1.5bn
<b>CNE Involvement</b>	A series of projects e.g. 35,000 t/y corn-based, high-quality, edible alcohol distillation equipment; 60,000 t/y top-quality alcohol equipment; molecular sieve dehydration equipment; upgrading distillation equipment
<b>Client</b>	Romania InterAgro S.A.
<b>Activity</b>	One of the largest comprehensive agricultural processing enterprises in Romania
<b>CNE Involvement</b>	General contractor of an 80,000 t/y fuel ethanol plant, 20,000 t/y edible alcohol plant, CO <sub>2</sub> recovery and DDGS feedstuff production equipment
<b>Client</b>	Song Yuan Ji'an Bio-chemical Co.
<b>Activity</b>	Second largest ethanol producer in China after COFCO
<b>CNE Involvement</b>	Series of projects including construction of an 150,000 t/y acetic acid equipment, molecular sieve devices for 200,000 t/y anhydrous alcohol, 150,000 t/y biobutanol and acetone production project

#### Cassava-based Ethanol

<b>Client</b>	Thailand EVT Co.
<b>Activity</b>	
<b>CNE Involvement</b>	Contractor for the design and equipment production of 30,000 t/y cassava-based fuel ethanol production line
<b>Client</b>	Jiangsu Xin Taicang Alcohol
<b>Activity</b>	Singapore-owned foreign company, specialising in the production of various alcohol products
<b>CNE Involvement</b>	Constructed 30,000 t/y anhydrous molecular sieve equipment

#### Wheat-based Biobutanol

<b>Client</b>	Anhui Ruifuxiang Food Co.
<b>Activity</b>	Enterprise involved in deep processing of grains
<b>CNE Involvement</b>	Provided the feasibility study, engineering design, manufacturing and installation of equipment and commissioning for the company's 30,000 t/y biobutanol project

#### Corn-based Biobutanol

<b>Client</b>	Tongliao ZhongKe Tianyuan Starch Chemical
<b>Activity</b>	Specialises in the production and sale of edible alcohol and bio-butanol
<b>CNE Involvement</b>	Provided a 15,000 t/y corn biobutanol production line and a 100,000 t/y corn edible alcohol production line

Source: China New Energy.

## Opportunities beyond EPC

### Biogas

Biogas, or anaerobic digestion, occurs following the breakdown of biodegradable material in the absence of oxygen. CNE has developed a process whereby waste product from the production of bioethanol is treated through anaerobic fermentation to produce biogas, which is rich in methane and that can then be used as a source of renewable energy. After a series of treatments including cleaning, purification and compression, biogas can be made into pipeline fuel gas for use in cars, industry and thermal electric generation, etc.

Whilst the production of biogas itself is nothing new, the utilisation of biogas as a waste product from the biofuel process is and in itself makes biofuel plants more efficient. CNE is in discussions to develop this business going forward on a revenue-sharing basis with the operators of the plant. The company currently has two pilot biogas agreements in the pipeline with breweries in Dongguan and Shenzhen, with biogas from the latter potentially being sold to the Shenzhen City Gas Corp.

### Energy Management Conservation (EMC)

In essence, EMC aims to improve existing plant efficiency and save costs by reducing the amount of energy (steam) used in operation. The EMC business model involves CNE making an initial investment in an existing bioethanol plant to modify and install auxiliary energy saving equipment in return for a portion of the customer's net energy saving.

To date CNE has completed one of these projects with Yichang Sanxia Linin Biochemical Ltd (in Hubei Province, China), which completed in 2009. What CNE has done is help the plant operator reduce energy consumption through replacement and modification of existing equipment. From the initial investment of c.RMB4.2m, CNE agreed to receive monthly payments of RMB220,000 for a period of 60 months.

The EMC business model is an attractive, high-margin supplement to EPC operations and one which generates a recurring revenue stream and clear revenue visibility. The company estimates that around one third of existing biobutanol/bioethanol production capacity in China requires this efficiency saving action so the potential exists for significant business in this area.

However, CNE has only completed one EMC project due to resource limitations. In order to scale up the EMC business, additional capital is needed to fund an effective sales and marketing effort, as well as provide further engineering capacity.

### Yeast management services – expanding EMC

The emphasis for ethanol plant managers should be improving ethanol yield and maximising production. Thus, a great deal of importance is now being put on the choice of yeast, format, handling, technical service and training to effectively and economically reach maximum production and profitability. It is important to examine the different formats of yeast and the conditions which make them most effective.

Other areas of an ethanol plant, such as process upsets and distillation, have the risk of lowering yields. Fermentation is the only plant operation in which yield can be enhanced through effective handling and optimising of procedures and parameters. If yeast is not treated with the utmost care, the ethanol yield may be disappointing and the result fiscally unacceptable. In this regard, CNE is able to facilitate wet yeast on a production site, which helps improve efficiency. The company is also currently developing a new business initiative of developing new yeast strains, supplying yeast formulation and management services to clients as well as producing and selling yeast to end users.

### Pre-treatment – prototype cellulosic bioenergy

CNE has developed proprietary technology for producing biobutanol using cellulosic materials. This process essentially involves pre-treatment of cellulosic biomass using acid, base, steam, special catalysts, such as ionic liquids, followed by enzymatic digestion of cellulose and/or hemicellulose. During the process, corn starch is used to ferment the raw materials rather than dry milled corn, and the process enables the efficient capture of all co- and by-products ABE (Acetone, Butanol and Ethanol) and biogases.

In terms of costs, under present laboratory conditions, the unit cost of one tonne of biobutanol is between c.RMB8,500 per tonne and RMB9,000 per tonne versus the current market price of c.RMB12,000 per tonne. The company is currently working towards reducing the unit production costs and over the next 12 months aims to reduce these to between c.RMB7,500 per tonne and RMB8,000 per tonne.

According to a report conducted by Novozymes and McKinsey & Co., cellulosic ethanol could substitute 31 million tonnes of gasoline in China by 2020, which effectively cuts oil imports by 10%, while inducing \$14.1bn or RMB96bn worth of construction projects.

There is no doubt as to the significance of second generation biofuels to China going forward in meeting Chinese domestic market demand.

Due to CNE's R&D collaboration with the Institute, it is in the advantageous position of potentially being able to penetrate the market with significant reward available. There are several options open to the company at present, and we believe that the company is taking a realistic view as to how to progress. These are outlined below.

#### Option One: Owner-operator

CNE seeks out and acquires opportunistic targets such as existing bioethanol manufacturing facilities in China which are not operating or making money at present because the economics does not make it worthwhile due to high corn (food) input costs. CNE would transform these plants into operating and profitable enterprises by producing ABE (in the proportion of 30%/65%/5%) instead of purely bioethanol. This would provide recurring cash flow.

We visited a potential facility in Tongliao, Inner Mongolia, in October 2011, which has both a corn ethanol mill and a starch mill on site. Due to the unfavourable economics associated with ethanol production, only the starch mill is currently operating, with two lines producing 200ktpa from 300ktpa of corn, with uses in the medical, agri-feed and food and beverage industries.

CNE proposes to purchase the plant in order to retrofit and upgrade the existing machinery and turn this plant into a profitable, operating biobutanol factory.

#### Benefits

- ◆ Establish as commercial producer of cellulosic biofuel in China;
- ◆ Utilise in-house R&D and EPC expertise;
- ◆ Generate significant income stream.

#### Risks

- ◆ Butanol prices fall;
- ◆ Cannot reduce the cost of strains/enzymes to a commercial cost – CNE has addressed this by focusing on R&D internally and in collaboration with third parties;
- ◆ Exposure to a competitive, high-risk marketplace.

In order to carry this plan out c.£10m of capex would be required. We believe that CNE is justified in its aspirations to own and operate the cellulosic ethanol/butanol technology. However, in this highly competitive and fast-developing market, getting the timing right is essential. Venturing into commercial production of cellulosic bioethanol would represent a big change in direction for CNE and management will need to carefully assess the risk/reward given the strength of CNE's core operations. To commit to becoming an operator at this stage could create a 'make or break' scenario, and CNE timing this plan to a point when the right market conditions arise will be critical.

### Option Two: Technology Provider

Option two is to demonstrate to the market that CNE, with its hybrid and integrated business model, possesses the technology and engineering capabilities to utilise the latest feedstock technology to help clients construct new plants or integrate/"bolt-on" the latest technology into existing ethanol facilities. We believe that this would deliver a strong platform to capture the burgeoning cellulosic biofuel and biochemical markets around the world without direct exposure to the competition/risks of production.

According to the Biofuel Digest, eight billion gallons of new cellulosic biofuel capacity (or around 160 new biorefineries) are mandated between 2016 and 2019. CNE's strong track record in EPC, coupled with R&D development of CNE's cellulosic feedstock treatment and fermentation systems, leaves CNE in a strong position to potentially benefit from growth in the global cellulosic biofuel market, particularly in China.

The pace in which industrial biotechnology innovation occurs is rapid while any commercialisation of new biotechnology is expensive. Research and development of new strains and chemical technology, which once took up to five years to develop, now occurs in one year, and the number of patents granted for industrial biotechnology now exceeds 20,000 per year. The key is to be able to adopt and adapt to new technology as it advances, with diligent considerations of different market and environmental dynamics, such as the supply chain structure. We believe the options open as to how CNE approaches the cellulosic market going forward are realistic and sensible.

### Development and collaboration with third parties

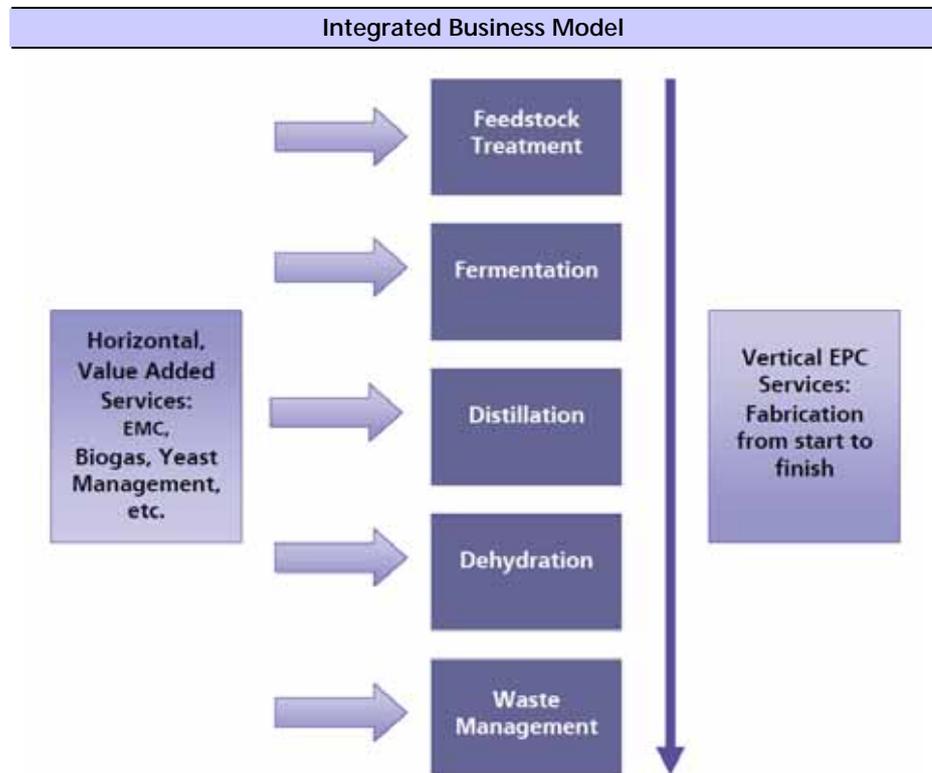
In terms of advancing technology, the close links with the Institute in Guangzhou means that R&D can remain relevant. Meanwhile, CNE has initiated strategic partnerships which open up the option for production in the near future (option one). To date the company is advancing the following:

- ◆ A partnership with Butylfuel, in Ohio, to jointly market technologies in order to break into the US market. Butylfuel is recognised as a market leader in the advancement of biobutanol technology ([www.butanol.com](http://www.butanol.com)).
- ◆ A letter of intent with Green Biologics (GBL) in the UK to develop efficient fermentation technology related to cellulosic production. GBL researches advanced fermentation biotechnology related to second generation biorefining including biobutanol ([www.greenbiologics.com](http://www.greenbiologics.com)).
- ◆ Technology collaboration with Ji'nan University in China to use genetic engineering technology to modify the *Saccharomyces Cerevisiae* strains used in ethanol fermentation with the objective of improving ethanol yield. Under the agreement both CNE and Ji'nan University shall have the rights to a 70:30 split of any returns created through directly using the R&D results.

CNE's management believes that the contributions from these collaborations will increase the potential market opportunities for construction projects for second generation operators – this is complementary to CNE's existing business model.

## Summary: CNE's hybrid approach

We feel that CNE's fully integrated business model offers a hybrid solution to the biofuels market going forward. Vertically, the EPC covers the design and construction stages while the EMC solutions add value horizontally to the production cycle from start to finish, offering a hybrid solution to the biofuels market going forward. Meanwhile, R&D provides the technology necessary to enhance each stage of the process.



*Source: Arden Partners.*

- ◆ Vertically down the chain – the design and build of biofuel factories from start to finish or work on any modular part of the process;
- ◆ Horizontally across the chain – technological services to improve yield and generate efficiency savings for existing operators; initiatives include EMC, Yeast Management and waste management;
- ◆ Research and development – this adds value via research into chemicals, cellulosic material, yeast and starch, etc. which are directly complementary to the vertical and horizontal businesses.

Unlike some of the recent biochemical IPOs in the US, CNE is not entirely exposed to the second generation biofuels race. Pragmatic additions have been made to the core EPC business, and, in the near term, EMC provides necessary energy saving and yield-enhancing solutions to existing operators. R&D efforts, along with collaboration with the Institute in Guangzhou and other third parties, enable CNE to remain in touch with developments in cellulosic biofuel production. CNE is positioned to benefit in the near term from existing producers seeking to maximise yields from their plants, while also positioned to benefit longer term and in various capacities, as full-scale commercialisation of second generation biofuels becomes viable.

# Financials

## Historical performance

The reporting currency for CNE is RMB. The FX rate at the time of writing:  
 GBP:RMB = 10.15.

### Historical Performance

(RMB '000)	2007	2008	2009	2010
Revenue	205,749	224,209	125,301	138,359
COGS	(163,947)	(182,129)	(93,781)	(98,131)
<b>Gross Profit</b>	41,802	42,080	31,520	40,228
Gross Margin	20.3%	18.8%	25.1%	29.0%
SG&A	(20,709)	(23,174)	(14,349)	(14,846)
Other Operating Costs	(32,609)	(39,969)	(8,308)	(2,187)
<b>Operating Profit (EBIT)</b>	(11,516)	(21,063)	8,863	23,195
Other Operating Income	1,079	5,275	5,563	464
Finance Costs	(3,423)	(18,462)	(2,837)	--
<b>PBT</b>	<b>(13,860)</b>	<b>(34,250)</b>	<b>11,589</b>	<b>23,660</b>
Tax	(9)	(8)	(2,508)	(3,623)
<b>Net Profit</b>	<b>(13,869)</b>	<b>(34,258)</b>	<b>9,081</b>	<b>20,037</b>

Source: China New Energy and Arden Partners.

The table above shows the financial performance of the company since 2007. We can see that revenues in 2009 were down almost RMB100m as a result of the financial crisis which hit the bioenergy industry hard.

Despite this CNE has been able to deliver net profit in both 2009 and 2010 by significantly restructuring its EPC model to be more specialised, and establishing a dominant market share in China (designed and constructed 60% of incremental capacity of ethanol in China over the past three years) which helped to improve gross margins from 18.8% in 2008 to 29.1% in 2010.

CNE made large provisions for bad debts in 2007 and 2008 totalling approximately RMB60m which were accounted for in other operating costs. The performance in 2008 highlights the dangers for this business if it takes on too much debt; in the Q311 trading update management outlined its intention to clear debts with Citadel on schedule by October 2012.

The business also managed to reduce its administrative expenses throughout this period of consolidation, and this has enabled the company to invest in R&D to help drive the business forward.

## Forecasts

### Profit Analysis

(RMB'000) Dec Yr End	2010	2011E	2012E	2013E
Revenue	138,359	156,713	195,892	249,762
COGS	(98,131)	(117,535)	(142,022)	(174,833)
<b>Gross Profit</b>	40,228	39,178	53,870	74,929
Gross Margin	29.1%	25.0%	27.5%	30.0%
SG&A	(14,846)	*(12,188)	(10,521)	(11,830)
Other Operating Costs	(2,187)	(2,406)	(2,647)	(2,911)
<b>Operating Profit</b>	23,195	24,585	40,702	60,187
Other Operating Income	464	6,640	1,980	1,320
Finance Costs	--	\$(4,255)	\$(3,830)	--
<b>PBT</b>	23,660	26,969	38,852	61,507
Tax	(3,623)	(5,007)	(7,161)	(12,029)
<b>Net Profit</b>	20,037	21,962	31,691	49,478
Number of Shares (m)	304,617	304,617	304,617	304,617
<b>EPS (RMB)</b>	6.50	7.10	10.3	16.1
<b>EPS (£p)</b>	0.64	0.70	1.01	1.59

Source: China New Energy and Arden Partners.

#### Notes:

\*2011 SG&A numbers include a one-time cost for the "Employee Benefit Trust" which the company estimates to be c.RMB4m. The EBT was part of the IPO process under which free shares would be granted to employees.

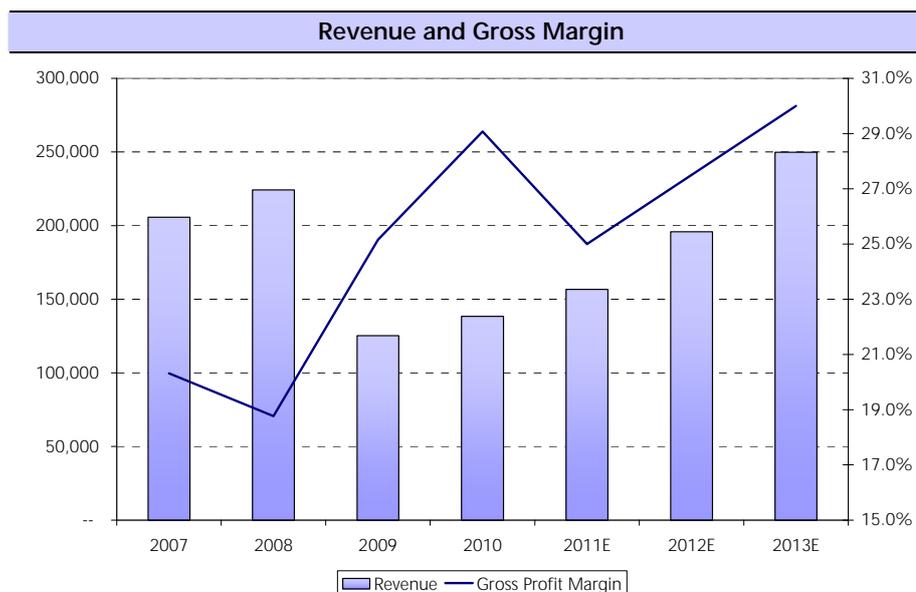
# Finance costs are associated with repayments to Citadel and domestic loans (for working capital).

For FY11 we are forecasting revenue growth of c.13% to c.RMB157m. We expect gross margins to drop to 25% from 29.1% in 2010, due to relatively high margin contracts delivered last year and costs overrun associated with the floods in Thailand which has held the project back (management estimates this project will deliver a 34% margin). Due to the higher margin project pipeline we believe our gross margin forecasts of 27.5% and 30% in 2012 and 2013 respectively to be conservative, especially given the higher margin nature of the prospective projects. However, we feel it more prudent to remain conservative at this stage.

As the business has been expanding into new business initiatives, significant R&D costs have been incurred; we forecast this to be significantly larger in 2011 compared with 2010, which is reflective of management's desire to move the business model forward from a pure EPC contractor.

#### Revenue and margin growth

Growth in the EMC and biogas operations and access to higher margin EPC contracts will likely contribute to higher gross profit margins, which we forecast to hit 30% (previous high of 29% in 2010) in 2013, with revenues of c.RMB250m. This will deliver a gross profit of RMB75m versus RMB40m in 2011.



Source: China New Energy and Arden Partners.

## Cash Flow

(RMB'000)	2010	2011E	2012E	2013E
EBIT	23,660	25,037	35,805	60,143
D&A	2,110	2,321	2,553	2,808
<b>EBITDA</b>	25,770	27,358	38,358	62,952
Net Income	1,400	12,376	25,684	46,765
Interest Paid	--	--	--	--
Income Tax Paid	(191)	(5,007)	(7,161)	(12,029)
<b>Operating Cash Flow</b>	1,209	7,368	18,523	34,737
Acquisition of Subsidiary	(1,320)	--	--	--
Purchase of PP&E	(8,106)	(1,621)	(10,700)	(12,840)
Purchase of Intangible Assets	(1,610)	--	--	--
<b>Investment Cash Flow</b>	(11,036)	(1,621)	(10,700)	(12,840)
New Equity – Shares Issues	--	4,000	--	--
New Equity – Convertible Bonds	--	--	--	--
Proceeds from Borrowings	5,000	--	--	--
Repayment of Borrowings	--	(11,276)	(3,830)	--
<b>Financing Cash Flow</b>	5,000	(7,276)	(3,830)	--
	--	--	--	--
<b>Net Increase/(Decrease) in Cash</b>	(4,827)	(1,804)	3,994	21,897
Cash & Equivalents at Beginning of Year	19,741	14,913	13,110	17,376
<b>Cash &amp; Equivalents at End of Year</b>	14,913	13,383	17,376	39,273

Source: Arden Partners.

## Key revenue streams: 2012 and 2013

The table below shows the major projects in negotiation as it currently stands, with a total consideration of c.RMB260m (c.£23m) in the pipeline. If these are converted into contract wins then this will provide solid revenue visibility for the tradition EPC operations going forward.

### Project Bid Pipeline

Domestic	Project Type	Contract Value (RMB)
Jilin Alcohol Industrial Group	Corn-based, 30,000 tonnes per year of Neutral Ethanol	15,000,000
Qinhuangdao Tianma Alcohol Ltd	Corn-based, 60,000 tonnes per year of Super Grade Ethanol	60,000,000
Anhui Ante Bio-Chemical Ltd	Corn-based 30,000 tonnes per year of Super Grade Ethanol and of 50,000 tonnes per year Fuel Ethanol	25,000,000
<b>Overseas</b>		
Simin Taak Alcohol Factory – Iran	Molasses-based 12,000 tonnes per year of Fuel Ethanol	38,000,000
Butibenz S.R.O – Slovakia	Corn-based 15,000 tonnes per year of Butanol	93,000,000
Frings Austria, Gesellschaft – Austria	Corn-based 80,000 tonnes per year of Fuel Ethanol	30,000,000
		<b>Total: 261,000,000</b>

Source: China New Energy.

### Earnings growth

We have forecast earnings growth of 9.2% in FY11, 44% for FY12 and rising to 56% in FY13.

### Growing horizontally

As outlined above, growing the horizontal, value added services has been a core component of the CNE business model. There is good logic behind this thought, as existing operators seek to ramp up efficiency saving initiatives in an effort to maximise yields. These will provide more stable revenue streams.

Management expects the contract with Jilin Alcohol Industrial (further detail in the Q3 trading update below) to provide a key platform for solid revenue growth and cash flow generation going forward into the next three years.

## Valuation

Below is the forecast table translated into GBP (FX Rate GBP:RMB = 10.15).

GBP Forecasts				
(FX Rate GBP:RMB 10.15)	2010	2011E	2012E	2013E
<b>GBP ('000)</b>				
Revenue	13,631	15,440	19,300	24,607
COGS	(9,668)	(11,580)	(13,992)	(17,225)
<b>Gross Profit</b>	<b>3,963</b>	<b>3,860</b>	<b>5,307</b>	<b>7,382</b>
Gross margin	29.1%	25.0%	27.5%	30.0%
SG&A	(1,463)	(1,201)	(1,037)	(1,166)
Other Operating Costs	(215)	(237)	(261)	(287)
<b>Operating Profit</b>	<b>2,285</b>	<b>2,422</b>	<b>4,010</b>	<b>5,930</b>
Other Operating Income	46	654	195	130
Finance Costs	--	(419)	(377)	--
<b>PBT</b>	<b>2,331</b>	<b>2,657</b>	<b>3,828</b>	<b>6,060</b>
Tax	(357)	(493)	(706)	(1,185)
<b>Net Profit</b>	<b>1,974</b>	<b>2,164</b>	<b>3,122</b>	<b>4,875</b>
Number of Shares (m)	304,617	304,617	304,617	304,617
<b>EPS (p)</b>	<b>0.64</b>	<b>0.70</b>	<b>1.01</b>	<b>1.59</b>

Source: China New Energy and Arden Partners.

Finding a suitable peer group in which to perform a relative valuation is difficult given the unique market position CNE enjoys in China. However, we have decided to use UK-listed EPC operators in the oil & gas markets. We have also included GTL Resources which is a UK-listed ethanol producer in the US.

### Comparatives: UK Oil & Gas EPC Operators

Name	Market Cap (£m)	P/E			EPS Growth		
		+1	+2	+3	2011	2012	2013
GTL Resources	32	11.2x	9.5x	8.3x	-23%	14%	13%
Petrofac	4,921	15.2x	12.9x	10.5x	-9%	15%	19%
Wood Group	2,299	17.3x	12.9x	10.7x	80%	25%	17%
Lamprell	651	12.8x	9.4x	7.7x	5%	27%	18%
Kentz	591	16.8x	15.4x	12.8x	18%	8%	17%
Cape	566	10.5x	9.3x	8.0x	5%	12%	14%
AMEC	3,021	13.2x	11.5x	10.2x	-4%	13%	11%
Hamworthy	290	19.5x	16.0x	15.1x	29%	18%	5%
<b>Average</b>		<b>16.5x</b>	<b>12.1x</b>	<b>10.4x</b>	<b>13%</b>	<b>17%</b>	<b>15%</b>
<b>China New Energy</b>	<b>18.3</b>	<b>8.4x</b>	<b>5.8x</b>	<b>3.7x</b>	<b>9%</b>	<b>44%</b>	<b>56%</b>

Source: Bloomberg.

Using the above comparatives we can see that CNE currently trades at a significant discount to its peers. However, this is reasonable given the relatively unknown status of the company. Improving visibility via contract wins and the demonstration of successful EMC ventures will likely improve CNE's rating. Currently, the company is valued at £18.3m.

If the horizontal, value added EMC businesses are successful we consider a P/E rating uplift year-on-year of 25% is achievable. Such an uplift would imply a market valuation of c.£35m in 2013, as the following table outlines.

**With a 25% Uplift**

	2011E	2012E	2013E
Net Profit	£2.23m	£3.28m	£5.02m
P/E Rating	10.2x	8.9x	7.1x
Valuation	£22.9m	£28.6m	£35.7m
Implied Share Price	7.5p	9.4p	11.7p

Source: Arden Partners.

Depending upon the success of the new initiatives, a 35% rating uplift (which would bring P/E more in line with peers) would imply a valuation of £45m (or 14.7p per share) in 2013, as outlined below.

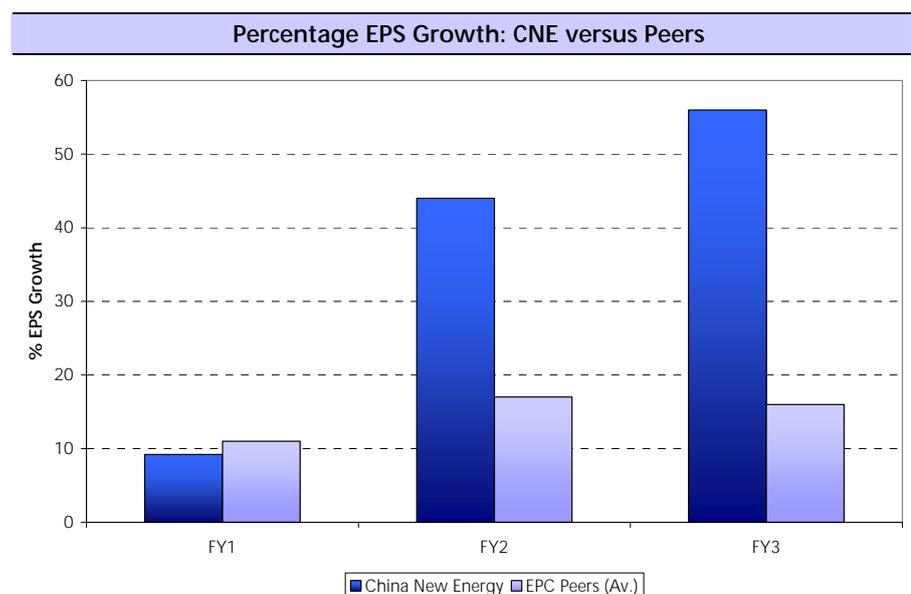
**With a 35% Uplift**

	2011E	2012E	2013E
Net Profit	£2.23m	£3.28m	£5.02m
P/E Rating	11.1x	10.4x	9.0x
Valuation	£24.7m	£33.3m	£45.0m
Implied Share Price	8.1p	11p	14.8p

Source: Arden Partners.

**Superior EPS growth to peers**

As the chart below outlines, CNE offers superior earnings growth versus peers, increasing 44% in 2012 and 56% in 2013.



Source: Arden Partners Estimates.

**Large US IPO market caps**

The list below shows the US biotech companies who have recently completed IPOs. Despite these companies offering no revenue or earnings growth to date, we note their large market capitalisations (between \$195m and \$1.63bn) which highlight the amount of investment in second generation technology. Moreover, unlike these tech companies, CNE has an established track record.

**Recently-listed US Biotechs**

	Market Cap. (\$m)
KIOR	1,629
Amyris	636
Solazyme	554
Codexis	197
Gevo	195

*Source: Bloomberg.*

## Trading update

### Nine months to 30 September 2011

CNE has released its nine-month trading update in which revenue increased to RMB101.7m versus RMB84.9m year-on-year. Gross profit declined 11% to RMB21.5m reflecting the unusually high margin contracts delivered during the comparable period during the financial year to 31 December 2010.

There have been positive developments in the horizontal, value added services, as outlined in the company strategy, which confirmed that the company is expanding its offering and will provide a platform for more stable revenue going forward. This is in addition to the major bid pipeline, and is outlined below.

### Jilin Ethanol Co. Ltd

CNE has been designated as the sole technology and engineering solution provider to Jilin Ethanol Industrial Co. Ltd ("JEIC").

JEIC was formed in order to amalgamate various inefficient state-owned ethanol producers within the province of Jilin to form a group with a current annual production capacity of 600,000 tonnes of ethanol. In addition, the company will have management control over another entity with 500,000 biofuels-grade ethanol. JEIC is targeting to increase the annual production of ethanol to 1,000,000 tonnes of production capacity by 2012 which will make it the largest ethanol producer in Asia.

The proposal also highlighted that Guangzhou Zhongke Tianyuan (CNE's wholly owned operating units in China) will be one of the collaboration parties to provide technology and engineering solutions. CNE is in the process of negotiating the terms and conditions of this collaboration; most likely it will be a JV company formed to provide technology and engineering in EMC, Yeast Formulation and Management, recovery and sale of by-products, and waste treatment into biogases.

The collaboration with JEIC will have a very positive impact for CNE going forward into 2012:

1. Provides a recurring revenue stream from EMC, Yeast Formulation and Management (selling the yeast) and biogases;
2. EPC benefits from participation in the Capex contracts to increase JEIC capacity from 600,000 tonnes to 1,000,000 tonnes of annual capacity (either by way of modification of existing facilities or construction of new facilities);
3. A platform to collaborate on CNE's technology initiatives of producing ABE (Acetone, Butanol, Ethanol) using cellulosic materials;
4. A platform to showcase CNE's integrated business model and demonstrate the potential to scale/duplicate this elsewhere.

Going into FY12, the pipeline for core EPC offerings is strong. On top of this, the potential JEIC JV offers a platform for CNE to verify that its proposed business model works, and will thus significantly benefit from the recent R&D expense. We are forecasting top-line revenue growth of 25% in FY12 and 28% in FY13, with net profit reaching c.RMB50m by 2013. We believe that these are conservative numbers and will review these as details become clearer.

#### **New yeast management business initiative**

Under this initiative CNE will make an initial investment to install equipment on site to supply live (wet) yeast to existing ethanol operators producing above 100,000 tonnes per year; thereafter drawing a steady stream of income. Management estimates that this will:

- ◆ Enable clients to reduce their cost of production by between 5% per tonne and 10% per tonne of ethanol production; thus improving efficiency and yield;
- ◆ Provides CNE with a 30% margin recurring income stream.

#### **Collaboration agreements with third parties**

These are progressing as planned;

- ◆ CNE has signed a technology collaboration with Green Biologics Limited for producing biobutanol from cellulosic biomass;
- ◆ Entered into strategic technology collaboration with Ji'nan University.

#### **Repayments to Citadel on track**

Under the agreement with Citadel, as outlined in the admission document, CNE had agreed to repay its loan via a series of instalments totalling \$3m plus interest. The company reported that \$1m of the loan was paid on 8 October 2011, while it has negotiated to pay \$0.8m by the year end followed by three tranches next year totalling \$0.5m each, with repayment of the full amount of the loan by 8 October 2012.

#### **Significant uplift in R&D spend**

This increased to RMB1.5m in the first nine months of 2011 versus RMB0.6m in the same period last year and is in line with management's strategy to ramp up its technology offering via new business initiatives.

#### **Delays to Thai project**

This cassava-based ethanol project in Ubon Ratchathani province which is expected to generate RMB77m in revenue in total has been delayed due to the floods in Thailand. Only RMB11m of this has been recognised as revenue, with RMB4m gross profit (margin c.35%). Management feels that it can complete 50% by the year end which would be in line with our full-year forecasts.

## SWOT analysis

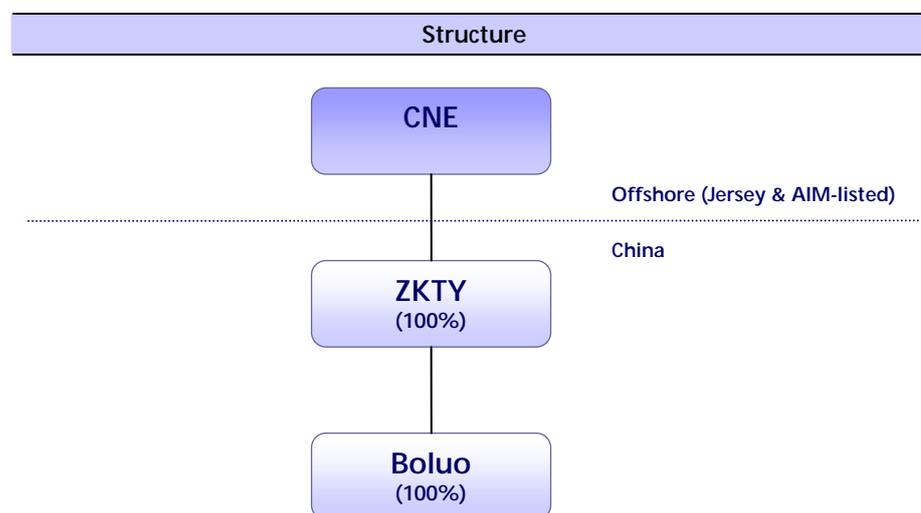
<p style="text-align: center;"><b>Strengths</b></p> <ul style="list-style-type: none"> <li>◆ Track record and experienced management;</li> <li>◆ Demand for horizontal, value added services in near term;</li> <li>◆ Macro trends – expanding bioenergy capacity.</li> </ul>	<p style="text-align: center;"><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>◆ Currently, minimal recurring revenue – overreliance on contract wins;</li> <li>◆ Small market size;</li> <li>◆ Lack of working capital.</li> </ul>
<p style="text-align: center;"><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>◆ Expand EMC business and new initiatives;</li> <li>◆ Develop integrated business model in China and export internationally;</li> <li>◆ Expand R&amp;D efforts and collaborations.</li> </ul>	<p style="text-align: center;"><b>Threats</b></p> <ul style="list-style-type: none"> <li>◆ Macro price shocks;</li> <li>◆ Fall behind market developments;</li> <li>◆ Project delays (e.g. adverse weather, delays in payment, etc.).</li> </ul>

Source: Arden Partners.

# Corporate

## Ownership structure

CNE has one wholly foreign owned entity (ZKTY) which itself has a 100% ownership of the fabrication factory in Boluo.



Source: China New Energy.

Significant Shareholders		
<b>Excluding Directors</b>		
Best Full Investments Ltd	48,000,000	16.18%
Cobalt Ventures Ltd	40,398,640	13.62%
Jiang Xinchun	20,000,000	6.74%
Qui Weiming	20,000,000	6.74%
<b>Directors</b>		
Yu Weijun	90,932,440	30.65%
Tang Zhaoxing	48,000,000	16.18%
Foo Shiang-Peow	8,079,728	2.72%

Source: China New Energy.

## Management

### Yu Weijun – Executive Chairman

Mr Yu is the Chairman of CNE and ZKTY. He is primarily in charge of the overall strategic planning and corporate development of CNE. Prior to joining CNE, he worked in GIEC CAS. He joined the assets and finance department of GIEC CAS in 1988 where he was responsible for asset management and financial matters of GIEC CAS. Mr Yu was promoted to Deputy Chief of GIEC CAS, in charge of the industrial and external investments, asset management and financial matters of GIEC CAS where he gained experience of corporate transactions, restructuring and financial management. Mr Yu holds an Executive Master of Business Administration from Sun Yat-sen University and is a member of the Chinese Institute of Certified Public Accountants.

**Tang Zhaoxing, BSc, MBA – Chief Executive Officer**

Mr Tang Zhaoxing has been a director of CNE since 2006 and is the managing director of ZKTY. He is responsible for overall company operation, sales, project design and management. Prior to joining ZKTY, he was managing director of GZTY Regeneration Resources where he continues to be a director.

Mr Tang graduated from South China Science & Tech University with a degree in Chemical Engineering, and holds an EMBA from Peking University.

**Chen Yong, BSc, MSc, PhD – Non-executive Director**

Mr Chen has been the President of the Guangzhou Branch of the Chinese Academy of Sciences since April 2001. His major is researching in utilisation of municipal solid wastes and management. He was a director of GIEC CAS from April 1998 to October 2006 and has been a Professor since October 1996. He was a teaching assistant at Jiangsu Polytechnic University from August 1981 to April 1985, an instructor at Jiangsu Polytechnic University teaching Chemical Engineering from April 1988 to April 1989, and an Assistant Professor at Nagoya University researching on clean coal technology and utilisation of wastes between April 1993 and October 1996. Mr Chen Yong graduated from Nanjing University of Technology with a bachelors degree in Chemical Engineering in 1981. In 1988 he graduated with a masters degree from Aichi University of Technology, Japan. He obtained a PhD in chemical engineering from Nagoya University, Japan, in 1993.

**Foo Shiang Peow – Non-executive Director (not independent)**

Mr Foo Shiang Peow has many years of investment and corporate finance experience. He is currently a director of NovusAsia Capital Limited, an investment and corporate advisory company. Mr Foo started his career as an equity analyst in Salomon Brothers Inc., based in Singapore, in 1994, and subsequently moved to Credit Suisse First Boston. He was then a senior manager at UOB Asia Limited (part of the United Overseas Banking Group in Singapore) before becoming a director of corporate finance at BDO Raffles, Singapore between 2002 and 2004. He established NovusAsia Capital Limited.

Mr Foo has a MBA from Nanyang Technological University, Singapore.

**Richard Bennett – Non-executive Director**

Mr Bennett started his career in the energy industry, working for General Electric in Asia. He held a portfolio of roles that involved commercialising and bringing to market new technologies. In 1993 Mr Bennett was a co-founder of JFAX Inc., which became a major internet communications company, and founder of J2 Global communications Inc., which listed on NASDAQ (NASDAQ: JCOM) and today has a valuation exceeding \$1bn.

Mr Bennett has been involved in developing two businesses which have been admitted to AIM, Virtual Internet UK Limited (which was subsequently acquired by a US multinational company) and Coms plc (AIM :COMS).

Mr Bennett is actively working in the clean technology sector as CEO of Jade Clean Technology Limited, which is developing underground coal gasification projects in China and India.



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