

# **DECC Electricity Market Reform Consultation**

## **Introducing the Energy Pool**

**Response by the Institute for Security and Resilience  
Studies**

## 1/ Introduction

The Institute for Security and Resilience Studies (ISRS) of University College London focuses in particular on the need for secure, resilient and sustainable UK infrastructure. One of the most important aspects is the need for secure and resilient energy supply in the short medium and long terms, and this ISRS response addresses this need through an innovative approach to the investment framework for the capital and credit necessary for transition to a low carbon economy.

Existing market architecture incorporates centralised banking systems (credit intermediaries) and market transaction clearing systems (trading intermediaries), and concentrates risk in single points of failure. Moreover, current European and US regulatory efforts – which aim to ensure that off-exchange transactions are centrally cleared – will serve only to concentrate risk even further.

There is now a systemic shortage of the credit and capital necessary to finance development and to fund in the long term a new generation of transmission and distribution infrastructure and low carbon power generation capacity.

ISRS's approach to resilient market infrastructure, both domestically, and in the context of the global markets in which the UK is an important participant, is based upon the observation that the pervasive spread of direct instantaneous connections is leading to the emergence of a decentralised and dis-intermediated market architecture.

This response aims to provide a cross-cutting constructive proposal which addresses most of the Consultation questions through outlining a disintermediated and decentralised energy market architecture – the **Energy Pool** – which is complementary to the existing UK market architecture. It also incorporates a simple but radical new financing mechanism – **Unitisation** – which enables direct investment in energy productions and savings.

Perhaps the most important financial aspect of the **Energy Pool** proposal is that it will optimise the balance sheets of market participants by enabling them to outsource their long term capital funding to stakeholders, particularly to energy consumers. It thereby both enables extremely efficient capital utilisation, and minimises the need for scarce bank credit.

## 2/ Energy Pools - Generally

The foundations of the conventional system of finance capital are the “twin peaks” of Equity and Debt. But in fact new complementary enterprise models are emerging which use partnership-based frameworks, and these are capable of revolutionising the financing of energy infrastructure and thereby the transition from a carbon-based economy.

### Conventional Financing and Funding – Debt and Equity

Equity consists of shares in the legal person (or corporate entity) known as a Joint Stock Limited Liability Company. These shares have a par value (typically £1.00) and confer rights of ownership and control over productive assets.

Debt consists of interest-bearing credit created by credit institutions known as Banks. This credit – which is supported by an amount of capital specified by banking regulators – comes into existence both when banks lend, by creating interest-bearing loans; and when they spend, by crediting the accounts of suppliers, staff, management, shareholder dividends and so on and instantaneously create matching deposits in the system.

There is a systemic shortage of bank capital which is restricting the availability and inflating the cost of credit available for financing and funding of energy infrastructure.

### Emerging Financing and Funding – quasi Equity

Innovations in bank credit and the resulting problems have obscured the emergence of a new wave of legal vehicles for investment which are based not upon Company law, but upon Trust and Partnership law.

First in Australia, and then in Canada, Corporations listed on stock exchanges placed part of their *gross* revenues into Trusts which were then divided into Units. Risk-averse investors such as pension funds perceived that streams of gross income are much more certain than dividends from conventional shares which are distributed – if at all – out of companies’ net profits after overheads, such as management costs, have been deducted.

Such Income Trusts and Royalty Trusts were hugely popular, but were rapidly throttled by the Australian and Canadian Treasuries for tax reasons. However, other innovative quasi-equity has been more permanent. Real Estate Investment Trusts (REITs) – distribute virtually all of their income, and allow direct investment in property.

Finally, Exchange Traded Funds (ETFs) have begun to invest directly in all manner of assets, and tens of billions of dollars have flowed into such funds invested in gold and commodities.

### Capital Partnership

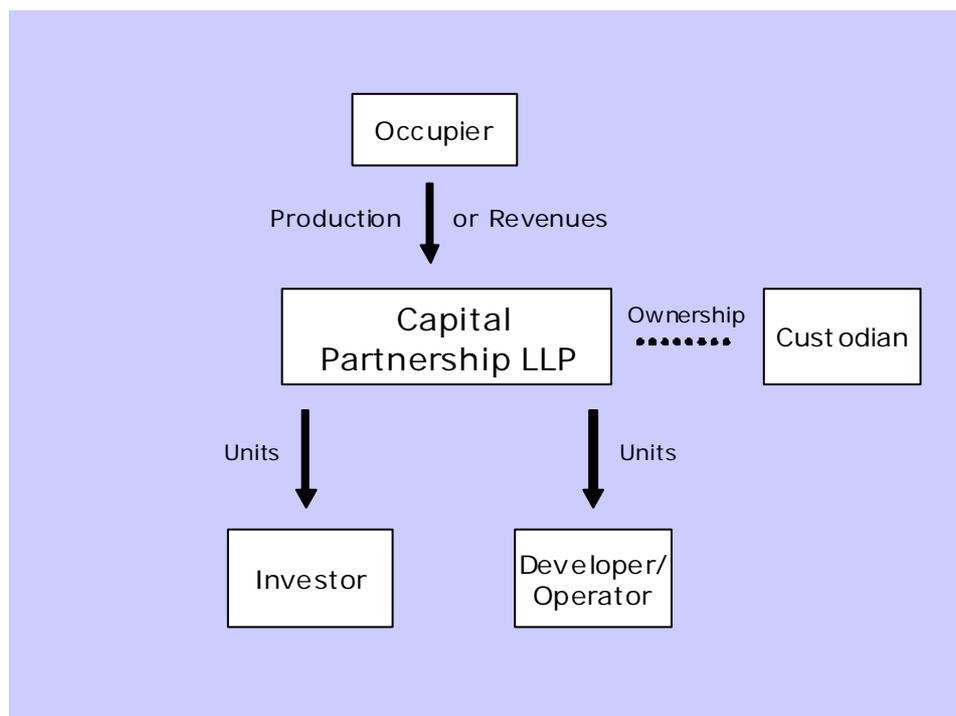
The introduction in the UK in 2001 of a new legal form – the Limited Liability Partnership (LLP - now also introduced in Jersey, Dubai, Qatar, Japan, and India) - has created new possibilities for financing and funding through the emergence of the 'Capital Partnership'

LLPs are now in routine use in the Private sector for joint ventures, such as First Hydro LLP, a pumped storage UK hydro-electricity project between International Power Plc and Mitsui & Co Ltd. Moreover, they are also now being used in the Public Sector, where the City of Glasgow participates in five joint ventures with private sector service providers, but with conventional bank financing and funding.

A Capital Partnership brings investors *inside* the LLP framework and thereby enables co-ownership of productive assets by investors, and users of investment.

An embryonic example of a Capital Partnership was an LLP framework which enabled the *gross* revenues from ten UK hotels to be shared proportionally between the Hilton Group,

as “Capital User”, and a “Capital Partner” consortium consisting of a bank, a property developer and a hotel specialist.



### Unitisation

The Capital Partnership is not an Organisation – it does not own anything, do anything, employ anyone or contract with anyone. It is simply a framework within which the stakeholders self organise to achieve a common purpose, which may be the production of renewable energy (Mega Watts), or energy savings (Nega Watts).

By using such a framework, production, revenues from sale of production, or even savings, may be proportionally shared between stakeholders and their entitlements may be sold to investors through the creation and issue by a Custodian of **Units** redeemable against units of production eg Kilo Watt Hours or the energy equivalent in gas or heat.

### Units - the Investment Proposition

#### Investors

The purchaser from an Energy Pool of a Unit redeemable in payment for (say) 10 Kilowatt Hours of electricity may: (a) sell the Unit to someone else for £, or even for “£'s worth” of goods and services; or (b) choose to redeem the Unit in payment for the supply of electricity through the Pool.

The advantage for an Investor compared to Units in a conventional fund is that the price of Units will always be related to the actual physical market price of electricity which is determined by the continuous matching of supply and demand of electricity. This is because if the price of Units falls below the price of electricity actually consumed then consumers will buy Units and pay for electricity with them in preference to conventional money. Consumers may therefore lock in their electricity price through using Units to “buy forward”.

#### Producers

The proposition of Units for producers is equally simple. They are selling their production forward to Investors, locking in a price, and receiving value now as an interest-free loan.

Their obligation in return is to accept Units from customers as and when presented in payment for electricity supplied.

This means, of course, that if energy prices rise in future, then they are giving up the increase in value of this production. Moreover, insofar as a producer has costs, then selling production forward may be risky if costs rise and income from sales is limited. It makes sense therefore, for producers to enter into production sharing arrangements with suppliers. So the owner of a gas fired power plant could agree with a supplier partner that a proportional share of electricity production would be allocated to him in exchange for gas.

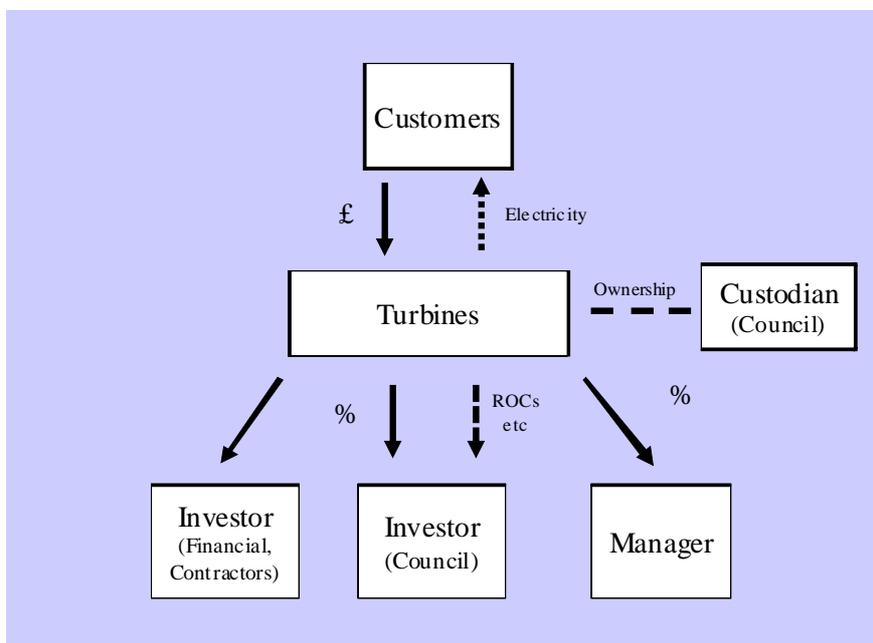
Fuel cost is not an issue for a wind turbine, because fuel costs are zero, and the only requirement would be the sort of operating partnership arrangement – such as that offered by Enercon – where an equity share in electricity production is agreed in exchange for operation and maintenance.

### Developer/Operator

The Capital Partnership enterprise model enables service providers to share in gross revenues or production in a way which aligns their interests with other stakeholders. This enables the customary 'principal/agency' conflict between interests of owners and managers – which is inherent in all company and trust forms of organisation, and extends to public sector organisations – to be transcended.

### 3/ Energy Pool - Examples

A Municipal Energy Pool could be implemented as follows, with (say) wind turbines in public ownership, but privately developed and operated.



## **Custodian**

Turbines are in public/community ownership.

## **Investor**

- **Council** - invests value of land, and/or permissions and receives a proportional Equity Share in the production of the completed turbines, plus ROCs, CRC etc
- **Contractor** - *may* invest costs, but *must* invest profit margin in return for redeemable Units
- **Financial** - invests funds necessary to cover costs, in return for redeemable Units.
- **Manager** - receives a proportional Equity Share in the revenues from sale of production and acts as developer, without putting any financial capital at risk, but with an interest in ensuring timely completion to high standards of quality.

The Municipal Energy Partnership framework may be used as a simple variation from an Energy Services Company (ESCO) to “pool” all municipal energy projects. In addition to investment in renewable energy, it is also possible for investment to be made in energy saving projects, such as retrofitting CHP, through making “energy loans”.

## **Negawatts**

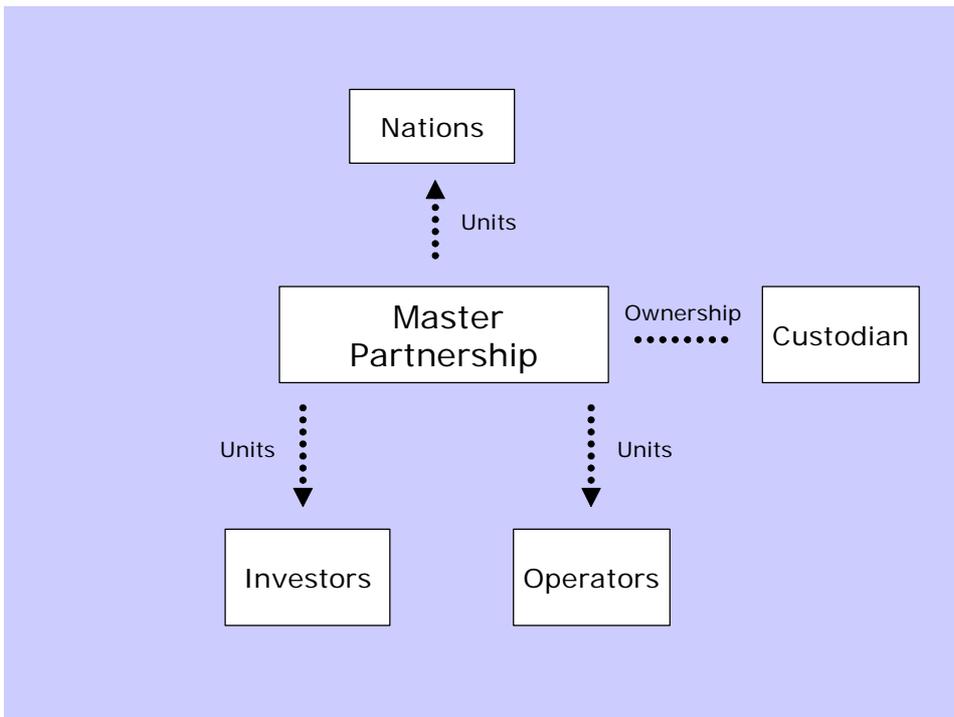
A new policy option is available to implement a **New Green Deal 2.0** as a complement to existing plans through the use of loans denominated in energy – 'energy loans'. These interest-free loans will be made from the Energy Pool fund to households in respect of investment either in their property or in a community of properties in which they are a member. While energy loans are paid in sterling they are denominated in energy at the market price. eg a loan of 50,000 kWh @ 10p per kWh is £5,000.

The energy loan is made to the property, and not to the owner, and repayments are made through the repurchase of Units by the occupier from the Energy Pool at the market price of energy. So by way of example, a loan of £5,000 may give rise to an “energy loan” of 100 Mega Watt Hours at £50.00 per Mega Watt Hour / Btu equivalent.

Energy loans are repaid through the purchase from the Energy Pool of Units at the prevailing market price. These repayments – which are funded by the reductions in energy use arising from the investment – may be billed/collected by a utility eg as a form of “Hot Water Rate”.

## North Sea Energy Pool

A North Sea Master Partnership may be created as a framework for investment in offshore wind and other energy production, and for the proposed North Sea HVDC Supergrid.



The transfer of interests in North Sea oil and gas fields takes place within a legal framework based upon UK trust law known as the **MasterDeed** to which all North Sea oil and gas participants are signatories. **MasterDeed** is complex and cumbersome, but is nevertheless a great improvement on the pre-existing legal chaos.

The **Master Partnership** concept extends this legal framework to include all stakeholders, and in particular to include direct investors in energy production.

- **Custodian** - the legal form and jurisdiction would require careful consideration, but a Trustee under an amended **MasterDeed** agreement is a possibility.
- **Nations** - each littoral North Sea nation would transfer all national rights to North Sea energy production to the **Custodian**, retaining certain veto rights of governance.
- **Investors** and **Operators** - would share with **Nations** the North Sea Energy Pool of production within the overall Master Partnership framework through a network of project-specific sub-partnerships as recorded in "Enterprise Agreements".

Partnership interests and redeemable Units created in accordance with these Enterprise Agreements will be recorded in suitable transaction and title registries nominally held by the **Custodian**. Accounting of transfers of Units and currency would be administered by a suitable **Operator** financial service provider.

## 4/ UK Energy Market in Context

### A Natural Grid

Firstly, investment in decentralised renewable energy production and in energy savings, which are by definition local will reduce the demands on the National Grid, it will not reduce the need for cross border connections with other energy producers and consumers.

The requirement is for a complete reconfiguration of the Grid, to create what has been called a Natural Grid, rather than the existing legacy National Grid. HVDC links to Iceland, Nordic and other nations may be linked to, and possibly replace much of, the existing legacy infrastructure.

### European Energy Clearing

In order to finance and fund such cross border infrastructure, and link it to the emerging wave of off-shore wind and other generation, a new European market is required.

While existing Nordic and EU electricity markets are successful in terms of electricity scheduling and spot pricing, it has been recognised that the forward electricity markets must be re-configured.

The use of energy pooling, as outlined above, and a dis-intermediated market architecture may enable the creation of what could in effect be a combination of a European Energy Clearing Union and a decentralised network of energy investments from community level up to inter-government projects like the North Sea Grid.

### Natural Gas

The continuing 'Dash for Gas' has, as observed in the consultation, made the future of the UK electricity market integral with the emerging global market in gas. The increasing UK dependence on imported gas is becoming clearer by the day, and deals such as Centrica's recent 3 year LNG contract with Qatargas will become routine.

The current over-supply of gas has led to a disconnection of the gas price from the financially inflated oil price. While this temporary respite will not last, it creates a temporary window for consumer nations to explore with producer nations the possibility of a new global settlement in the context of a 21<sup>st</sup> century decentralised and dis-intermediated networked market in gas

## 5/ Outcomes

- **Economic** - the economics of investment in energy assets and savings will be transformed, since Units created in respect of investment in energy savings and renewable energy essentially cost nothing to redeem. Project appraisal will be on the basis of energy returned against energy invested (EROEI).
- **Equity Release** - existing market participants have vast amounts of capital tied up in their asset base, and the use of Unitisation – within a suitable partnership enterprise model – will allow existing debt to be repaid and equity to be returned to investors.
- **Dis-intermediation** - market participants would transition from a transaction intermediary role – or the provision of services for profit - to become service providers sharing in surplus value created, and requiring only the capital necessary to cover operating costs.

- **Decentralisation** - the Energy Pool framework will facilitate the creation of local community-based initiatives and a decentralised network of energy provision not dissimilar to the Danish approach. Market participants will act as service providers to share in the value of renewable energy production and – **New Green Deal 2.0** - in energy savings. .
- **Big Society** - partnership frameworks for financing and funding provide the necessary economic underpinning for the communitarian 'Big Society' concept.

## 6/ Other Research Initiatives

The subject of a resilient economy and society potentially covers almost the entire range of academic disciplines in one way or another and there are a plethora of academic programmes which are relevant.

Initiatives we are aware of include:

1/ The Scottish Universities Insight Institute

*“Designing the transition to sustainability: resourcing community resilience”*

<http://ewds.strath.ac.uk/instituteforadvancedstudies/Programmes/Currentprogrammes/CommunityResourcing.aspx>

2/ The work of Bristol University's Cabot Institute

<http://ewds.strath.ac.uk/instituteforadvancedstudies/Programmes/Currentprogrammes/CommunityResourcing.aspx>

3/ In terms of Economics, the work of Elinor Ostrom, the recent Nobel prize winner in relation to the economics of the commons.

4/ Numerous academic programmes in relation to systems thinking.