ENERGY POLICY RESEARCH & IMPLICATIONS FOR DATA CENTRES IN EMEA

EDITOR:

Harkeeret Singh, Thomson Reuters

CONTRIBUTOR:

André Rouyer, Schneider Electric

RESEARCH:

CB Richard Ellis

Table of Contents

1 Executive Summary

On behalf of The Green Grid, CB Richard Ellis has identified existing and emerging energy policies affecting the data centre industry. The current research has reviewed key international, EU-wide and specific national sustainable energy policies in the following countries:

- UK
- France
- Germany
- Spain
- Netherlands
- Italy
- Switzerland
- South Africa
- Russia
- United Arab Emirates
- Saudi Arabia
- Qatar

Energy security, energy prices and climate change have dramatically risen up the policy agenda, resulting in a comprehensive policy framework in many countries. The growth of data centres, along with their energy intensity, means the industry will be particularly affected by legislation driving efficiency of design, build and operations — above and beyond the business impacts of increasing cost of energy and of carbon.

Recent years have seen the introduction of a range of new policies internationally, such as a new carbon trading schemes, Feed-in Tariffs (FITs) and the tightening of existing policies and building regulations.

At the same time, the challenging economic conditions and market and technology developments have resulted in a rapidly changing policy environment. Many countries, for example, have made significant reductions in their FIT regimes supporting photovoltaics (PV). Others, such as Italy, France and the Netherlands, have either scaled back or abolished their ambitions for taxing carbon.

Some of the key trends to have emerged include:

- **Mandatory Regulations**: All countries have been implementing increasingly demanding building regulations. This is particularly the case in the EU, where EPBD will continue to aim towards "nearly carbon neutral" development. Other mandatory regulations are emerging such as mandatory performance requirements to be introduced in 2018 in the UK.
- **Reputation Drivers**: Local voluntary building certification schemes have been implemented in all countries reviewed in recent years, and are likely to continue to be an increasingly important driver.
- **Financial Cost**: Ambitions for adding costs to carbon (through, for example, taxes) have generally been scaled back as the economic crisis and opposition to such taxes persists. The likely growth of "green taxes," along with increasing fossil fuel prices, however, means that the cost of energy and carbon will remain an important driver for energy efficiency in the sector.
- **Financial Incentives** are likely to remain for many technologies through Feed-in Tariffs, despite the recent reductions in support of PV, whilst tax incentives will remain a means of incentivising investment in energy efficiency solutions.

What has not changed is the significance of energy and climate change policy. There is substantial upward pressure on energy prices and, even throughout the economic crisis, energy costs have remained at around $100/barrel. Yet government commitments to tackling climate change remain largely intact.

Successful data centres will most effectively manage the uncertainty and the complex policy environment, continue to invest in energy efficiency, benefit from incentives provided by countries and be prepared to exploit the opportunities arising from policy innovations as they continue to emerge.

1.1. Overview of the Study

The current study summarises the key policy mechanisms across each of the above countries, focusing on:

- The regulatory obligations placed upon data centres operating in the country
- The voluntary mechanisms within the country, with the impacts on reputation
- The financial incentives targeting investment in low carbon technologies and practices
- The financial costs associated with energy and carbon, aiming to incentivise action

These are presented through:

- Section 1: The introduction and executive summary
- Section 2: A detailed summary of policies and their implications for data centres
- Section 3: Detailed policy descriptions, by country
- Section 4: A reference list of policies, by country and by commercial impact

1.2. Summary of the Key Policies

The following summarises some of the key policies that affect data centres. How countries have implemented these policies can be found in Section 3.

- **EU policy** continues to play a significant role in driving energy policy amongst the EU member states, most notably through:
    - European directives for products and buildings that are pursuing reductions in greenhouse gases emissions, efficient use of energy, and energy performance labelling.
    - The Energy Performance of Buildings Directive that enabled the rollout of Energy Performance Certification but, perhaps more significantly, is also a key driver for the member states to implement ever increasingly challenging building regulations.
    - The EU ETS presents data centres with an uncertain (and potentially significant) indirect cost as suppliers (who must participate in the scheme) typically pass on the associated costs.
- Key **Regulatory Drivers** are building regulations, which present perhaps one of the key policy mechanisms employed to deliver higher levels of energy performance across all countries reviewed.
- **Voluntary Drivers** were also found to be important, with Voluntary Certification and industry standards established internationally. These are becoming increasingly important in driving action, as well as limiting the need for even more legislation.
- **Financial Incentives** have been established in many of the countries reviewed, in particular through the establishment of electricity Feed-in Tariffs, which are in force in all countries apart from Russia, the UAE, Saudi Arabia and Qatar. These have, without exception, seen significant changes over recent years and months due to trends in technology prices, demand and government finances changing.
- **Financial Cost** as a policy driver has been implemented to a lesser degree. The EU has established the EU ETS, which presents an indirect cost to data centres operating across the EU. The UK, Italy and Switzerland have established carbon taxes (with Italy shying away from implemented cost increases promised).
- Policy innovations have emerged in a number of countries, for example:
    - **Other Feed-in Tariffs** have emerged. For example, the Renewable Heat Incentive launched on 28 November 2011 in the UK and a CHP tariff in Germany.
    - **Carbon Trading**: There are certain significant policy innovations seen in carbon trading, perhaps most notably, the UK CRC Energy Efficiency Scheme (a carbon trading scheme introduced in 2010) and the Swiss voluntary carbon trading scheme (enabling participants to opt out of the carbon tax by joining the carbon trading scheme).
    - **Planning Policy** emerged in the mid 2000s in the UK with certain local authorities demanding that new building developments have certain percentages of final energy demand or carbon emissions met through onsite renewable energy solutions.

1.3. Energy Policy Map

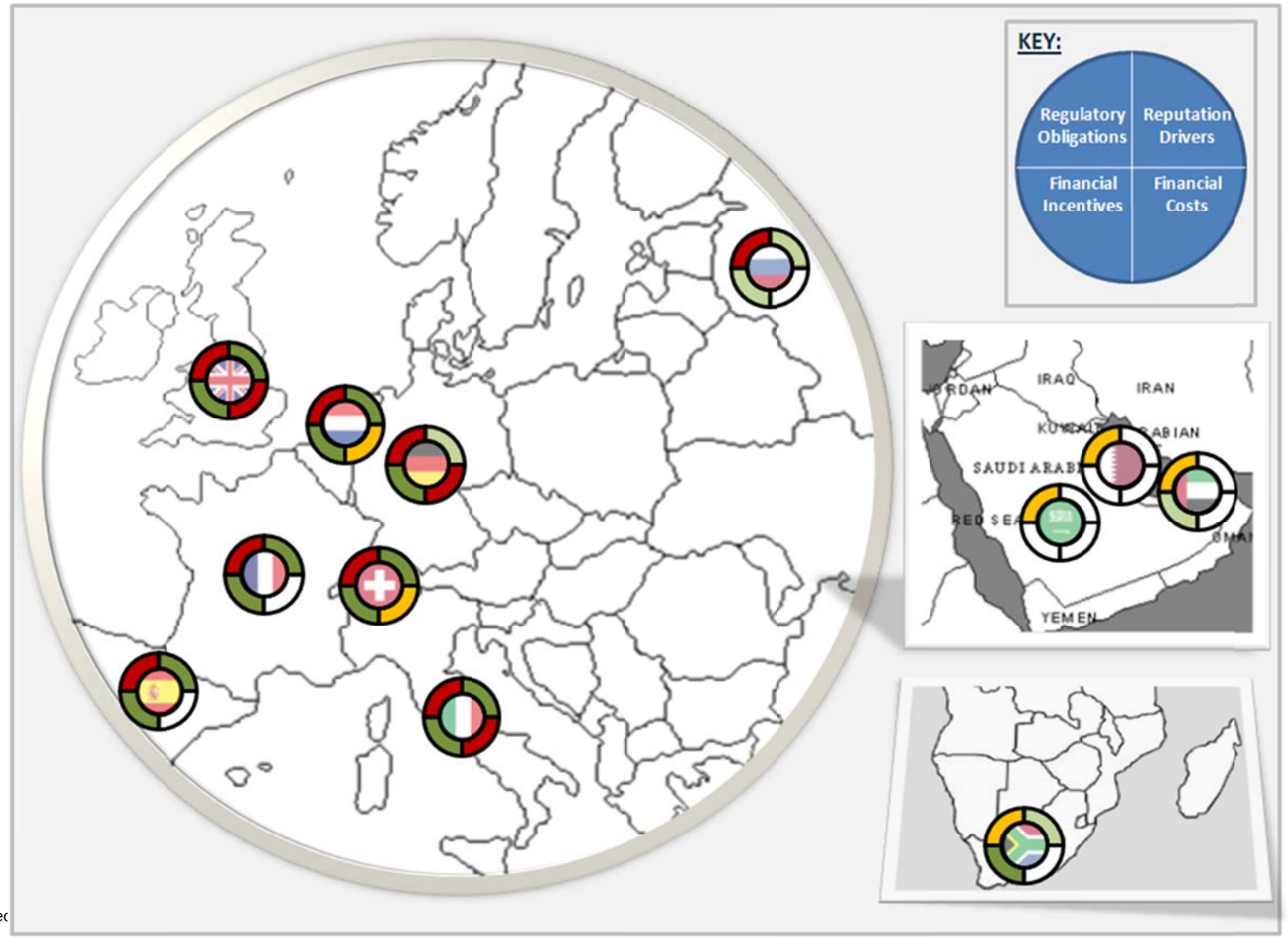
The following provides an indicative illustration of the extent of the commercial implications on data centres in different countries.

Notes:

- **Regulatory Obligations** include mandatory policies such as building regulations
- **Reputation Drivers** include voluntary policies such as BREEAM / LEED building certification
- **Financial Incentives** such as the Feed-in Tariff
- **Financial Costs** such as carbon taxes or trading schemes

Scale:

- Red refers to high regulatory requirements or cost



- Orange refers to moderate regulatory requirements or cost
- Green (dark) refers to high voluntary options or incentives
- Green (light) refers to moderate voluntary options or incentives

1.4. Table Summarising the Commercial Implications for Data Centre Industry, by Country

	Build ← Operate				
	Regulatory Obligations	Voluntary Mechanisms	Financial Incentives	Financial Cost (Carbon & energy)	Summary of Commercial Impact
United Kingdom	High	High	High	High	High
France	High	High	High	Low	High-Med
Germany	High	Moderate	High	Low	High-Med
Spain	High	High	High	Low	High-Med
Netherlands	High	Moderate	High	Moderate	High-Med
Italy	High	High	High	Low	High-Med
Switzerland	High	High	High	Moderate	High
South Africa	Moderate	Moderate	High	Low	Moderate
UAE	Moderate	Low	Moderate	Low	Med Low
Russia	High	High	Moderate	Low	Moderate
Saudi Arabia	Moderate	Low	Low	Low	Low
Qatar	Moderate	Low	Low	Low	Low

Note:

- For Regulatory Obligations and Financial Costs: red indicates a high cost/operational impact, orange indicates a moderate impact
- For Voluntary Mechanisms and Financial Incentives: green (dark) indicates a high financial / reputation incentive, green (light) indicates a moderate impact
- For Summary of Commercial Impact: blue indicates the overall commercial level impact
- These ratings are indicative only and based on the research undertaken

1.5 Summary of Key Policies and Implications for the Data Centre Industry, by Country

The following tables provide an overview of the key policies based upon the extent of the commercial impacts upon the data centre industry:

Note: Policies with most significant impacts within each group (cell within the table) are highlighted in bold

- For Regulatory Obligations and Financial Costs: red indicates a high cost/operational impact, orange indicates a moderate impact
- For Voluntary Mechanisms and Financial Incentives: green (dark) indicates a high financial / reputation incentive, green (light) indicates a moderate impact
- For Summary of Commercial Impact: blue indicates the overall commercial level impact

	Build → Operate			
	Regulatory Obligations	Voluntary Mechanisms	Financial Incentives	Financial Costs
United Kingdom	**Building Codes, leading to zero carbon development** **Planning policy supporting renewable energy**	**BREEAM (for new build)**	**Enhanced Capital Allowance** **Feed-in tariffs** **Renewable Heat Incentive**	**CRC** **The Climate Change Levy**
France	**Code de l'Urbanisme & Certificat d'Urbanisme** **Réglementation Thermique 2012** Label HPE 2005 (Very High / High energy performance standard)	**HQE Environmental Assessment Certification**	**Advanced renewable Tariffs (Tarife Equitable) 2006**	**Certificat d'économie d'énergie (Energy Saving Certificates)**
Germany	**Energy saving regulations EnEV 2009 (Energieeinsparverordnun)**	**Building Certification: DNGB certifications**	**Feed-in Tariffs: Renewable Energy Act (EEG)**	

the green grid
get connected to efficient IT

	Build → Operate			
	Regulatory Obligations	Voluntary Mechanisms	Financial Incentives	Financial Costs
	▪ Renewable Energies Heat Act		▪ CHP Act	
Spain	▪ The Technical Building Code ("CTE") ▪ Regulation on Indoor Heating and Air-conditioning Systems (RITE)	▪ Green Building Council España Certificate-VERDE	▪ Feed-in Tariffs	
Netherlands	▪ Building Regulations: Bouwbesluit ▪ The Decree on Energy Performance of Buildings (BEG)	▪ BREEAM-NL	▪ Energy Investment Allowance ▪ Feed-in Tariffs ▪ Green Deal	▪ NOx emissions trading
Italy	▪ Law on Building Quality ('Legge per il Sistema Casa Qualitá') ▪ Norme per l'edilizia sostenibile	▪ The Italian Green Building Council (GBC)	▪ Feed-in Tariffs	
Switzerland	▪ Building Regulations: Mustervorschriften der Kantone im Energiebereich (MuKEn)	▪ MINERGIE and MINERGIE-P (Green Building Standard)	▪ Feed-in Tariffs	▪ Carbon Tax ▪ Carbon Trading
South Africa	▪ South African National Standard (SANS 10400-XA: 2011)	▪ Green Star SA Certification ▪ Energy Star ▪ ITU Sustainable ICT Specification	▪ Tax incentive: Taxation Laws Amendment Bill, 2009 ▪ Renewable Energy Feed-in Tariff (REFIT)	
United Arab	▪ Estidama Pearl Building Rating System	▪ Estidama Pearl Building	▪ Sovereign wealth funds	

the green grid®
get connected to efficient IT

	Build			Operate
	Regulatory Obligations	Voluntary Mechanisms	Financial Incentives	Financial Costs
Emirates	(mandatory in some areas) ▪ Local plans	Rating System	investment in large projects	
Russia	▪ Building Regulations (2009 Energy Efficiency Legislation) ▪ *Stroitelnye Normy i Pravila* (Construction Codes &Regulations)	▪ Green Standards (Local implementation of LEED)	▪ Tax Incentives through tax credits of up to 30%	
Saudi Arabia	▪ Saudi Building Code (SBC) ▪ Mandatory Energy Efficiency Labelling	▪ Saudi Green Building Council	▪ Potential for market responsive Feed-in Tariffs	
Qatar	▪ Conservation of Water & Energy Law	▪ QSAS	▪ Sovereign wealth funds investment in large projects	

SECTION 2:

SUMMARY

2 Summary

2.1. Summary of Key Policies in Force, by Country

	United Kingdom	France	Germany	Spain	Nether-lands	Italy	Switzer-land	South Africa	Russia	United Arab Emirates	Saudi Arabia	Qatar
EU and International Policy												
Energy Performance of Buildings Directive	✔	✔	✔	✔	✔	✔						
Revisions to the Energy Performance of Buildings Directive	✔	✔	✔	✔	✔	✔						
Mandatory Energy Labelling (e.g., The Energy Labelling Directive)	✔	✔	✔	✔	✔	✔					✔	
EU Ecolabel / Flower	✔	✔	✔	✔	✔	✔						
The EC Code of Conduct on Data Centre Energy Efficiency	✔	✔	✔	✔	✔	✔						
Expansion of the Eco-Design Directive	✔	✔	✔	✔	✔	✔						
Fluorinated Greenhouse Gases	✔	✔	✔	✔	✔	✔						
EU GHG Emission Trading Scheme	✔	✔	✔	✔	✔	✔						
ETSI / CEN / CENELEC Standards	✔	✔	✔	✔	✔	✔						

the green grid®
get connected to efficient IT

	United Kingdom	France	Germany	Spain	Nether-lands	Italy	Switzer-land	South Africa	Russia	United Arab Emirates	Saudi Arabia	Qatar
ISO 50001 and ISO 14001	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
ITU Sustainable ICT Specification	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
EU Energy Star	✔	✔	✔	✔	✔	✔						
Energy Star (US)							✔	✔	✔	✔	✔	✔
Monitoring, Measuring and Reporting	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Mandatory Policies (Building Regulations, Planning and Mandatory Performance)												
Building Regulations Driving Energy Performance	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Strong Planning Policy Driving Low Carbon Development	✔											
Future Mandatory Energy Performance	✔											
Increasing the Cost of Energy and Carbon (Taxes and Carbon Markets)												
Direct Energy and Carbon Taxes	✔				✔	✔	✔					
Local Carbon Markets	✔						✔					
NOx Markets					✔							

the green grid®
get connected to efficient IT

	United Kingdom	France	Germany	Spain	Nether-lands	Italy	Switzer-land	South Africa	Russia	United Arab Emirates	Saudi Arabia	Qatar
Financial Support for Sustainable Energy												
National Tax Incentives for Data Centres	✔	✔			✔	✔		✔	✔			
Significant Grant Funding												
Finance Mechanisms / Interest-Free Loans				✔	✔		✔					
Electricity Feed-in Tariff	✔	✔	✔	✔	✔	✔	✔	✔				
Heat Feed-in Tariff	✔											
CHP Feed-in Tariff			✔									
Government / Sovereign Wealth Funding										✔	✔	✔
Voluntary Measures Supporting Sustainable Energy												
Local Property Certification of Environmental Performance	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

2.2. Overview of the Commercial Implications of Key Policies on the Data Centre Industry

The following table provides an overview of the key policies by country and details their potential commercial implications, be it operational requirements, cost implications, financial benefits or potential impacts on reputation.

	Overview of Key Policies	Commercial Implications for the Data Centre Industry
Key EU and International Policies	**The Energy Performance of Buildings Directive** • This policy demands that EU member states implement policies requiring all properties that are rented or sold to have in place an Energy Performance Certificate (EPC) and that all air conditioning systems are inspected at regular intervals. • The policy also demands that EU Members put in place plans and strategies to deliver carbon reductions over time. • Revisions to the EPBD have called on member states to work towards carbon neutral development of property by 2020.	• There are limited financial implications associated with the requirement to complete EPCs, as these can be completed cost effectively. • There is a moderate reputation impact associated with the EPC. However, industry is yet to value the certificate significantly and as such has not driven decisions by either landlord or tenant significantly. • The EPC measures theoretical performance of assets, not the operational energy consumption (so significant to data centres). As such, the implications for the data centre industry are limited. • There is a potential for significant impacts in the future if plans for carbon neutral development are implemented. There is, however, a degree of uncertainty over the likelihood of adoption, which is likely to persist with the challenging financial circumstances and its impacts on demand for new development.

	Overview of Key Policies	Commercial Implications for the Data Centre Industry
	EU Ecolabel • The EU Ecolabel Flower labelling is a voluntary system designed to encourage businesses to market products and services that are kinder to the environment. To date, the Ecolabel Flower only covers computers, lighting, washing machines and refrigerators.	• This voluntary measure has had mixed reports. According to an OECD report on eco-labelling schemes, the EU Ecolabel has been criticized for being too broad and uptake was limited. On the other hand, anecdotal evidence suggests that adoption of the scheme had for some (such as Hoover) seen sales soar following its adoption. Whilst uncertain, it is most likely that this scheme could have significant impacts on consumer-focused brands, but impact on the data centre industry specifically is uncertain.
	EC Code of Conduct on Data Centre Energy Efficiency The EU CoC provides stakeholders with essential energy efficiency and technical guidance. The Best Practice parts of these codes are updated annually. Please see: EC DG Joint Research Council Code of Conduct on Data Centre Energy Efficiency	• The code requires limited investment in time or resource. • Participation and adoption of the Code of Conduct does, however, offer the industry reputation benefits and is important for the development of clients' trust and relationships. • Implementing such codes of conduct effectively does provide the industry with the opportunity to self-regulate, therefore reducing the risk of increasingly challenging and less effective future legislation. • Implementing the EU Code of Conduct best practices should enable you to understand the energy consumption of the data centre and implement best practices that should help reduce your consumption and operational expenditure.

	Overview of Key Policies	Commercial Implications for the Data Centre Industry
	The Energy Labelling Directive The Energy Labelling Directive has proved to be very effective for household appliances and the EC is considering the extension of the scope to include both energy-using products and those in the commercial sectors.	• The EU has been considering the application of the Energy Labelling Directive to the commercial sector for some time now and, as such, it is not likely in the short to medium term. It is therefore unlikely to have any implications for the data centre industry at the moment.
	ISO 50001 and ISO 14001 ISO 50001:2011 is a management system focused specifically on operational energy management within property generally. ISO 50001 specifies requirements for effective energy management, providing a systematic approach to achieving continuous improvement. It supports the implementation of effective energy management and specifies requirements for measurement, documentation and reporting of performance. The standard has been designed to be used independently, but it can be integrated with other management systems such as ISO 14001 (a wider environmental management system) and ISO 9001.	• ISO 50001 and the more widely recognised ISO 14001 allow data centre operators to demonstrate their commitment to effective energy and wider environmental management and, hence, could have significant reputation benefits. • Given the significance of energy within the data centre environment, ISO 50001 could be a more effective and focused system to implement than ISO 14001, which is more typically implemented for those organisations with a range of environmental impacts.
	LEED An important environmentally focused assessment scheme and award/label available for commercial buildings is the US Green Building Council's (USGBC) Leadership in Energy and Environmental	• LEED provides recognition for the design of a building. Those that achieve the highest recognition, both in design and in operations, can provide operators with a competitive advantage, particularly

	Overview of Key Policies	Commercial Implications for the Data Centre Industry
	Design (LEED) rating system for commercial buildings. It provides assessment criteria for specific stages of construction.	for those data centres seeking to attract larger corporate organisations, many of which have made specific commitments to occupying space with LEED certification. • LEED has, over recent years, become amongst the main certification systems adopted internationally, despite many developed countries having in place their own local schemes.
Key UK Policies	**Part L of the Building Regulations** The UK Building Regulations provides detailed minimum performance levels for the energy performance of new developments and refurbishments, with both minimum requirements for individual systems and overall maximum theoretical carbon emissions. It is the intention for these standards to be tightened every five years, with the aim of delivering carbon neutral development in 2019.	• New developers are required to deliver ever-increasing standards of performance and are therefore required to price in the associated costs. Given the high energy consumption associated with data centres, this is likely to result in additional capital investment to meet the standard during build. However, benefits will be seen during its operational lifecycle. • Ever-increasing standards also add risk of older data centres becoming increasingly out of touch with the best in the market.
	Local Planning Policy Local planning policy in the UK developed rapidly in the mid-2000s with a significant number of local authorities demanding carbon reductions beyond the requirements of building regulations. Many of these demand that between 10% and 20% of energy demand is satisfied through the use of on site renewable energy (normally only where	• Planning policy was often targeting total predicted energy demand and carbon emissions (rather than 'regulated emissions' which excludes operational and IT loads as with building regulations). The result of this is that most data centres would fail to fulfil this policy requirement. Negotiations with planning officers would therefore

	Overview of Key Policies	Commercial Implications for the Data Centre Industry
	feasible).	be expected and could add time to a project and present additional costs associated with meeting at least a proportion of energy demand through renewables or, in some cases, the potential to invest in renewable energy projects outside of the development.
	Mandatory Energy Performance and the Green Deal New legislation to be introduced over the coming year includes the 'Green Deal' where the government is establishing financing mechanisms to deliver energy efficiency and renewable energy projects in partnership with suppliers. In addition, the government intends to implement policy effective from 2019 that demands particular levels of energy performance is achieved (likely to be an 'E' rated EPC) unless all opportunities associated with the Green Deal are adopted.	• These policies are not yet in force and, as such, uncertainties over their impacts remain. • The Green Deal offers great opportunity to implement energy saving projects without the capital cost required to do so. • The Mandatory Energy Performance policies could have significant implications on landlords in the future, as poor performing properties would not be able to be let out from 2019. This policy could, dependent upon the levels of performance demanded, have significant cost and property value impacts in the future. Planning ahead in portfolio decisions is therefore critical.
	Feed-in Tariffs (FITs) and the Renewable Heat Incentive The UK recently changed its FIT (supporting electricity generating renewable energy technologies) and launched (in November 2011) the renewable heat incentive (to support heat generating technologies). Both of these schemes pay a unit rate for each kWh energy generated and certain technologies have seen significant increases in deployment as a result.	• There have been very attractive opportunities for organisations to invest in renewable energy technologies, with those acting fast enjoying significant returns on investment (for example with solar electricity, or PV technologies). • There is a need, therefore, to carefully consider future opportunities with the range of technologies and identify the commercial

	Overview of Key Policies	Commercial Implications for the Data Centre Industry
	The scheme is however, as with many FITs around the world, uncertain as the government works to set the tariff appropriately in response to changing demand, technology prices and their own budgets.	opportunities prior to (what can be rapid) changes being made to the price paid by government.
	Enhanced Capital Allowance The enhanced capital allowance allows companies investing in energy-saving technologies to more rapidly depreciate these assets, providing attractive tax reductions as an incentive to make these carbon reductions.	• Data centres should be aware of this legislation and take advantage of the benefits associated with implementing those energy-saving technologies on the Enhanced Capital Allowance approved lists.
	Climate Change Levy The Climate Change Levy (CCL) places a cost on energy bills in order to incentivise energy reduction and provide funding for government investment in sustainable energy.	• Data centres should be aware of this additional cost and consider the potential for avoiding the cost through adopting 'green' tariffs, where the CCL is avoided.
	The Carbon Reduction Commitment The Carbon Reduction Commitment is a mandatory scheme that is now in force requiring groups of companies to measure and report on their carbon emissions and then purchase carbon allowances with respect to these emissions. Participants are required to maintain a detailed Evidence Pack and should be audited on average once every five years. A league table will be published each year ranking performance of participants, based primarily on the absolute reductions in carbon	• There are significant commercial implications and risks as groups are required to purchase carbon allowance. The price of carbon could increase significantly over time, which could, for data centre providers, become very expensive. • There are reputation implications associated with the league table. However, whether this has a significant impact on the data centre industry is as yet unknown. Those organisations with significant

	Overview of Key Policies	Commercial Implications for the Data Centre Industry
	emissions delivered.	brands should be concerned by the impact that consumption throughout their group has on their league table position. • Data centre providers and tenants must give thought as to which party ultimately bears the cost and carefully consider their existing and future leases to ensure these costs are appropriately managed.
	BREEAM and BREEAM in Use BREEAM is a voluntary environmental assessment methodology that has become increasingly popular in the UK over the last 10 years. Most large commercial organisations are demanding BREEAM rated properties, in particular for new development. Certain planning authorities have included in their policies a requirement for achieving a certain BREEAM rating. BREEAM In Use is a more recent addition to the BREEAM family and has seen limited uptake to date.	• Data centre developers should be aware of the potential for planning policy to require including a particular BREEAM rating and understand the (potentially) significant cost associated with securing a rating. • Data centre operators should also be aware of the potential for their clients to demand a BREEAM rating as larger corporate clients are increasingly demanding particular BREEAM ratings as they select space. • BREEAM has also created a standard for data centres, although it is early, standard users should be aware of it.
Key French Policies	**Building Regulations Code de l'Urbanisme & Certificat d'Urbanisme** In France, the Building/Construction Code (Code de l'Urbanisme) and Certificat d'Urbanisme (CDU), a certificate of town planning or urban development, are required prior to any building, construction, renovation or development of a property.	• New developers are required to deliver ever-increasing standards of performance and are therefore required to price in the associated costs. Given the high energy consumption associated with data centres, this is likely to result in additional capital investment to meet the standard during build. However benefits should be seen

	Overview of Key Policies	Commercial Implications for the Data Centre Industry
	For new constructions, the Grenelle law set the target of widespread low consumption buildings by 2012 and positive energy buildings by 2020.	during its operational lifecycle. • Ever increasing-standards also add risk of older data centres becoming increasingly out of touch with the best in the market. With the adoption of Grenelle, and supported by the EPBD requirements for new build, the trend for ever-tighter building regulations for energy efficiency is set to continue.
	Feed-in Tariffs (FITs) In March 2011, France adjusted its FIT system for electricity from solar PV plants. In fact, the support framework is now structured along two main systems: • A tariff, adjusted every trimester, for small integrated systems • Tenders for larger installations and ground mounted plants Where solar PV installed capacity reaches or exceeds the fixed cap of 100 MW per year for residential and 100 MW per year for non-residential, tariffs will drop by 2.6% each trimester (or about 10% annually).	• The FITs in France have been attractive and, like others across the world, have seen rapid changes over recent months. Detailed assessment, flexibility and quick decision making by data centres is therefore important to take advantage of opportunities where they exist. • The FIT support can change quickly across Europe with changes in demands, PV prices and broader economic conditions. As such, the specific policies in the specific locations at specific times should be investigated in detail in advance of any investment decisions being made. The current document should not be relied upon for such decisions.
	HQE Environmental Assessment Certification France's HQE (High Environmental Quality) focuses on reducing consumption of natural resources and discharge of pollutants, as well as enhancing the comfort and health conditions of buildings.	• HQE can be an essential certification to obtain to remain competitive within the commercial property sector, subject to the market at which the property is aimed. The reputation drivers are

	Overview of Key Policies	Commercial Implications for the Data Centre Industry
	It is concerned with the design and the construction of both refurbishment and new building projects. More recently (in 2009), HQE ® "Operation" was developed for existing buildings.	therefore potentially significant. • Owners of data centres should, however, consider the market carefully and consider the most appropriate certification system for their client base. A global or US company may, for example, prefer to adopt a LEED-rated building for the purpose of consistency in the portfolio globally. In such cases, some developers are adopting both LEED and HQE.
Key German Policies	**Energy Saving Regulations (EnEV 2009)** The federal government's resolutions for an integrated energy and climate programme (IEKP) have been implemented in relation to buildings by amending the energy saving (and heating cost) regulations. Compliance with minimum standards for energy efficiency in buildings and heating/cooling systems applies in new construction and renovation of residential and non-residential buildings. As with other countries, such as the UK, the German building regulations demand ever tightening requirements for energy performance and specific details should be examined for any new developments.	• As with the UK and France, new developers are required to deliver ever-increasing standards of performance and are therefore required to price in the associated costs. Given the high energy consumption associated with data centres, this is likely to result in additional capital investment to meet the standard during build. However, benefits should be seen during its operational lifecycle. • Ever-increasing standards also add risk of older data centres becoming increasingly out of touch with the best in the market.
	Renewable Energies Heat Act The Renewable Energies Heat Act (EEWärmeG) aims to increase the share of renewable energies in heat provision to 14% by 2020. The Act makes the use of renewable energy for space and hot water heating	• German regulations demanding the adoption of renewable energy technologies in new developments have an impact on the cost of development. However, the impact for data centres is limited by

	Overview of Key Policies	Commercial Implications for the Data Centre Industry
	mandatory for new buildings. It also stipulates budget requirements to this end for the Market Stimulation Programme.	the fact that data centres do not have a (significant) heat demand. Data centre providers with a requirement for new (heated) office space, for example, will need to consider the additional cost associated with development.
	Feed-in Tariffs and the Combined Heat and Power Act The most important legal instrument in Germany to support the production of electricity from renewable sources is the Renewable Energy Source Act (EEG), which first came into action in the year 2000. Since then, the EEG was amended in 2004 and, more recently, in 2008 to cope with the changing requirements. Enabled by the Combined Heat and Power Act, investors / operators of CHP benefit from the following incentives (EUR cents / kWh for different sized systems): • Up to 50kW systems: 5.11 ct/kWh electricity for 10 years • 50kW to 2MW systems: 2.1 ct/kWh electricity for 6 years (up to 30,000 hours operation) • Over 2MW systems: 1.5 ct/kWh electricity for 6 years (up to 30,000 hours operation)	• Along with Japan, Germany was a very early adopter of the Feed-in Tariff (FIT). Significant investments have been made by the state and, through doing so, the cost of renewables globally has declined significantly. The tariffs have, however, been reduced over time as the industry has matured and prices reduced. • FITs could still provide good long-term investment opportunities. However, the particular rates, technologies, location and investment horizon should all be considered carefully against the particular policy support provided at the time of development. • CHP similarly provides commercial opportunities for data centre operators, in particular with the potential for tri-generation to provide cooling. The specific technology and energy demand profiles of the particular site should be considered carefully as such solutions are not always feasible and necessary back up infrastructure must be considered. Whilst there are opportunities to deliver significant cost and carbon savings cost effectively, the specific technical feasibility and risks must be carefully considered.

	Overview of Key Policies	Commercial Implications for the Data Centre Industry
	DNGB Building Certification Whilst Building Certification codes such as LEED can, and have been, applied in Germany, in January 2009, Germany adopted its own Sustainable Building Seal (DNGB certifications) tool. This certification scheme is most appropriate for offices and administration properties.	• The impacts of the DNGB Certification tool are, to date, limited as this voluntary measure has thus far been focused on office and administrative properties.
Key Spanish Policies	**The Technical Building Code ("CTE") and Regulation on Indoor Heating and Air-conditioning Systems (RITE)** A series of standards and codes resulted from this process in Spain in an attempt to cover the requirements laid down in Directive 2002/91/EC, namely a Royal Decree establishing the following mandatory measures: • The Technical Building Code. • The basic procedure for the energy efficiency certification of new buildings. • The regulation governing thermal installations in buildings.	• New developers are required to deliver ever-increasing standards of performance and are therefore required to price in the associated costs. Given the high energy consumption associated with data centres, this is likely to result in additional capital investment to meet the standard during build. However, benefits will be seen during its operational lifecycle. • Ever-increasing standards also add risks of older data centres becoming increasingly out of touch with the best in the market.
	Feed-in Tariffs (FITs) Spain, along with Germany and Japan, led the development of the PV market through support provided to the industry in the form of FITs. In 2008, Spain installed 45% of all photovoltaics worldwide, with favourable solar conditions combined with extremely generous tariffs. Since then, however, the government has changed this law, limiting the	• The Feed-in Tariff regime in Spain presented significant opportunities in 2007 and 2008. As the economic crisis developed, the government reduced tariffs significantly and there is currently significant uncertainty surrounding the opportunities for FITs in Spain.

	Overview of Key Policies	Commercial Implications for the Data Centre Industry
	FIT, resulting in significant drops in the rate of new installations.	• Data centres should therefore consider the opportunities for renewable energy, but must also consider the particular policy environment at the time prior to making any significant investments.
	VERDE - Green Building Council España Certificate The Green Building Council España's Technical Committee has put together criteria and established rules to define the requirements a building must meet to be qualified as sustainable and obtain a GBC España Certificate-VERDE.	• VERDE offers data centres opportunities to differentiate themselves and enhance their reputation for sustainability. • Owners of data centres should, however, consider the market carefully and consider the most appropriate certification system for their client base. A global or US company may, for example, prefer to adopt a LEED-rated building for the purpose of consistency in its global portfolio. In such cases, some developers are adopting both LEED and VERDE.
Key Dutch Policies	**Building Regulations: Bouwbesluit and the Decree on Energy Performance of Buildings** The **Bouwbesluit**[1] are the technical building regulations in the Netherlands, laid down in the Building Decree to unify performance. These performance-based regulations are set at the national level and all structures must comply. Performance relates to a range of issues, including energy efficiency.	• New data centre developers are required to deliver ever-increasing standards of performance and are therefore required to price in the associated costs. Given the high energy consumption associated with data centres, these additional investments will make the new data centre a more compelling proposition in the market.

[1] Dutch Building Code http://www.rijksoverheid.nl/#ref-vrom

	Overview of Key Policies	Commercial Implications for the Data Centre Industry
	The Netherlands strengthened standards for newly built houses by 25% in 2011 and by 50% in 2015, compared to the standard in 2007. As of 2017, newly built non-residential buildings have to be 50% more energy efficient compared to the 2007 standard. The energy-neutral building in 2020 is a goal of European Union, expressed through the EPBD and to be implemented over time through The Bouwbesluit by the Dutch government.	• Ever-increasing standards also add risks of older data centres becoming increasingly uncompetitive in the market.
	Tax Incentive: EIA (Energy Investment Allowance) Companies are provided tax reductions in return for investment in energy efficiency and renewable energy. 44% of the investment costs for approved equipment are deductible. An Energy List determines which types of equipment qualify for this programme.	• Data centres should be aware of this legislation and take advantage of the benefits associated with implementing the energy saving technologies on the Energy Investment Allowance approved lists.
	Green Deal The aim of this plan is to stimulate initiatives for energy efficiency and local sustainable energy projects. As part of this Green Deal, the government, working in partnership with the private sector, will facilitate the funding to finance energy-saving initiatives.	• This legislation provides data centre operators with a route to finance and invest in large-scale renewable energy projects. This support can be an attractive opportunity for those data centre operators seeking to deliver innovations in energy performance at appropriate risk and without the requirement for fully funding the project.

	Overview of Key Policies	Commercial Implications for the Data Centre Industry
	Feed-in Tariffs (FITs) The Dutch implemented the FIT in March 2009, but has already scaled back and capped the tariffs significantly. The FIT in the Netherland excludes a deduction of the average electricity price (limiting the benefit when energy prices rise).	• The FIT regime has presented opportunities. However, there have been changes to the tariffs recently and further change cannot be ruled out, despite the innovative approach to providing stable returns by linking it to the fuel price increases. • Data centres should consider the opportunities for renewable energy, but must also consider the particular policy environment at the time prior to making any significant investments.
	BREEAM-NL In September 2009, the council formally approved BREEAM-NL 2010 Version 1.0 for new buildings. This scheme can be used for individual offices, schools, shops, industrial buildings and major renovation projects. On October 1, the scheme was publicly launched. BREEAM-NL are also currently looking at developing a specification specifically for data centres.	• Data centre operators should consider whether a bespoke BREEAM can be secured in order to obtain the reputation benefits associated with this environment performance certification scheme. They should also pay attention to see if anything is released in terms of a data centre specification. • Owners of data centres should, however, consider the market carefully and consider the most appropriate certification system for their client base. A global or US company may, for example, prefer to adopt a LEED-rated building for the purpose of consistency in its global portfolio. In such cases, some developers are adopting both LEED and BREEAM-NL.
Key Italian	**Law on Building Quality ('Legge per il Sistema Casa Qualitá') and**	

	Overview of Key Policies	Commercial Implications for the Data Centre Industry
Policies	**Regional Building Codes** In Italy, planning and building control, environmental matters, and the system of regulation of sustainability aspects of construction are the responsibilities of their 20 regions. Of these, five regions have a particular degree of legislative and financial autonomy. And there are two regions that have their own construction regulations owing to their alpine geography. As at the end of 2010, it has been reported that seven of the 20 regions had implemented laws to transpose the energy labelling requirements of EPBD and another seven had implemented broader 'sustainability' laws. As described above, the methodologies adopted by the various regions differ.	• The regionalisation of the implementation of building regulations means it is necessary for data centre developers to become familiar with the particular requirements of the particular region where a data centre is being developed. • Whilst the regions do have a degree of autonomy, they are tasked with the implementation of the EPBD regulations that continue to drive energy performance improvements through the building regulations.
	Feed-in Tariffs (FITs) The Ministerial Decree of 19 February 2007 introduced a new version of the FIT scheme applied to photovoltaic plants connected to the grid with a nominal capacity higher than 1 kWp. Different tariff regimes apply to projects that are building integrated, partially integrated into buildings and standalone systems.	• The FIT has offered attractive returns, but has experienced significant changes with reductions being made recently. • As such, the current tariffs (if any) at the time of considering renewable energy projects should be investigated thoroughly prior to any investment decisions being made.
	The Italian Green Building Council The Italian Green Building Council (GBC) was the first to implement a tailored version of the US GBC LEED green building rating system in Europe.	• Data centre operators should also be aware of the potential for their clients to demand an environmental performance rating as larger corporate clients are increasingly demanding particular

	Overview of Key Policies	Commercial Implications for the Data Centre Industry
	The GBC Italia version of LEED will reference local standards and codes, include Italian-specific units and outline alternative compliance paths appropriate to the region.	ratings as they select space. The reputation impact of not obtaining certification could be significant.
Key Swiss Policies	**Building Regulations: Mustervorschriften der Kantone im Energiebereich (MuKEn)** Mustervorschriften der Kantone im Energiebereich (MuKEn) are the model building regulations in Switzerland. These regulations are the responsibility of the 26 cantons that make up the federal state of Switzerland. Since 2000, the cantons have been harmonising their building regulations according to Model Cantonal Building Prescriptions (MuKEn). 23 cantons have already adopted the basic MuKEn module into their energy legislation.	• Whilst Switzerland has not been obliged (under the EU EPBD) to deliver ever-tighter building regulations (and carbon neutral development by 2020), it has for many years adopted effective building regulations and demanded high levels of energy performance. • Data centre developers should be aware of the energy performance requirements of the particular canton (region) in which they are developing their property. • As such, developers in Switzerland are required to deliver high standards of performance and are therefore required to price in the associated costs. Given the high energy consumption associated with data centres, this is likely to result in additional capital investment to meet the standard during build. However, benefits should be seen during its operational lifecycle. • Ever-increasing standards also add risks of older data centres becoming increasingly out of touch with the best in the market.

	Overview of Key Policies	Commercial Implications for the Data Centre Industry
	Feed-in Tariffs (FITs) Switzerland introduced the so-called "Cost covering remuneration for feed in to the electricity grid (CRF)" on 1 May 2008. The CRF applies to hydropower (up to 10 megawatts), photovoltaics, wind energy, geothermal energy and biomass and waste material from biomass. The attractive tariffs provided have seen significant demand and large numbers of projects for certain technologies such as PV have been left waiting to be included as a relatively modest cap had been set.	• The FIT has offered attractive returns, leading to significant demand that is likely to leave data centre clients on waiting lists, which could present considerable operational challenges. • Further reductions in the tariff are expected, so operators should review the feasibility of investment at the time of considering renewable energy projects.
	Carbon Tax and Carbon Trading Scheme In 2005, the federal government decided that additional measures were needed to meet its Kyoto Protocol commitments and in 2010, the highest tax rate was tripled from its introductory rate to US $34.20 per tonne CO_2. A proportion of the tax is revenue neutral, with revenues redistributed back to companies being in proportion to the payroll of their employees. Companies can exempt themselves from the tax by participating in a Swiss cap and trade emissions trading scheme where they voluntarily commit to legally binding targets to reduce their CO_2 emissions.	• Data centre operators will need to consider the relative benefits and risks of participation in the carbon trading scheme over the simpler option of simply paying the tax associated with their carbon emissions. • Data centre operators need to consider the overall cost of the operation of their data centres in Switzerland, including the electricity price and cost of carbon once this decision has been made.
	MINERGIE and MINERGIE-P MINERGIE is the Swiss building standard for lower energy consumption at a higher level of comfort. Around 14,000 buildings are already	• Data centre operators should also be aware of the potential for their clients to demand a MINERGIE rating, as larger corporate

	Overview of Key Policies	Commercial Implications for the Data Centre Industry
	certified to this voluntary standard. A MINERGIE building consumes around 60% less energy than a conventional building through, for example: • Compact building form and air tightness • Improved thermal insulation for windows, walls and roof • Use of renewable forms of energy such as solar energy, wood heating, geothermal heat MINERGIE-P reduces the energy consumption by a further 20 to 30% compared with a normal MINERGIE building.	clients are increasingly demanding certification as they select space. • The reputation implications of such certifications can therefore be significant.
Key South African Policies	**South African National Standard (SANS 10400-XA: 2011)** The South African National Standard (SANS 10400-XA: 2011) deals with the application of the National Building Regulations. The Act was amended in September 2011 with the introduction of requirements for energy usage in buildings, which come into effect from 11 November 2011. SANS 10400-XA specifies the requirements for compliance with Part-XA (Energy Usage) of the National Building Regulations and covers space heating, sustainability and energy usage. The policy also drives the adoption of certain technologies. For example, "A minimum of 50% by volume of the annual average hot water heating requirement shall be provided by means other than electrical resistance heating, including, but not limited to solar	• Data centre developers are required to deliver increasing standards of performance in South Africa and are therefore required to price in the associated costs. Given the high energy consumption associated with data centres, this is likely to result in additional capital investment to meet the standard during build. However, benefits should be seen during its operational lifecycle. • The requirement for incorporating specific low carbon heating solutions is indicative of ever-increasing standards in performance demanded by South Africa's building regulations. However, the specific requirement will have little impact on data centres given their demand for hot water is negligible.

	Overview of Key Policies	Commercial Implications for the Data Centre Industry
	heating."	
	Taxation Laws Amendment Bill, 2009 The National Treasury released a discussion document for public comment in December 2010 entitled "Reducing Greenhouse Gas Emissions, the Carbon Tax Option." The paper considers different types of tax, including an emissions tax, an excise tax and a sales tax on the outputs of energy intensive sectors.	• Whilst South Africa does not include a tax on carbon as yet, there is the potential for such a tax to come into effect as South Africa continues to work towards greater security of energy supply. • Data centres should therefore consider the risk of potential increases in costs associated not only with on-going fuel price increases, but also the potential for taxes to be levied on carbon in the future.
	South Africa Renewable Energy Feed-in Tariff (REFIT) Renewable Energy Feed-in Tariff (REFIT) was announced in 2009 with the aim of producing 10 TWh of electricity per year by 2013. The selection of projects will be on the basis of a competitive bid process and will include the following technologies: • Landfill gas power plant • Small hydro power plant (less than 10MW) • Wind power plant • Concentrating Solar Power (CSP) plant	• South Africa has taken an innovative approach to Feed-in Tariffs, including a bidding process to determine the qualifying price. This aims to avoid the challenges seen in many European FITs where over-attractive prices resulted in significant demand and lower value for money being secured. • Data centre operators should consider carefully the potential opportunities for investment and understand the market context prior to investment. Options for partnership with renewable energy developers could also be explored to manage the risk associated

	Overview of Key Policies	Commercial Implications for the Data Centre Industry
		with the bidding process in South Africa.
Key Russian Energy Policy	**Building Regulations (2009 Energy Efficiency Legislation)** The Law on Energy Efficiency was adopted in 2009 and adopted by the government of the Russian Federation in January 2011. At the federal level, a number of relevant building codes are in force. These are made up of two types of documents: • SNiP (*Stroitelnye Normy i Pravila*, or Construction Codes and Regulations) contain prescriptive and performance requirements • GOST (*Gosudarstvennye Standart*, or State standard) provide protocols for measuring and reporting performance Regional codes are mandatory for all Russian and foreign entities involved with construction in the given region, even in isolated cases where federal codes do not apply. They may be consistent with federal codes or may be more stringent. Regional codes also contain detailed climate parameters not contained in the federal code.	• Data centre developers are required to deliver increasing standards of performance in Russia and are therefore required to price in the associated costs. Given the high energy consumption associated with data centres, this is likely to result in additional capital investment to meet the standard during build. However, benefit should be seen during its operational lifecycle. As new data centres are developed to higher energy performance standards, the risk of obsolescence of older existing properties could increase.
	Energy Passports The federal SNiP and regional codes require the completion of an "Energy Passport" for the building, a document that verifies energy performance in design, construction, and operation.	• Energy Passports provide the mandatory verification of energy performance of a data centre and will support the increasing

	Overview of Key Policies	Commercial Implications for the Data Centre Industry
	Energy Passports give potential buyers and tenants information on what they can expect regarding the building's energy efficiency and real costs, helping to stimulate market preferences for high-performance buildings (as with an EPC).	awareness and importance occupiers attach to energy performance in Russia.
	Green Standard In 2010, the first Russian certification for real estate – "the Green Standard" – was launched, based upon the LEED certification system. 2010 also saw the first properties secure LEED and BREEAM ratings.	• Although the LEED standard only assesses the building shell of a data centre, operators should consider the potential for adopting the Green Standard to secure reputation benefits of certification as occupiers increasingly demand this, in particular from new properties. • Owners of data centres should consider the most appropriate certification system for their client base. A global or US company may, for example, prefer to adopt a LEED-rated building for the purpose of consistency in its global portfolio. The "Green Standard" provides an attractive option as it is based upon the LEED standard.
Key UAE Energy Policy	**Permits FOR Development and Local plans** The policy agenda and nature of development is such that planning and permits for development are geographic (and on larger projects, project-specific). Bodies involved in UAE's permitting process include	• Sustainable energy development is project-specific and not driven through strict building codes or planning policy. Rather, the authorities drive sustainable energy development through specific

	Overview of Key Policies	Commercial Implications for the Data Centre Industry
	the municipality, road and transport authorities and water and electricity departments. Developers must also be aware of local plans such as Plan Abu Dhabi 2030.	initiatives, like the significant Masdar City programme. Data centre developers should therefore consider the range of stakeholders and the context in which they are developing to understand the specific requirements for the project.
	Estidama Pearl Building Rating System (required in some areas, otherwise voluntary) The Estidama Pearl Building Rating Scheme is a certification scheme tailored to the Middle East and implemented by the UPC (Abu Dhabi Urban Planning Council). The Pearl Building Rating System applies to: • All new, permanent buildings that require a building permit • Property incorporating air conditioning • Properties in which peak electrical loads exceed 15kW Abu Dhabi Urban Planning Council demands that all new buildings must meet the 1 Pearl requirements starting in September 2010, whilst all government funded buildings must achieve minimum 2 Pearls.	• Data centre developers should be aware of the potential for planning policy to require the Pearl Building Rating and consider the cost associated with securing it, in particular in Abu Dhabi. • Data centre operators should also be aware of the potential for their clients to demand certification, as larger corporate clients are increasingly demanding such certifications. The reputation benefit associated with certification can, therefore, be significant.
Saudi Arabia	**Saudi Building Code (SBC)** The Saudi Building Code Energy Conservation Requirements ("Saudi Building Code 601") was based on the *International Energy*	• Saudi building regulations are based on International Codes and, as such, data centre developers should expect high levels of energy

	Overview of Key Policies	Commercial Implications for the Data Centre Industry
	Conservation Code (IECC). The development process prescribed in the Building Code covers the building envelope, mechanical systems, water heating, power and lighting and the total building performance. The 2003 and 2006 International Codes (I-Codes) were used to form the basis for a new Saudi Building Code set for implementation later this year.	performance requirements now and in the future.
	Mandatory Energy Efficiency Labelling Saudi Arabia's energy labelling program covers all products being sold in Saudi Arabia, including air conditioning systems, heat pumps and air-to-air heat pumps.	• The impact of the legislation will affect suppliers of building services solutions rather than the data centre industry. However, awareness of this legislation is important when designing and specifying solutions in Saudi Arabia.
Qatar	**Law on the Conservation of Water and Energy** In January 2010, KAHRAMAA announced their intention to enforce a new law on the conservation of water and energy. This law requires the installation of water and electricity meters in all new buildings and the improvement of the minimum standards for insulation in buildings.	• Data centre operators should be aware of the requirement to install energy and water meters and meet minimum standards for insulation. The impact for data centres is likely to be insignificant, however, as the requirement is not very onerous in the context of data centre development.
	QSAS Building Certification QSAS provides a set of performance-based standards that addresses the specific regional needs and environment of Qatar, with the aim of creating a sustainable built environment that minimises ecological	• Data centre operators should consider the potential for adopting the Green Standard to secure reputation benefits of certification, as occupiers increasingly demand this from new properties. • Owners of data centres should consider the most appropriate

	Overview of Key Policies	Commercial Implications for the Data Centre Industry
	impact.	certification system for their client base. A global or US company may, for example, prefer to adopt a LEED-rated building for the purpose of consistency in its global portfolio. The "Green Standard" provides an attractive option as it is based upon the LEED standard.

2.3. Summary of Policies Driving the Financial Cost of Energy and Carbon

Data centre investors and occupiers must consider the current and future costs associated with energy consumption and, hence, carbon emissions, as developments of policy are likely to have significant implications, as the following table and examples of policy indicates. Included are carbon and related taxes that have since been scrapped as well as those proposed, given an indication of the likelihood of their future introduction.

	Direct Costs	Indirect Costs
UK	• CCL (link to price) • CRC EES (further information, prices currently set by budget)	• EU ETS (see www.pointcarbon.com for current prices) • Renewables Obligation (see OFGEM for information on the RO)
France	• Carbon Tax (Scrapped)	• EU ETS (see www.pointcarbon.com for current prices)
Germany		• EU ETS (see www.pointcarbon.com for current prices)
Spain		• EU ETS (see www.pointcarbon.com for current prices)
Netherlands	• Flight tax (launched in 2008, scrapped in 2009)	• EU ETS (see www.pointcarbon.com for current prices)
Italy	• Carbon tax on certain fuels introduced with proposed escalators over 5 years. Increases have been halted.	• EU ETS (see www.pointcarbon.com for current prices)
Switzerland	• Carbon tax (can opt out by joining a carbon trading scheme) (link to Swiss Energy)	
South Africa	• Consideration is being given to the introduction of a carbon tax (it is not certain it is to be direct)	• South Africa provided the fifth largest subsidies for electricity in 2005, in essence reducing the cost of electricity indirectly
Russia		• Russia provided the world's largest subsidies for electricity in 2005 (in essence reducing the cost indirectly)
UAE		
Saudi Arabia		• Saudi Arabia provided the world's third largest subsidies for electricity in 2005 but is scaling this back (increasing costs indirectly)
Qatar		

Sources for 2005 subsidies for South Africa, Russia and Saudi Arabia: "Reforming Energy Subsidies", United Nations Environment Programme Division of Technology, Industry and Economics

2.4. Table Summarising the Commercial Implications for Data Centre Industry, by Country

- Policies with most significant impacts within each group (cell within the table) are highlighted in bold
- For Regulatory Obligations and Financial Costs: red indicates a high cost/operational impact, orange indicates a moderate impact
- For Voluntary Mechanisms and Financial Incentives: green (dark) indicates a high financial / reputation incentive, green (light) indicates a moderate impact
- For Summary of Commercial Impact: blue indicates the overall commercial level impact

	Build ←			Operate →	
	Regulatory Obligations	Voluntary Mechanisms	Financial Incentives	Financial Cost (Carbon & Energy)	Summary of Commercial Impact
United Kingdom	**High**	**High**	**High**	**High**	**High**
France	**High**	**High**	**High**	**Low**	**High-Med**
Germany	**High**	**Moderate**	**High**	**Low**	**High-Med**
Spain	**High**	**High**	**High**	**Low**	**High-Med**
Netherlands	**High**	**Moderate**	**High**	**Moderate**	**High-Med**
Italy	**High**	**High**	**High**	**Low**	**High-Med**
Switzerland	**High**	**High**	**High**	**Moderate**	**High**
South Africa	**Moderate**	**Moderate**	**High**	**Low**	**Moderate**
UAE	**Moderate**	**Low**	**Moderate**	**Low**	**Med Low**
Russia	**High**	**High**	**Moderate**	**Low**	**Moderate**
Saudi Arabia	**Moderate**	**Low**	**Low**	**Low**	**Low**
Qatar	**Moderate**	**Low**	**Low**	**Low**	**Low**

SECTION 3:

ENERGY POLICY

BY COUNTRY

3 EU and International Energy Policy

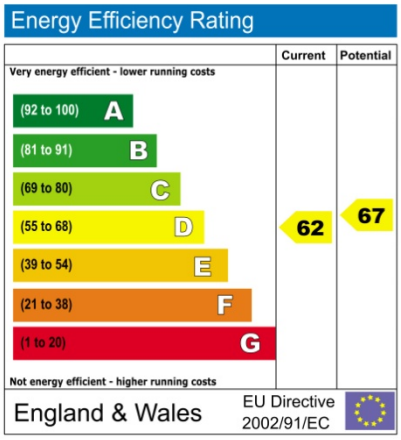
3.1. EU Policies

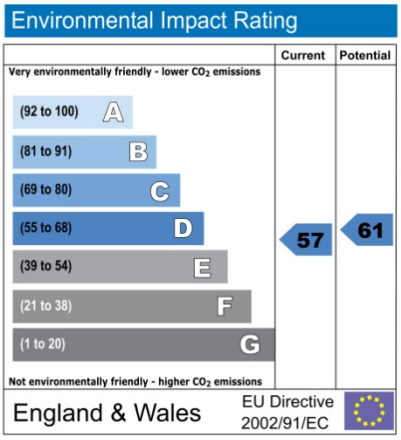
3.1.1. Energy Performance of Buildings Directive (2002/91/EC)

At the EU level, the Energy Performance of Buildings Directive (2002/91/EC, also known as the EPBD) introduced several legal requirements for non-domestic buildings regarding energy efficiency.

Since December 2006, an energy performance certificate (EPC) that shows a building's theoretical energy efficiency must have been issued at the point of a building's completion, sale or lease (example below). The certificate is usually valid for 10 years and must be generated by an accredited assessor.

Each of the EU member states are required to implement these policies in a means that is most appropriate to their local conditions.





3.1.2. Revisions to the Energy Performance of Buildings Directive

On 19 May 2010, the European Parliament and the Council of the European Union adopted a recast of the Energy Performance of Buildings Directive in order to strengthen the energy performance requirements and to clarify and streamline some of the provisions from the 2002 Directive it replaces:

- As of 31 December 2020, new buildings in the EU will have to consume "nearly zero" energy and the energy will be "to a very large extent" from renewable sources.

- Public authorities that own or occupy a new building should set an example by building, buying or renting such “nearly zero energy building” as of 31 December 2018.
- The definition of very low-energy building was agreed to: "Nearly zero energy building means a building that has a very high energy performance, determined in accordance with Annex I. The nearly zero or very low amount of energy required should to a very significant level be covered by energy from renewable source, including renewable energy produced on-site or nearby."
- No specific target has been set for the renovation of existing building, but Member States shall following the leading example of the public sector by developing policies and take measures such as targets in order to stimulate the transformation of buildings that are refurbished into very low-energy buildings, and inform the Commission thereof in their national plans.

3.1.3. The Energy Labelling Directive (92/75/EEC)

EU legislation is evolving in terms of energy labels for IT and electronic appliances. The Energy Labelling Directive requires that appliances be labelled to show their power consumption in such a manner that it is possible to compare the efficiency with that of other makes and models. The intention is that consumers will prefer more energy efficient appliances to those with a higher consumption, resulting in less efficient products eventually being withdrawn or decommissioned.

The Energy Labelling Directive (92/75/EEC) has proved to be very effective for household appliances and the EC is proposing to extend the scope to include both energy-using products and those in the commercial sectors.

3.1.4. EU Ecolabel / Flower

Established in 1992, the European Ecolabel is the only European ecolabel officially used in all member countries of the European Union. It is issued in France by AFNOR Certification, an independent certification body.

The EU Ecolabel Flower labelling is a voluntary system designed to encourage businesses to market products and services that are kinder to the environment.[2] To date the Ecolabel Flower only covers computers, lighting, washing machines, and refrigerators.

The ecolabel is based on the consideration of the whole life cycle of the product from the extraction of raw materials, manufacturing, distribution and use to recycling or disposal after use. The quality and use are also taken into account. These criteria support the increased use of cleaner products that reduce environmental impacts throughout their life cycle.

3.1.5. The EC Code of Conduct on Data Centre Energy Efficiency

The European Commission's voluntary Code of Conduct on Data Centre Energy Efficiency[3] was launched in November 2008, following input from the data centre industry, to provide education and guidance for stakeholders. It is European focused and the "aim is to inform and stimulate data centre operators to reduce energy consumption in a cost effective manner without hampering the critical function…"[4] The European Commission Code of Conduct on Data Centre Energy Efficiency is often referred to as the European Union Code of conduct or EU CoC.

The main guide is supported by a Technical Guide[5] that provides essential and technical advice related to energy-efficient design, specification, technologies and management of data centres. The Code responds to an earlier European Commission recommendation "to inform relevant organisations about energy consumption by IT and to stimulate its reduction by spreading awareness of energy-efficient best practices."

---

[2] EU Ecolabel http://ec.europa.eu/environment/ecolabel/

[3] EU CoC Voluntary Code, Guide Version 1 (30th October 2008) http://re.jrc.ec.europa.eu/energyefficiency/html/standby_initiative_data%20centers.htm

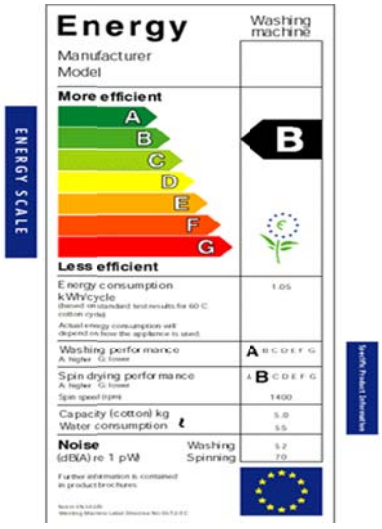
[4] Paolo Bertoldi, European Commission DG JRC presentation in London (November 2008) http://re.jrc.ec.europa.eu/energyefficiency/pdf/Meeting%20CoC%20DC%2019112008/Paolo%20Bertoldi-EC%20JRC.pdf

[5] EU CoC Best Practice Guide (October 2008) http://re.jrc.ec.europa.eu/energyefficiency/pdf/CoC%20data%20centres%20nov2008/Best%20Practices%20v1.0.0%20-%20Release.pdf

There are indications that, following the UK government's launch of the Cabinet Office "Greening Government ICT"[6] strategy in spring 2009, the UK government is seeking to mandate the adoption of the EU COC in central government and public-sector procurement policy. If this is the approach adopted in the UK, it may well be the case that other European governments follow suit by adopting the EU CoC.
There is an annual update and, when organisations are accepted as participants by following the code of conduct's best practices detailed, the credit is awarded for a three-year period.

The following provides a link to the Code of Conduct:
EC DG Joint Research Council Code of Conduct on Data Centre Energy Efficiency

3.1.6. The Energy Labelling Directive (92/75/EEC)



EU legislation is evolving in terms of energy labels for IT and electronic appliances. The Energy Labelling Directive (92/75/EEC) has proved to be very effective for household appliances and the EC is proposing to extend the scope to include both energy-using products and those in the commercial sectors.

3.1.7. Eco-Design Directive for Energy-Using Products (2005/32/EC)

The Eco-Design Directive for Energy-Using Products (2005/32/EC) established a framework under which manufacturers of energy-using products are obliged, at the design stage, to reduce the energy consumption and other negative environmental impacts occurring throughout the product's life cycle. This directive currently requires domestic and some industrial energy-using products (EUPs)[7] to conform to energy consumption requirements before they can be sold in the EU.

On 21 October 2008, the EC adopted a working plan for 2009-2011, setting out an indicative list of priority EUP groups, including air conditioning and ventilation systems, network, data processing, and data storage equipment, transformers and water-using equipment.

---

[6] Cabinet Office Greening Government ICT website
http://www.cabinetoffice.gov.uk/cio/greening_government_ict.aspx

[7] EUPs are products that use, generate, transfer or measure energy (such as electricity and gas), including consumer goods and industrial products such as transformers, industrial fans and industrial furnaces.

3.1.8. Expansion to the Eco-Design Directive

On 16 July 2008, the European Commission proposed a recast of the Eco-Design Directive to amend the directive's scope in order to extend it from EUPs to include energy-related products (ERPs), which it described as "any good having an impact on energy consumption during use."[8]

Implications of Revisions to the Eco-Design Directive

The EC's desire to extend the scope to all energy-related products in the industrial and commercial sectors follows the domestic appliance success story. Key implications include:

- Financial impacts for product designers and manufacturers as the minimum standards increase.
- A small risk for those product suppliers who invest ahead of legislation, although that does encourage innovation through research and development.
- Financial impacts for customers who inherit additional purchase costs, although these should be offset by the energy savings realised during product use.

3.1.9. Certain Fluorinated Greenhouse Gases (EC Regulation 842/2006)

A number of ozone-depleting substances that were used in the manufacture of cooling equipment are now banned in most instances under this directive, known as the F Gas Regulation. These substances, often referred to as F gases, include:

- Chlorofluorocarbons (CFCs)
- Hydrochlorofluorocarbons (HCFCs)
- Halons[9]

Clearly, most stand-alone data centres were built after 2000. However, older data centres with air conditioning systems installed in 1999 or before may rely on these substances to operate.

---

[8] EUROPA http://ec.europa.eu/enterprise/environment/sip/sip_a2_ecodesign_en.htm

[9] Department for Local Government & Communities "Improving the energy efficiency of our buildings A guide to air-conditioning inspections for buildings" (July 2008) http://www.communities.gov.uk/publications/planningandbuilding/airconditioning

In the UK, there will be a ban on the use of virgin HCFCs for the maintenance and servicing of refrigeration and air conditioning systems from 1 January 2010 and a ban on the use of all HCFCs from 1 January 2015.[10] In practice, this means that the gases will need to be replaced with less-harmful alternatives or, potentially, that equipment will need to be upgraded and/or replaced.

Article 3 of the Fluorinated Greenhouse Gases Regulation also requires operators to use all available measures—those that are technically feasible and that do not entail disproportionate cost—to prevent leakage of F gases and to repair any detected leakage (as soon as possible) from the following applications: refrigeration, air conditioning, and heat pump equipment (including their circuits) and fire protection systems.[11]

Implications of the Fluorinated Greenhouse Gases Regulation

There are potential operational and financial risks for older data centres operating with air conditioning plants that use F gases that need to be maintained, topped up, and potentially replaced.

3.1.10. EU GHG Emission Trading Scheme (Directive 2003/87/EC)

In January 2005, the European Union Greenhouse Gas Emission Trading Scheme (EU ETS) commenced operation as the largest multi-sector greenhouse gas emission trading Scheme.[12]

The EU ETS covers large combustion installations (larger than 20 MW thermal) within EU member states. Sectors covered by the system include power generation, cement, glass, ceramics, the steel industry and so forth, with the aviation industry included from 2013.

Operators of installations that are covered by the EU ETS are obliged to monitor and report emissions of greenhouse gases from that installation and to surrender allowances equivalent to those GHG emissions. The EU ETS has evolved and is now in its second phase of operation, which runs to 2013. It is also now a regional scheme, which operates under the Kyoto Protocol worldwide umbrella of GHG trading schemes.

[10] NETREGS http://www.wastedirectory.org.uk/

[11] Fluorinated Greenhouse Gases Regulation text http://members.wto.org/crnattachments/2008/tbt/EEC/08_0033_00_e.pdf

[12] Europa http://ec.europa.eu/environment/climat/emission/index_en.htm

Whilst the ICT and data centre sectors are not included in the scheme, there is an indirect impact of EU ETS on data centres as the permits purchased by utility providers are passed through as an indirect cost through to energy consumers and, therefore, data centres.

The European Environmental Protection Agency[13] details how the scheme currently works.

Implications of the EU ETS

To date, the ICT and data centre sectors have not been included in the EU ETS and no literature or anecdotal evidence has been found to indicate that a change may be considered.
However, given that it is estimated that the ICT sector is responsible for around 2% of global CO2 emissions—approximately the same as the airline industry—the wider industry would be wise to keep an eye on this scheme.

In addition, the EU ETS presents, in effect, an indirect cost to data centres as electricity suppliers pass on the cost of their participation in the scheme.

[13] European Environmental Protection Agency http://www.epa.ie/downloads/pubs/air/etu/

3.1.11. The Green Digital Charter

The Green Digital Charter is a voluntary scheme in which cities may participate. These cities have committed to:

- Deploy five large-scale pilots by 2015
- Decrease ICT's direct carbon emissions by 30% by 2020
- Create a partnership between cities on ICT and carbon reduction

The scheme was launched at the end of 2009 and has so far attracted 24 participating cities, including:

- Amsterdam
- Belfast
- Birmingham
- Bologna
- Bristol
- Ghent
- Genoa
- The Hague
- Helsinki
- Lisbon
- Malaga
- Malmo
- Manchester
- Murcia
- Nantes Métropole
- Nice Cote d'Azur
- Nuremberg
- Reykjavik,
- Rijeka
- Tallinn
- Stockholm
- Vienna
- Zagreb
- Zaragoza

3.2. EU Standards Providers

CEN, CENELEC and ETSI, as well as other standardisation organisations, have identified energy efficiency as a key area for standardisation. ETSI is currently focusing on Green Agenda activities in three areas: (i) technical standardisation activities, (ii) electronic working tools and (iii) promotion and identification of requirements via Green Agenda seminars.

The ETSI liaises with other standards organisations on two main topics: (i) energy efficiency in relation to the architectural aspects of broadband deployment, and (ii) environmental issues, including measurement methods, definition of power consumption targets, thermal management and powering architecture and supervision.

CEN has developed standards for energy management systems, such as EN 16001, at a corporate management level and is involved in standardisation to support energy efficiency in the data centre sector. See the following links for detailed information on each of these standards developing organisations:

- www.cenelec.eu
- http://www.cen.eu
- www.etsi.org

3.2.1. ETSI

ETSI is a key international standards-developing organisation for Information and Communication Technologies (ICT).

Founded initially to serve European needs, ETSI has become highly respected as a producer of technical standards for worldwide use, providing the following services:

- Technical specifications and standards with global application
- Support to industry and European regulation
- Specification & testing methodologies
- Interoperability testing

3.2.2. CEN

The European Committee for Standardization (CEN) develops European Standards and other products covering a vast range of subjects.
The European Standard (EN) is the major deliverable of CEN. An EN must be implemented by all CEN National Standardization Bodies, who must withdraw any conflicting national standards.

Besides ENs, CEN produces other reference documents, which can be developed quickly and easily, with a different objective. These include the Draft European Standard (prEN), a CEN Workshop Agreement (CWA) that is often used in fast-evolving technologies and the creation of new markets, a Technical Specification (TS) and a Technical Report (TR).

3.2.3. CENELEC

CENELEC is currently analysing the role of standardisation to support efficient energy use in data centres. So far, standardisation needs have been identified in the following specific areas:

- The definition of energy efficiency parameters
- The algorithms using those parameters to create Key Performance Indicators
- Parameter measurement
- Energy-efficient infrastructures capable of delivering energy-efficient solutions

European Standards (ENs) are based on a consensus, which reflects the economic and social interests of 31 CENELEC Member countries channelled through their National Electro-technical Committees (NCs). Most standards are initiated by industry. Other standardisation projects can come from consumers, small and medium-sized enterprises or associations or even European legislators.

Besides European Standards, CENELEC produces other reference documents, which can be developed quickly and easily: Technical Specifications, Technical Reports and Workshop Agreements.

Standards are driven by business and drafted by technical experts in the field. In building European consensus, industry, trade federations, public authorities, academia and NGO representatives are invited to contribute to the standardisation process. It is this open participation that accounts for the strength of European standardisation.

3.3. Links to EU Policy

3.3.1. Links to Energy Policy in the EU

Directive 98/11/EC	Implementing Council Directive 92/75/EEC with regard to energy labelling of household lamps
Regulation 106/2008	On a community energy-efficiency labelling program for office equipment
Directive 2003/66/EC	Implementing Council Directive 92/75/EEC with regard to energy labelling of household electric refrigerators, freezers and their combinations
Directive 2010/30/EU	Labelling and product information of energy consumption by energy-related products
	Energy Networks
Communication 677/4	Energy infrastructure priorities for 2020 and beyond - A blueprint for an integrated European energy network
Regulation 1775/2005	On conditions for access to the natural gas transmission networks
Directive 2005/89/EC	Concerning measures to safeguard security of electricity supply and infrastructure investment
	Energy Efficiency / Renewables
Communication 639	Energy 2020 - A strategy for competitive, sustainable and secure energy
Communication 5174	National RE Action Plans under Directive 2009/28/EC of the European Parliament and of the Council
Directive 2009/28/EC	On the promotion of the use of energy from renewable sources
Communication 105	Green paper - A European Strategy for Sustainable, Competitive and Secure Energy
Communication 105	Green paper Annex - What is at stake, a background document

(Annex)	
Communication 30	20 20 by 2020 Europe's climate change opportunity
Communication 6817	Establishing harmonised efficiency reference values for separate production of electricity and heat
Directive 2004/8/EC	On the promotion of cogeneration based on a useful heat demand in the internal energy market
Directive 2005/32/EC	A framework for the setting of eco-design requirements for energy-using products
Directive 2006/32/EC	On energy end-use efficiency and energy services
	Energy Efficiency in Buildings
Directive 2002/91/EC	On the energy performance of buildings
Directive 2010/10/EU	On the energy performance of buildings (2002/91/EC follow-up)
	Fossil Fuels
Directive 2006/67/EC	Imposing an obligation on Member States to maintain minimum stocks of crude oil and/or petroleum products
Directive 2003/55/EC	Concerning common rules for the internal market in natural gas
Directive 2004/67/EC	Concerning measures to safeguard security of natural gas supply
Regulation 405/2003	Concerning community monitoring of imports of hard coal originating in third countries
	Competition
Regalation 1228/2003	On conditions for access to the network for cross-border exchanges in electricity
Communication 192	Progress in creating the internal gas and electricity market

Source: http://www.energy.eu/

3.3.2. Feed-in Tariffs (FITs) in the EU

The following table provides an **indicative** summary of Feed-in Tariffs (FITs) across the world. It should be noted that the prices provided may be for particular scales of technology and the extent to which funding is available may be limited. FITs are also undergoing considerable changes in many countries:

Member state	Wind power 'On-shore'	Wind power 'Off-shore'	Solar PV	Biomass	Hydro
Austria	0.073	0.073	0.29 - 0.46	0.06 -0.16	n/a
Belgium	n/a	n/a	n/a	n/a	n/a
Bulgaria	0.07 - 0.09	0.07 - 0.09	0.34 - 0.38	0.08 - 0.10	0.045
Cyprus	0.166	0.166	0.34	0.135	n/a
Czech Republic	0.108	0.108	0.455	0.077 - 0.103	0.081
Denmark	0.035	n/a	n/a	0.039	n/a
Estonia	0.051	0.051	0.051	0.051	0.051
Finland	n/a	n/a	n/a	n/a	n/a
France	0.082	0.31 - 0.58	n/a	0.125	0.06
Germany	0.05 - 0.09	0.13 - 0.15	0.29 - 0.55	0.08 - 0.12	0.04 - 0.13
Greece	0.07 - 0.09	0.07 - 0.09	0.55	0.07 - 0.08	0.07 - 0.08
Hungary	n/a	n/a	0.097	n/a	0.029 - 0.052
Ireland	0.059	0.059	n/a	0.072	0.072
Italy	0.3	0.3	0.36 - 0.44	0.2 - 0.3	0.22
Latvia	0.11	0.11	n/a	n/a	n/a
Lithuania	0.10	0.10	n/a	0.08	0.07
Luxembourg	0.08 - 0.10	0.08 - 0.10	0.28 - 0.56	0.103 - 0.128	0.079 - 0.103
Malta	n/a	n/a	n/a	n/a	n/a
Netherlands	0.118	0.186	0.459 - 0.583	0.115 - 0.177	0.073 - 0.125
Poland	n/a	n/a	n/a	0.038	n/a

Portugal	0.074	0.074	0.31 - 0.45	0.1 - 0.11	0.075
Romania	n/a	n/a	n/a	n/a	n/a
Slovakia	0.05- 0.09	0.05- 0.09	0.27	0.072 - 0.10	0.066 - 0.10
Slovenia	0.087 - 0.094	0.087 - 0.095	0.267 - 0.414	0.074 - 0.224	0.077 - 0.105
Spain	0.073	0.073	0.32 - 0.34	0.107 - 0.158	0.077
Sweden	n/a	n/a	n/a	n/a	n/a
United Kingdom	0.31	n/a	0.42	0.12	0.23

http://www.energy.eu/

3.4. International Policies

3.4.1. ISO 50001 and ISO 14001

ISO 50001 is a standard developed by the International Organisation for Standardisation, focused specifically on operational energy management within property generally.

ISO 50001:2011 specifies requirements for effective energy management, focusing on the following areas:

- Enabling organisations to follow a systematic approach to achieving continuous improvement through establishing, implementing, maintaining and improving an energy management system
- Specifies requirements for measurement, documentation and reporting
- Details design and procurement practices for equipment, systems and personnel

The standard has been designed to be used independently, but it can be integrated with other management systems such as ISO 14001 and ISO 9001.

ISO 50001 is applicable to any organisation wishing to ensure that it conforms to its stated energy policy and wishing to demonstrate this to others. Data centres can either benefit from adoption of the management system by means of self-evaluation and self-declaration of conformity or by certification by an external organisation for greater credibility.

ISO 14001 provides a similar management system However, it covers the range of environmental management issues rather than having a focus on energy management alone.

3.4.2. ITU Sustainable ICT Specification

The data centre (and ICT more broadly) is expected by a range of stakeholders to report on environmental performance, but lacks agreed upon standardised methodologies for doing so.

The ITU Sustainable ICT Specification aims to provide a standardised checklist of sustainability requirements specific to the ICT sector, with agreed upon sustainability characteristics to allow for a more objective view of performance to be formed. The key indicators of performance include:

- Sustainable Buildings and how ICT companies operate physical plant

- Sustainable Products and how companies design, manufacture and manage products throughout the lifecycle (including end of life)
- Sustainable Services and how ICT companies design and deliver services

Technical guidance is provided on environmentally conscious design, maintenance, repair and operating principles and best practices, with the standard covering four main areas:

- Design and Build Specifications
- Building Maintenance, Repair and Operations
- Building Improvement and Renovation
- Technical Buildings and Outside Plant
- Focus is on collecting information on existing standards and examples of best practice

3.4.3. LEED

An important environmentally focused assessment scheme and awards/label available for commercial buildings is the US Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) rating system for commercial buildings.

It provides assessment criteria for specific stages of construction, and covers new construction, core and shell construction and existing buildings.[14]

In 2007, Digital Realty Trust completed the world's first LEED Gold data centre in the United States. In Europe, the first LEED-certified data centre was Citibank's Frankfurt data centre, which gained the LEED Platinum rating in 2008.[15]

3.4.4. Monitoring, Measuring & Reporting Performance

One challenge for many industries is the practice of monitoring, measuring and reporting environmental performance. This has been acknowledged by a number of organisations interested in this area, from IPD,[16]

---

[14] US Green Building Council LEED Rating Systems http://www.usgbc.org/DisplayPage.aspx?CMSPageID=222

[15] "Citi: Delivering the World's First Green Data Centre" article in CB Richard Ellis *ViewPoint, European Data Centres* Q4 2008

[16] Environnent Code www.ipdoccupiers.com/environmentcode

which launched a standard for measuring property environmental performance in 2008, to The Green Grid, through its development of the Power Usage Effectiveness metric.

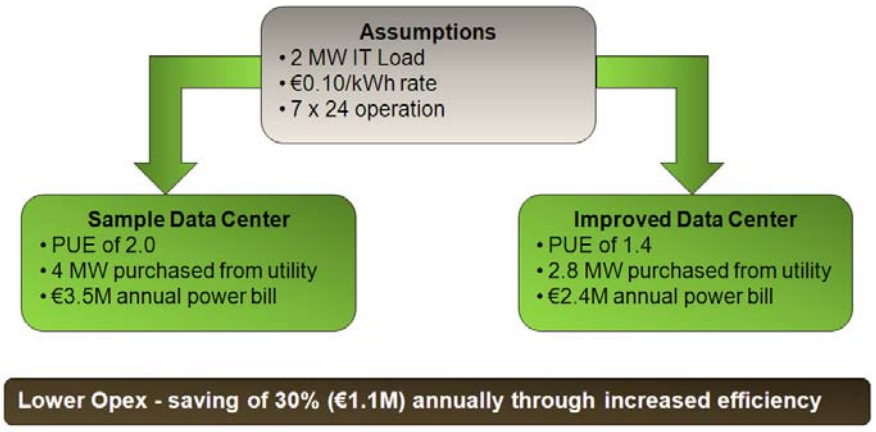
To support monitoring, there are computerized metering systems for buildings, called building management systems (BMS), which provide automatic feedback every 30 minutes (often called "Half Hourly Metering" or HHM meters). It is the meter-reading data that enables organisations to calculate/measure their total and relative energy performance.

The Green Grid has responded to the measurement gap by working with the data centre industry to create performance metrics such as the Power Usage Effectiveness (PUE) ratio[17] for data centre IT/server appliances, which is calculated for a data centre running at full capacity. PUE is defined as:

$$PUE = \frac{\text{Total Facility Power or}}{\text{IT Equipment Power or Energy}}$$

As the following diagram shows, a sample data centre applying the PUE metric before and after employing energy efficiency measures and management was able to reduce its PUE from 2.0 to 1.4 and achieve significant financial savings.

[17] The Green Grid Data Center Power Efficiency Metrics: PUE and DCiE, www.thegreengrid.com/en/Global/Content/white-papers/The-Green-Grid-Data-Center-Power-Efficiency-Metrics-PUE-and-DCiE



Those interviewed pointed out that the PUE is a very useful measurement for a specific data centre, enabling its operators to benchmark changes in energy performance, but that it is not suitable for benchmarking data centres against each other, especially those in different climates. PUE has, since being released in 2007, gone through development at a global level (including data centre organizations such as Uptime Institute, ASHRAE, 7x24, Silicon Valley Leadership Group, US Green Building Council and US, EU & Japanese governments) to standardise the method of measuring and reporting PUE. The recommendations below get the industry closer to benchmarking across different data centres.

PUE Level 2 Yearly Continuous	PUE_{L2YC}
Unit of Measure	Energy
Frequency of Measurement	Continuous
Averaging Period of Measurement	Annually
Data Center location of Measurement	Utility(ies) Hand-off
Information Technology Location of Measurement	PDU Output

Complementing The Green Grid's work is the EC Code of Conduct (CoC), which is concerned both with the efficiency of the data centre as a whole and with its appliances. Therefore, it provides a "facility efficiency rating" and an "asset efficiency rating." In terms of reporting, the EU CoC also advocates periodic reporting of performance against these metrics.

To help measure server energy efficiency, Dell, AMD, Intel and several other manufacturers have joined with the non-profit Standard Performance Evaluation Corporation (SPEC)[18] to develop power-performance benchmarks.

The UK CRC is another mechanism requiring performance reporting, this time at the organizational level, for total energy consumption and relative CO2 emissions. The results of this reporting will be publicly available and disclosed annually via the performance league table.

Recently, there have been significant releases of Data Centre Infrastructure Management (DCIM) solutions that promote measuring, monitoring and reporting in the data centre in order to make improvements.

The Green Grid, in March 2011, released the Data Center Maturity Model (DCMM), a tool that allows users to benchmark the energy efficiency and environmental sustainability of their data centres and IT today and into the future. The model outlines current best practices and the future roadmap for energy efficiency and environmental sustainability across the data centre: power, cooling, compute, storage and network. An assessment tool is currently being created. Its release -- likely in early 2012 -- will allow users to benchmark their assessment results against others. Parameters for benchmarking will include comparing your results against other in the same country, industry and type of data centre.

Implications

With increasing attention on monitoring, measuring and reporting on the energy performance of assets and equipment, the implications for the data centre industry may include:

- Initial moderate demands on facility and data centre managers, including a small resource requirement once monitoring, measuring and reporting is established, with the added advantage of being able to track changes over time and show others how certain actions have affected consumption.

---

[18] *Premises & Facilities Management*, "How to reduce data centre energy consumption, environmental impact and power costs" http://www.fmlink.com/ProfResources/Magazines/article.cgi?Premises%20%26%20Facilities%20Management:pfm101508-6.html

- Moderate changes to energy management and financial procedures for UK CRC participants.
- Small demands on company time and resources through representation of industry working groups to inform the adoption and refinement of metrics and approaches to benchmarking energy performance.

3.4.5. Energy Star

Another energy label being used is the voluntary **Energy Star** label, which is awarded to qualifying energy-efficient electronic equipment. The EU recently signed an agreement to use the US Energy Star database in Europe.[19] Since May 2009, this database has included Tier 1 servers in "idle mode," with Tier 2 due to be included in October 2010.[20] Tier 1 currently excludes blade servers and chassis, systems with greater than four sockets and others.

The U.S. Environmental Protection Agency (EPA) intends to investigate future specifications for storage and networking equipment.
In addition, Energy Star is currently collecting energy data from data centres to inform a future "Energy Star for Data Centers" label. A specification for enterprise storage, UPS is currently being developed. In 2012, they will be looking at large networking equipment and cooling equipment.

The EU Energy Star scheme provides a database that allows users to pick the most energy efficient systems. The following provides link to the EU Energy Star and EU Energy Star Databases:
EU Energy Star
EU Energy Star: Database

3.4.6. Worldwide Feed-in Tariffs (FITs)

Over recent years, Feed-in Tariffs (FITs), in particular to support PV, have been established across many countries across the world. The following provides a link to a source of information for such tariffs internationally:

---

[19] EU Energy Star database list http://www.eu-energystar.org/en/database.htm

[20] Energy Star Enterprise Server and Data Center Energy Efficiency Initiatives
http://www.energystar.gov/index.cfm?c=prod_development.server_efficiency

Source of information for FITs Worldwide: http://www.solarfeedintariff.net/

Please note: This source of information may not present the most up-to-date data, as the tariffs have been changing frequently in recent months and years.

4 UK Energy Policy

4.1. EU and International Policies

4.1.1. European Performance of Buildings Directive & Energy Performance Certification

The Energy Performance of Buildings Directive introduced the legal requirements for non-domestic buildings regarding energy efficiency. Since December 2006, an energy performance certificate (EPC) that shows a building's theoretical energy efficiency must be issued at the point of a building's completion, sale or lease. The certificate is usually valid for 10 years and must be generated by an accredited assessor. The UK has translated the EPBD into national law, albeit with its own approaches and timeframes, as follows.

Energy Performance Certificates

In the UK, an Energy Performance Certificate (EPC) is required to be completed whenever a commercial property is purchased, sold, leased or rented. This certificate provides a rating of the asset's design (rather than the operational) energy performance. The responsibility for its completion is placed upon both the landlord and the tenant.

The UK only requires certificates to be on display in buildings visited by members of the general public. These certificates are known as Display Energy Certificates (DECs), which demonstrate operational energy performance rather than just the theoretical performance of the asset. These are quite different from the EPC, indicating a property's actual energy consumption in a given year relative to its benchmark.

Air Conditioning Inspections

The EPBD also introduced requirements for annual boiler and air conditioning system inspections to be undertaken by accredited assessors.

The air conditioning system inspections have necessitated new methodologies, assessor training and legal amendments in the UK. The trigger for air conditioning system inspections is the size (effective rated output) of the system. The EPBD requires inspections of air conditioning systems above 12kW rated output.[21]

[21] BUILD UP website: http://www.buildup.eu/publications/1656

In England and Wales, the Energy Performance of Buildings (Certificates and Inspections, England and Wales) Regulations 2007 requires all air conditioning systems over 250kW to have had their first inspection completed by 4 January 2009, and those over 12kW to get their first inspection by 4 January 2011.[22]

4.1.2. The Energy Labelling Directive (92/75/EEC)

The Energy Labelling Directive applies to IT and electronic appliances and is detailed in Section 2.1.3.

4.1.3. EU Ecolabel/Flower

The EU Ecolabel Flower labelling is a voluntary system across Europe designed to encourage businesses to market products and services that are kinder to the environment and is detailed in Section 2.1.4.

4.1.4. European Commission Code of Conduct on Data Centre Energy Efficiency

The European Commission's voluntary Code of Conduct on Data Centre Energy Efficiency[23] was launched in November 2008, following input from the data centre industry, to provide education and guidance for stakeholders and is detailed in Section 2.1.5.

4.1.5. Eco-Design Directive for Energy-Using Products(2005/32/EC)

The Eco-Design Directive for Energy-Using Products established a framework under which manufacturers of energy-using products are obliged, at the design stage, to reduce the energy consumption and other negative environmental impacts occurring throughout the product's life cycle. Further information on the Directive is provided in Section 2.1.7.

4.1.6. Certain Fluorinated Greenhouse Gases (EC Regulation 842/2006)

A number of ozone-depleting substances that were used in the manufacture of cooling equipment are now banned in most instances under this directive, known as the F Gas Regulation. Further information on this Directive is provided in Section 2.1.9.

---

[22] Department of Local Government & Communities (DCLG), Air Conditioning web pages http://www.communities.gov.uk/planningandbuilding/sustainability/energyperformance/airconditioninginspections/

[23] EU CoC Voluntary Code, Guide Version 1 (30th October 2008) http://re.jrc.ec.europa.eu/energyefficiency/html/standby_initiative_data%20centers.htm

4.1.7. EU GHG Emission Trading Scheme (Directive 2003/87/EC)

In January 2005, the European Union Greenhouse Gas Emission Trading Scheme (EU ETS) commenced operation as the largest multi-country, multi-sector greenhouse gas emission trading scheme, focused on large, energy intensive installations.[24]

The EU ETS covers large combustion installations (larger than 20 MW thermal) within EU member states. Sectors covered by the system include power generation, cement, glass, ceramics, the steel industry and so forth, with the aviation industry included from 2013.

Further information on the EU ETS can be found at Section 2.1.10.

[24] Europa http://ec.europa.eu/environment/climat/emission/index_en.htm

4.2. Regulatory Obligations

4.2.1. Building Codes

At the national level, building regulations have been adopted to drive improvements in the energy performance of buildings and infrastructure.

The current version of Building Regulations, 2010[25] "Approved Document L: Conservation for fuel and power" sets minimum performance levels for energy efficiency and ventilation for new and existing buildings (where building works are being carried out), and are split into four parts:

- Approved Document L1A: Conservation of fuel and power (New dwellings) (2010 edition)
- Approved Document L1B: Conservation of fuel and power (Existing dwellings) (2010 edition)
- Approved Document L2A: Conservation of fuel and power (New buildings other than dwellings) (2010 edition)
- Approved Document L2B: Conservation of fuel and power (Existing buildings other than dwellings) (2010 edition)

UK government had committed to increase the energy performance of buildings at each revision of the Building Regulations to meet the objective for all new buildings to be net zero carbon by 2019.

This is obviously a very challenging goal and, despite the economic downturn the target has not, as yet, been abandoned.

In the most recent publication from the Department of Communities and Local Government (DCLG), The Future of Building Control, Implementation Plan[26] the government has recognised that: "The economic circumstances have altered during this time, but the demands over the coming decades will not change – climate change [and] demographic change…"

The DCLG adds that they will "review Parts F and L and look to revise these again in 2013, as we seek to raise energy efficiency standards further as we move towards zero carbon homes… and will revise those parts only

[25] http://www.legislation.gov.uk/uksi/2010/2214/pdfs/uksi_20102214_en.pdf

[26] http://www.communities.gov.uk/documents/planningandbuilding/pdf/1320090

where there is a clear and evidenced need for change. ... we will consider changes that are needed to address government policy – where building regulations are a key delivery mechanism for specific policy ambitions, such as the move to zero carbon buildings, or in response to new EU obligations..."

Implications of Building Codes

The key implications for the data centre sector are the increasing financial burdens associated with building and technical designs that comply with increasing energy efficiency requirements. In the UK, this is indeed a growing challenge for data centre providers and developers.

4.2.2. Planning Policy

In addition to the building codes and regulations, there are spatial planning systems across Western Europe, setting policies at the national, regional and local levels.

At a national level, UK planning policy has become increasingly supportive of low carbon development. National Planning policy for England is set out in a series of Planning Policy Statements (PPS), covering a range of topics. They are legally binding and may be treated as material considerations in the determination of planning applications. PPS22 Renewable Energy is the national planning policy for renewable energy, published in 2004, which called on Local Authorities to include renewable energy requirements within their planning policies.

Also important to renewable energy developments is the supplement to PPS1, Planning and Climate Change, which takes precedence over others in the PPS series and sets out how planning, in providing for the new homes, jobs and infrastructure needed by communities, should help shape places with lower carbon emissions and resilience to climate change.

Where other regulations have not promoted or required best practices for renewable energy and/or environmental certifications, certain UK local planning authorities (led by those within London) have taken the lead by introducing policies for new developments, especially commercial development over 1,000m2.

For example, the London Borough of Merton requires new developments to generate at least 10% of their energy needs from on-site renewable energy equipment for non-residential developments over 1,000m2. This policy approach has since been widely replicated and has become known as "The Merton Rule."[27]
Planning policies in many authorities in England and Wales now require a percentage, from 10% to 20%, of a development's energy to be provided by on-site renewable energy technologies and/or a minimum BREEAM rating (to be gained prior to receiving planning permission). As the policy has been adopted, many boroughs have amended the so-called Merton Rule to focus on a carbon reduction target rather than a renewable energy contribution.

Implications of Planning Policies

With such a high number of local planning authorities in each country, there is currently an uneven planning policy field. Schemes submitted to local planning authorities in the UK, which do not meet their energy efficiency, renewable energy and/or environmental certification policies, increasingly risk planning refusal and the associated financial and time penalties associated with redesigning and reapplying for planning permission.

This inconsistency may lead to "preferred area" status for new data centre developments where planning policies are less stringent and data centres avoid authorities and municipalities with Merton Rule–style policies.

4.2.3. Mandatory Energy Certification – Demonstrating Performance

Buried in the UK Energy Bill which (at the time of writing) was going through Parliament, is a requirement on the government to introduce Regulations, to come into force no later than 1 April 2018, stating that property cannot be let unless it has a minimum energy performance rating.

The 3rd Reading of the Bill was completed on 14 September 2011, and received Royal Assent later in 2011. The Department of Energy and Climate Change has announced that it will meet this commitment by introducing the Private Rented Sector Regulations 2011, which will set the minimum rating as an "E" secured through an Energy Performance Certificate (EPC).

---

[27] The Merton Rule
http://www.merton.gov.uk/living/planning/planningpolicy/mertonrule/what_is_the_merton_rule.htm

The government will consult on the draft RegulationsThe government will consult on the draft Regulations this autumn, with a view to laying them before Parliament in early 2012.

From 2018, energy inefficient properties may not be able to be let in the UK which could significantly affect value. Landlords are expected to be required to secure an EPC of "E" or better to be able to let their properties.

The precise coverage of the Regulations is yet to be provided, however it is widely expected that there will be some important qualifications to the requirement, as follows:

- These requirements are subject to there being no upfront cost to landlords (i.e., funding available from the Green Deal). As such, landlords will have fulfilled the requirement if they have either reached the minimum standard or carried out the maximum package of measures funded under the government's proposed Green Deal (a policy instrument designed to provide financing for energy saving measures. For more detail, please the Section "Green Deal").
- The Energy Bill allows the Secretary of State to exempt certain types of properties from the Private Rented Sector requirements. These exemptions will be consulted upon as part of the secondary legislation ahead of 2018.

Implications of the EPBD and Energy Performance Certification on Data Centres

To date, the EPBD has had minor implications for the data centre sector, with the landlord paying a small amount for:

- The EPC for the building (or part of the building) that is being completed, sold, or leased.
- The annual boiler and air conditioning system inspection.
- There is potential that Display Energy Certificates will become mandatory, however the implications for data centres are likely to be limited.
- The introduction of mandatory energy performance standards (such as an "E" rating under the EPC) could be significant for the property sector as a whole and will further raise the profile of energy efficiency within the sector.
- The data centre industry may well be affected. However, the risks are considered to be manageable given that the demands placed upon owners will most likely be limited to measures that will attract financing support through as part of the forthcoming "Green Deal."

4.3. Financial Costs

4.3.1. The Carbon Reduction Commitment (CRC)

In addition to the EU ETS, The UK Government has established a carbon trading scheme focused on those organisations with more fragmented portfolios (such as supermarkets as opposed to large industrial sites). The Carbon Reduction Commitment (CRC) is a UK mandatory carbon trading scheme, and came into force in April 2010. It aims to support the UK government's legally binding target of an 80% cut in greenhouse gas emissions by 2050.

The following provides an overview of how the scheme works:

- The Carbon Reduction Commitment is mandatory for data centres that consumed more than 6,000 MWh through half-hourly metering in 2008 (i.e., the qualification year).
- Groups consuming more than 3,000MWh electricity through half-hourly metering were required to provide an "Information Disclosure." However, this requirement has since been abolished.
- CRC participants must establish auditable systems to report carbon emissions.
- Daily penalties for non-compliance will apply.
- A league table of performance will be established, affecting reputation. The 2011 League Table can be found at the following link: Performance League Table
- Organisations must buy carbon allowances equivalent to the carbon associated with their energy consumption.
- The participants must then (as the legislation stands in 2011) cancel these allowances. (Participants will not, in the initial phase, be able to retain the carbon allowances.)
- From April 2014, a carbon market may be established, which would introduce significant price uncertainty. However, this remains under consultation.

Under the CRC, generally speaking, the organisation that holds the direct contract with an energy supplier will be responsible for carbon emissions, be it the data centre provider or lessee.

The highest parent organisation will be responsible for reporting its total energy use and emissions, including those of subsidiaries or joint ventures it controls (as defined by the Companies Act, 2006).

Timeline

The following table introduces some of the CRC's key dates in a timeline to illustrate the rollout:

Date		Action
2009		Organisations determine if they are participants and establish their CRC strategies.
2010	Sept	Participants register for the first phase of the scheme, which runs from April 2010 to March 2014.
2011	April to July	Participants submit a footprint report and an annual report with respect to their carbon emissions.
	On-going	Participants are to maintain an Evidence Pack covering certain governance, organisation and energy information.
	Oct	The first League Table was published in the Autumn of 2011.
2012 (repeated in 2013)	Apr to July	• Participants submit annual report detailing emissions in previous year, then surrender allowances equivalent to the emissions reported in the annual report. • Participants purchase allowances for 2012/13 forecast emissions (at ~£12/tCO_2).
	Oct	League table based on previous reports will be produced.
2014	Apr	Second (capped) phase begins. (However, the government is currently consulting upon the nature of the second phase.)

League Table and Recycling Payments

The league table introduced by the government will have implications not only on participants' reputation, but also on the amount of revenue they receive each year from recycling payments.

The revenue generated from selling allowances was intended to be returned to participants based on their position in the league table when the scheme was first established. The scheme was intended to be revenue neutral for the government. However, this element of the scheme has been removed to reduce complexity and to support the UK Government's deficit reduction objectives.

As such, the scheme will present all participants with a cost irrespective of performance and based upon carbon emissions and the carbon price that will initially be set by the government and may later be set by the market through auction of allowances.

League Table Metrics

CRC participants' energy management and emissions reduction performance is measured against three metrics. The results against these metrics are then collated to enable the ranking of CRC participants' performance. The positions are then published annually in the league table. The following weightings will be applied over the first four years of the scheme.

CRC Metrics & Weightings	Introductory/1st Phase		2nd Phase
	2010/11	2011/12 & 2012/13	2013/14+
Early action metric	100%	40% then 20%	N/A
Absolute metric	0%	45% then 60%	75%
Growth metric	0%	15% then 20%	25%

1. Early action metric:

Used for the first and second year only, this metric recognises voluntary good energy management and gives equal weighting to:

- The extent of installation of voluntary automatic meter reading (i.e., excluding mandatory half hourly meters) before 31 March 2011[28].
- The percentage of an organisation's emissions covered by a valid energy efficiency accreditation scheme or Carbon Trust Standard certificate on 31 March each year.

2. Absolute metric:

This metric represents the total percentage change in annual carbon emissions, calculated by comparing annual emissions with the average emissions in the preceding years of the scheme. After the fifth year, annual emissions are compared with the average of the preceding five-year period.

[28] Note: Organisations with 100% mandatory half hourly meters in place will secure 50% of the credits for this part of the Early Action Metric.

3. Growth metric:

The growth metric aims to compensate for the fact that organisations may be growing or declining; it measures the percentage change in emissions per unit turnover for private companies.

Implications of UK Carbon Reduction Commitment

There are significant financial, operational and reputation implications associated with this new piece of legislation.

Financial implications and uncertainty:

Perhaps most significant for the data centre industry are the financial implications associated with the scheme. There are cash flow implications from 2012 when (between April and July 2012) participants must purchase carbon allowances to cover their CO2 emissions resulting from energy consumed between 1 April 2011 and 31 March 2012.

The current price of carbon has been fixed (for April 2012) at £12/tCO2, with the price being set by the Chancellor through the budget for the first phase of the scheme.
From the second phase of the scheme (from April 2014) a cap and trade mechanism is likely to be introduced, at which point the price would potentially be set by the market.

Reputation:

The league table has been established to provide a reputation driver to affect change through publishing the participating organisations' performance with regard to carbon emissions. Indeed, this will be the first mandatory requirement to publish actual carbon emissions (and reductions of carbon emissions) through a standard process of reporting. It will, of course, have significant implications for those organisations concerned about perceptions, in particular those that have made significant claims about their environmental practices.

The 2011 League Table can be found at the following link: **Performance League Table**

Compliance with and management of the CRC:

The CRC will place a number of operational burdens on data centre providers and users. The following summarises the key administrative requirements that will need to be addressed:

- Reporting accurately on carbon emissions
- Forecasting energy consumption, budgeting and purchasing carbon allowances
- Establishing treasury and accounting systems to manage carbon trading activities
- Developing systems for allocating associated costs to specific cost centres within the organisations and, potentially, to their clients where possible and appropriate

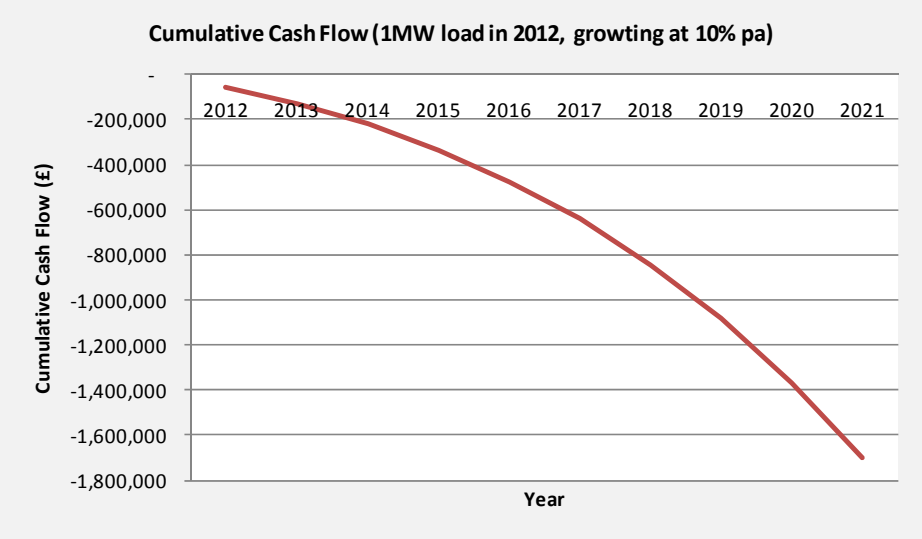
Illustrative Financial Implications for Data Centres

There remains considerable uncertainty associated with the CRC, not least:

- The price of carbon has been implicitly set out in the budget for the first phase of the scheme; however, the way in which prices will be set from 2014 is uncertain. The price of carbon over time is therefore a key uncertainty and will be determined either by:
  - The market, assuming a cap and trade is implemented following consultation.
  - Government, assuming a cap and trade is not implemented following consultation.
- The amount of carbon used over time is uncertain.
- The ability for data centres to transfer the costs associated emissions could be uncertain.

It should also be remembered that a CRC participant will purchase allowances for the total amount of CO2 emissions associated with its entire group, not just those related to a particular data centre.

1. The following graph illustrates the range of cash flows that may occur for a data centre with 1MW capacity, drawing 8,560MWh of electricity in 2010, with a growth rate of 10%
2. The graph assumes that the price of carbon increases linearly to £30/tCO2 (the carbon floor price set by government as an analogous to the CRC)
3. The graph also assumes that the scheme will not change (e.g., recycling payments will not be re-introduced)
4. Diesel and other fuels consumption are assumed to be zero



The total cost associated with the CRC in this case is £1.7 million.

As can be seen, the financial performance is not dependent upon energy efficiency performance relative to others as was the case in the initial legislation. Rather, performance is based primarily on carbon emissions and carbon price. For more details on the forthcoming UK CRC, see this report's appendix and the Department of Energy and Climate Change web site: www.decc.gov.uk/en/content/cms/what_we_do/lc_uk/crc/crc.aspx

4.3.2. The Climate Change Levy, Climate Change Agreements and Floor Price

The Climate Change Levy (CCL) was introduced on April 1, 2001, under the Finance Act, 2000 (replacing the Fossil Fuel Levy), with the aim of taxing carbon in order to drive down emissions. The cost of the Levy is (as at 2011) 0.485p/kWh for electricity, adding around 7% on to electricity costs (depending upon tariffs). The levy also affects other types of fuel outlined in the table[29] below:

Climate Change Levy: Rates of tax from 1 April 2011

[29] HMRC website: http://customs.hmrc.gov.uk/channelsPortalWebApp/channelsPortalWebApp.portal?_nfpb=true&_pageLabel=pageExcise_RatesCodesTools&propertyType=document&id=HMCE_PROD1_031183

Commodity	Rate
Electricity	0.485 pence / kWh
In Great Britain, gas supplied by a gas utility or any gas supplied in a gaseous state that is of a kind supplied by a gas utility	0.169 pence / kWh
Gas supplied by a gas utility or any gas supplied in a gaseous state that is of a kind supplied by a gas utility for burning in Northern Ireland	0.059 pence / kWh
Any petroleum gas, or other gaseous hydrocarbon, supplied in a liquid state	1.083 pence / kg
Any other taxable commodity	1.321 pence / kg

The Levy applies to commercial property and excludes the domestic and transport sectors and low carbon energy supplies (including renewable energy and approved cogeneration schemes, although not nuclear energy) are exempt. A reduction in the Levy of up to 80% can also be gained by energy intensive users, provided they sign a Climate Change Agreement as part of a sector group. Only certain industry sector groups are allowed to participate in a Climate Change Agreement (CCA). There are current 54 such groups and, to date, this has not included data centres. The data centre industry is, however, working with Intellect to explore the creation of a CCA.

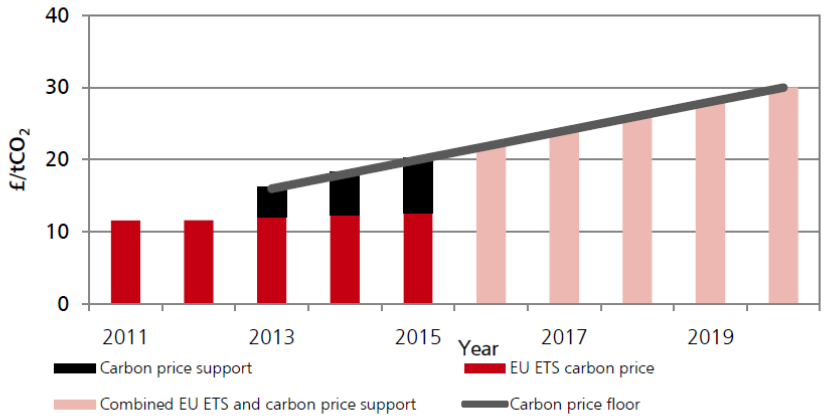
Whilst there are a number of participants in the data centre sector pressing for their inclusion in the CCA, a consultation launched by the government in September 2011 indicates that, at this stage, the number of sector groups will not be increased. It should be noted that purchasing accredited “green power”can enable exemption from the 0.485p / kWh CCL charge.

The Levy was, since 2006, linked to inflation. However, the costs were frozen in 2010. In the 2011 Budget, the UK Government announced that it would introduce a Carbon Floor Price from 1 April 2013 to provide more certainty and hence drive investment in the low-carbon power sector.

The Floor Price will be put in place by reforms to the Climate Change Levy and Fuel Duty so that they are levied on all fossil fuels used to generate electricity in the UK. The Floor will start at £16 per carbon tonne, rising to £30 in 2020 and £70 in 2030 (in 2009 prices). The floor will increase at around £2 per carbon tonne from 2013 to 2020. The carbon price supports rates for CCL and fuel duty to achieve the price floor reflects the

differential between the future market price of carbon (EU ETS) and the floor price. The £30/tCO2 in 2020 carbon price floor is shown in the chart[30] below:

Chart 2.A: Carbon price floor illustration (in real 2009 prices and calendar years)



Source: HM Treasury, 2011

[30] HMRC website

http://www.hm-treasury.gov.uk/d/carbon_price_floor_consultation_govt_response.pdf

4.4. Financial Incentives

4.4.1. Carbon Trust Interest-Free Loans

In the UK, the Carbon Trust offers a range of financing options for organisations wishing to invest in energy efficiency measures.

Support can range from £1,000 upwards with no maximum and is available to all types of organisations. The principle is that more efficient equipment would lower energy bills. So, payments are calculated so that the anticipated energy savings offsets them. The aim is essentially that the project would pay for itself, including the cost of financing.

To qualify for energy efficiency financing, businesses must have been trading for at least 36 months. This is, of course, subject to a normal credit assessment.

The Carbon Trust conducts an energy saving audit to ensure the business case for investment is robust. The scheme supports a wide range of technologies with each judged on its potential to deliver real energy (and cost) savings. These include, but are not limited to, the following:

- Air conditioning and heat recovery systems
- Lighting and controls
- Insulation and heating systems
- Power factor correction
- Variable speed drives

4.4.2. Enhanced Capital Allowance

To overcome the high capital cost barrier, reductions in the amount of taxes paid by companies investing in energy-efficient equipment are available in the UK.

The UK scheme is called the Enhanced Capital Allowance (ECA) and was introduced in 2001 to support a specific list of approved / qualifying energy-efficient equipment. ECAs enable a business to claim 100% first-year capital allowances on its spending on qualifying plant and machinery.

The Energy Technology List (ETL) details the criteria for each type of technology and lists those products in each category that meet them. It is managed by the Carbon Trust on behalf of the government and can be found at: http://etl.decc.gov.uk/etl/find
Businesses can write off the whole of the capital cost of their investment in these technologies against their taxable profits of the period during which they make the investment.

4.4.3. Grant Funding

There is currently no national grant funding available for energy efficiency measures for commercial property.

4.4.4. Feed-in Tariffs (FITs)

Feed-In Tariffs (FITs) are payments designed to incentivise investment in small-scale renewable energy technologies. The FIT supports electricity-generating renewable energy technologies and forms part of the "UK Clean Energy Cashback" Scheme. The second part is the Renewable Heat Incentive, which supports heat-generating renewable energy technologies.

The legislative framework for the tariffs was laid down in the 2008 Energy Act to help increase the level of renewable energy in the UK towards our legally binding target of 15% of total energy from renewables by 2020 (up from under 2% in 2009).

The FITs are intended to support all renewable electricity generation sources used below 5MW. Non-renewable, gas-powered combined heat and power (Micro-CHP) is also included and it appears likely that fuel cells could be included in the future.

As at the launch of the scheme the following technologies are eligible:

- Anaerobic digestion to produce biogas for electricity generation
- Hydro-electric power
- Solar electric photovoltaics (PV)
- Wind power
- Small-scale gas-powered combined heat and power up to 2kW

The Tariffs give three financial benefits:

- A FIT payment for the electricity generated, even if used on-site, that is index-linked with the Retail Price Index (RPI) with the price dependent upon the system size and type installed.
- Additional payments for electricity you export into the grid. These were set at 3p/kWh on 1 April 2011 and are also index-linked to the RPI.
- A reduction on your standard electricity bill for using energy you produce yourself.

Broadly speaking, the FITs are for everyone, including households, landlords, businesses and even organisations such as schools and care homes.

The following table summarises the technologies supported and the associated FIT for different sizes and dates of commissioning:

Generation Tariff Levels up to March 2012

Energy Source	Scale	Tariff (p/kWh)	Duration
Anaerobic digestion	≤250kW	14.0	20
Anaerobic digestion	>250kW - 500kW	13.0	20
Anaerobic digestion	>500kW	9.4	20
Hydro	≤15 kW	20.9	20
Hydro	>15 - 100kW	18.7	20
Hydro	>100kW - 2MW	11.5	20
Hydro	>2MW - 5MW	4.7	20
Micro-CHP	<2 kW	10.5	10
Solar PV	≤4 kW new	37.8	25
Solar PV	≤4 kW retrofit	43.3	25
Solar PV	>4-10kW	37.8	25
Solar PV	>10 - 50kW	32.9	25
Solar PV	>50 - 150kW	19.0	25
Solar PV	>150 - 250kW	15.0	25
Solar PV	>250kW - 5MW	8.5	25
Solar PV	Standalone	8.5	25
Wind	≤1.5kW	36.2	20
Wind	>1.5 - 15kW	28.0	20
Wind	>15 - 100kW	25.3	20
Wind	>100 - 500kW	19.7	20

Generation Tariff Levels up to March 2012			
Energy Source	**Scale**	**Tariff (p/kWh)**	**Duration**
Wind	**>500kW - 1.5MW**	**9.9**	**20**
Wind	**>1.5MW - 5MW**	**4.7**	**20**

It should be noted that the tariff levels are very likely to change from 1 April 2012 numbers in the table above. In addition, the very attractive rates available for PV could be reduced further, whilst the FIT payment for other technologies that have not seen as significant uptake could be increased. When looking at the payback for business cases and FITs please ensure you consult the government for the up-to-date tariffs.

4.4.5. The Renewable Heat Incentive

The Renewable Heat Incentive (RHI) is similar to the UK Feed-in Tariff. However, it focuses on heat-generating technologies only. It assists individuals, communities, businesses and the public sector and aims to support government policy for 12% of all heat to be generated by renewable energy by 2020.

After a number of delays, the scheme was launched on 28 November, 2011, with OFGEM (the UK Energy supply regulator) responsible for its administration. The scheme supports new or increased capacity of existing projects including:

- Bio-energy
- Solid biomass: Excluding wood burning stoves, air heaters, open fires and similar applications
- Heat from biogas
- Injection of biomethane into the gas grid
- Heat pumps: Using energy from the air, ground or water
- Solar energy: heating panels
- Combined Heat Power: Will receive the same tariff for renewable heat output as dedicated heat installations

Technologies not covered include cooling, heat used to generate electricity, heat recycled into anaerobic digestion plant, equipment that is not new and liquid bio-fuels, except where esterified vegetable oil replaces domestic heating oil and meets sustainability standards.

Suppliers and installers must be accredited under the Microgeneration Certification Scheme. The policy intends for payments to be made to any eligible installation built from 15th July 2009, although payments were only intended to start after April 2011.

There have, however, been delays to the launch of the scheme. On the 3rd of October, 2011, The Department of Energy and Climate Change (DECC) announced a last-minute delay due to concerns from the European Commission that the large biomass tariff was set too high. The scheme was then launched on 28 November 2011, with the following being the proposed tariffs for the RHI (subject to change as described above):

Technology & Scale (kW)	Tariff Level (p/kWh)
Solid Biomass - up to 45 kW	9
Solid Biomass 45 kW -500 kW	6.5
Solid Biomass 500 kW and above	1.6-2.5
Bio-liquids to replace heating oil	6.5
Biogas for heat - up to 45 kW	5.5
Biogas for heat – 45 kW - 200 kW	5.5
Ground source heat pumps - up to 45 kW	7
Ground source heat pumps – 45 kW - 350 kW	5.5
Ground source heat pumps – 350 kW and above	1.5
Air source heat pumps - up to 45 kW	7.5
Air source heat pumps – 45 kW - 350 kW	2
Solar Thermal – up to 20 kW	18
Solar Thermal – 20 - 100 kW	17
Biomethane injection	4

Note: The above provides an indication of the Feed-in Tariffs only at the time of writing and changes to these tariffs may have since occurred. It is therefore necessary to review the specific tariffs and policies in detail prior to any investment decisions being made.

It should be noted that, although the RHI is focused on heat generation, heat for cooling can, in some cases, be utilised and benefit from the tariff.

The Department for Energy and Climate Change wrote: “Heat used for cooling counts towards the renewables targets under the Renewable Energy Directive and therefore, provided it meets all other eligibility criteria, it will be eligible for RHI support. Heat can be used to provide cooling through absorption chillers; this is quite common practice in commercial and industrial uses. Therefore, cooling delivered in this way will be supported under the RHI.”

With the tariff likely to be dictated by the initial heat source, this is thought likely to benefit both biomass tri-generation systems.
However, DECC did not rule cooling from heat pumps as eligible “as it does not count under the Renewable Energy Directive towards our renewables targets.” Thus, only the heat element of generation from heat pumps will be eligible and, therefore, unlikely to benefit data centres.

4.5. Voluntary Mechanisms

4.5.1. BREEAM and BREEAM Data Centres

The Building Research Establishment Environmental Assessment Methodology (BREEAM) provides an environmental standard for measuring and reporting performance in sustainable building design and construction. Whilst established and most prevalent in the UK, BREEAM is not limited to the UK. Indeed the methodology can be employed elsewhere and BRE has established variations to the methodology for adoption in other countries.

A BREEAM assessment uses a range of measures of performance, which are set against benchmarks, to evaluate a building's specification, design, construction and use. The measures used represent a broad range of categories and criteria from energy to ecology. They include aspects related to energy and water use, the internal environment (health and well-being), pollution, transport, materials, waste, ecology and management processes.

A Certificated BREEAM assessment is delivered by a licensed organisation, using assessors trained under an accredited competent person scheme, at various stages in a buildings life cycle. This provides clients, developers, designers and others with:

- Market recognition for low environmental impact buildings
- Confidence tried and tested environmental practice is incorporated in the property
- Inspiration to find innovative solutions that minimise the environmental impact
- A benchmark that is higher than regulation
- A system to help reduce running costs, improve working and living environments

In the UK, the Building Research Establishment (BRE) and Digital Realty Trust have developed a new BRE Environmental Assessment Method -- BREEAM Datacenters[31] scheme for the design, construction, and operation of data centres.[32] Both the LEED and BREEAM schemes focus on a breadth of environmental issues

[31] Building Research Establishment http://www.breeam.org/page.jsp?id=157

[32] Ted Samson, *InfoWorld* (22 April 2009) http://www.infoworld.com/d/green-it/digital-realty-trust-sets-new-standard-green-datacenter-design-243

and impacts, including energy, water, materials, ecology, transport and management impacts. The certification can be obtained at various stages of the data centre's lifecycle:

- New data centre buildings
- Major refurbishment of existing data centre buildings
- Fit-outs of existing data centre buildings

4.5.2. BREEAM In-Use

BREEAM In-Use, launched in 2009, is designed to help building managers reduce running costs and enable investors to demonstrate the environmental performance of existing buildings.

It consists of a standard, easy-to-use assessment methodology and an independent certification process that provides a clear and credible route map to improving sustainability.

BREEAM In-Use sits alongside the already well-established BREEAM schemes for assessing the environmental performance of buildings at the design and construction stages.

- An assessment completed the Assessor (who needs not be qualified)
- Audit to be carried out by an Auditor
- Certification by the Building Research Establishment

BREEAM In-Use is currently relevant to all non-domestic, commercial, industrial, retail and institutional buildings. The scheme recognises the different components that lead to good (or poor) environmental performance:

- Part 1, Asset Performance: assesses and scores the inherent performance characteristics of the building based upon its built form, construction and services
- Part 2, Building Management Performance: assesses and scores the management policies, procedures and practices related to the operation of the building
- Part 3, Organisational Effectiveness: assesses and scores the implementation of management policies, procedures and practices such as staff engagement (for offices only)

4.5.3. Energy Star

Energy Star is an important energy labelling scheme that has been adapted to Europe. Further information on Energy Star can be found in Section 2.4.5.

5 France

5.1. EU Policy

5.1.1. Energy Performance of Buildings Directive

At the EU level, the Energy Performance of Buildings Directive (2002/91/EC), or EPBD, introduced several legal requirements for non-domestic buildings regarding energy efficiency. Since December 2006, an energy performance certificate (EPC) that shows a building's theoretical energy efficiency has been issued at the point of a building's completion, sale or lease. The certificate is usually valid for 10 years and must be generated by an accredited assessor.

France translated the EPBD into national law, albeit with its own approaches, as follows.

EPBD Translation into Le Diagnostic De Performance Energétique (DPE)[33]

To support implementation of EPBD, France has created building energy efficiency labels, detailing a property's performance. Since November 2006 all new buildings for sale have been required to complete an energy performance evaluation (an energy performance diagnostic, or DPE), and receive an energy performance certificate.

The certificate indicates both the level of energy consumption and the greenhouse gas (GHG) emission level, on a scale of A to G, with G being least efficient and highest GHG emissions.

As of 1 July 2007, the diagnostic and certificates must be provided for rentals also and is to be provided for all new construction where the building permit was submitted after 1 July 2007.

Since 2 January 2008, the DPE has been introduced for all public buildings and public display of the certificate has been mandatory.

The DPE is required on sale, purchase or letting of a property and is valid for 10 years. It provides not only an

[33] http://www.building-land-house-south-france.co.uk/maisons_traditionnelles_construction_custom_home/11_standards_and_labels.htm

indication of performance, but also recommendations for energy efficiency measures appropriate to the property, centering on heating, air conditioning, ventilation and lighting.

Three different categories of certificates are provided based on the building's function (hospital, offices, educational institution, etc.).

In addition to Basse Consommation (or Low Consumption), the following two categories may be achieved:

- **Label HPE 2005 (Haute Performance Energétique)** – High energy performance standard — This standard is awarded for a nominal energy consumption level that is 10% lower than that of the benchmark nominal energy consumption level stipulated in RT 2005 regulations.
- **Label THPE 2005 (Très Haute Performance Energétique)** – Very high energy performance — This is awarded for a nominal energy consumption level that is 20% lower than that of the benchmark nominal energy consumption level stipulated in RT 2005 regulations.

5.1.2. The Energy Labelling Directive (92/75/EEC)

The Energy Labelling Directive applies to IT and electronic appliances and is detailed in Section 2.1.3.

5.1.3. EU Ecolabel/Flower

The EU Ecolabel Flower labelling is a voluntary system across Europe designed to encourage businesses to market products and services that are kinder to the environment. This is detailed in Section 2.1.4.

5.1.4. European Commission Code of Conduct on Data Centre Energy Efficiency

The European Commission's Voluntary Code of Conduct on Data Centre Energy Efficiency[34] was launched in November 2008, following input from the data centre industry, to provide education and guidance for stakeholders. This is detailed in Section 2.1.5.

[34] EU CoC Voluntary Code, Guide Version 1 (30th October 2008)
http://re.jrc.ec.europa.eu/energyefficiency/html/standby_initiative_data%20centers.htm

5.1.5. Eco-Design Directive for Energy-Using Products (2005/32/EC)

The Eco-Design Directive for Energy-Using Products established a framework under which manufacturers of energy-using products are obliged, at the design stage, to reduce the energy consumption and other negative environmental impacts occurring throughout the product's life cycle. Further information on the Directive is provided in Section 2.1.7.

5.1.6. Certain Fluorinated Greenhouse Gases (EC Regulation 842/2006)

A number of ozone-depleting substances that were used in the manufacture of cooling equipment are now banned in most instances under this directive, known as the F Gas Regulation. Further information on this Directive is provided in Section 2.1.9.

5.1.7. EU GHG Emission Trading Scheme (Directive 2003/87/EC)

In January 2005, the European Union Greenhouse Gas Emission Trading Scheme (EU ETS) commenced operation as the largest multi-country, multi-sector greenhouse gas emission trading scheme, focused on large energy intensive installations.[35]

The EU ETS covers large combustion installations (larger than 20 MW thermal) within EU member states. Sectors covered by the system include power generation, cement, glass, ceramics, the steel industry, and so forth, with the aviation industry included from 2013. Further information on the EU ETS can be found at Section 2.1.10.

[35] Europa http://ec.europa.eu/environment/climat/emission/index_en.htm

5.2. French National Policy

5.2.1. Grenelle de l'environnement

The Grenelle de l'environnement is a key overarching environmental strategy developed through a multi-party debate in France, bringing together representatives from national and local government as well as stakeholders from industry including business, labour representatives, professional associations and NGOs.

The aim of the "Grenelle Environment Round Table" (as it might be called in English) has a goal of unifying key stakeholders on a range of environmental themes to define key points of public policy and to establish a plan of action of concrete measures for the coming five years.

Officially launched on 6 July 2007, the "Grenelle Environnement" included six working groups to debate the themes of climate change and energy, biodiversity, natural resources, health and the environment, production and consumption, ecology, and environmental employment and competitiveness. Two groups devoted to the issues of Genetically Modified Organisms and waste were also established.

Law No 2009-967 of 3 August 2009 relating to the implementation of the Grenelle Environment Forum (called "Grenelle I") sets a 38% target for the reduction of energy consumption by the existing building stock by 2020. See the following for a link to le Grenell Environment: www.legrenelle-environnement.fr

Climate Change and Energy

The working groups at Grenelle have set ambitious goals in many areas, as described above. However, the following provides a summary of the key measures focused on climate change and energy relevant to property and hence data centres. The main commitments are:

- Building and housing: generalisation of standards of low consumption in new housing and public building, plus setting up incentives for the renovation of housing and building heating.
- Energy: development of renewable energy to achieve 20% of total energy consumption by 2020.
- Ban on incandescent lamps.
- A tax on energy consumption and a "carbon tax" to bring in approximately 9.7 billion Euros per year. (See section on carbon taxes below, detailing that the planned carbon tax was shelved in light of the economic challenges facing business.)

- An obligation on large companies (of more than 500 employees) to report on their GHG emissions by the end of 2012.
- The policy paved the way for the introduction of the Feed-in Tariff to support, in particular, photovoltaic technologies, as well as proposing the introduction of a "renewable heat fund."

5.2.2. Energy Act, 2005[36]

France has established an Energy Policy Framework, Loi de Programme Fixant les Orientations de la Politique énergétique (POPE), n°2005-781," otherwise known as "the Energy Act, 2005."

The Energy Act 2005 does not in itself place an obligation upon industry to implement any specific measures. It does, however, demand that the country as whole deliver the following outcomes, thereby providing industry with an understanding of the long-term commitment France has to energy reduction:

- Quartering of CO2 emissions by 2050
- Average reduction of final energy intensity by at least 2% per year from 2015 and by 2.5% from 2015 to 2030
- Production of 10% of energy needs from renewable energy sources by 2010
- Incorporation of bio-fuels and other fuels of renewable origin to a level of 5.75% by the end of 2008 and 7% in 2010

It is expressed in the form of four major objectives:

- Contributing to national fuel independence and secure supply
- Improving environmental protection and, especially, taking further action to tackle the greenhouse effect
- Guaranteeing competitive fuel prices
- Contributing to social and territorial cohesion by guaranteeing access to energy for the entire nation

[36] http://www.epd.gov.hk/epd/SEA/eng/file/energy_index/france.pdf

5.3. Regulatory Obligations

5.3.1. Building Regulations Code de l'Urbanisme & Certificat d'Urbanisme (CDU)

In France, the Building/Construction Code (Code de l'Urbanisme) and Certificat d'Urbanisme (CDU), a certificate of town planning or urban development, are required prior to any building, construction, renovation or development of a property.

The building or construction code controls all construction in France[37]. A certificat d'urbanisme is a certificate of town planning or urban development in France required for the completion of any building, construction, renovation or development on a property.

It states the rights attached to a specific property and the buildings on it with regards to their function and purpose, future development and zoning of the property and the associated taxation on all land and buildings in the area.

There are two types of certificat d'urbanisme:

- The certificate of information (certificat de simple information): This provides information on the existing rights for development of the property but does not tell you if it may be developed beyond what is already allowed.
- The operational certificate (certificat opérationnel): In response to a request, this provides information on whether a specific development may be undertaken on the land.

The CDU is valid for one year (renewable on conditions). There is a heavy minimum fine for using land for a purpose other than that prescribed.

5.3.2. The Future of Building Regulations

For new constructions, the Grenelle law set the target of widespread low consumption buildings by 2012 and positive energy buildings by 2020.

[37] http://languedoc.angloinfo.com/information/4/urbanisme.asp

The work to prepare the new thermal regulations for new buildings, known as RT 2012, is now complete after two years' work and a large-scale consultation, according to the Grenelle Environment Forum model.

RT 2012 is a regulation comprised of targets. It therefore comprises three requirements for results relating to overall performance: bioclimatic needs, primary energy consumption and summer comfort.

- The Réglementation Thermique 2012 (RT 2012) sets the new minimum standard of thermal insulation of dwellings and other types of construction in France.
- It will be applicable to all new planning applications submitted for non-residential buildings from Oct 2011 and 1 January 2013 for the residential sector.

5.3.3. Planning Policy

In addition to the building codes and regulations, there are spatial planning systems across France that have two regulations that govern planning permission, as follows:

- National town planning regulations (see above, the Code de l'Urbanisme).
- Local rules contained in local schemes (including "POS – Le plan d'occupation des sols" or the "PLU – Plan Local d'Urbanisme").

Règlement Nationale d'Urbanisme (RNU) provides national rules governing new development and changes to existing buildings called Les dispositions imperatives du règlement nationale d'urbanisme (RNU).

- Les directives territoriales d'aménagement (DTA) - incontestable regional directives that are more often determined by central government.
- Les directives paysages or directives de protection et de mise en valeur des paysages – provide regulations mainly concerning planting requirements, the volume and height of buildings and external aspects of the development[38].

[38] http://www.french-property.com/guides/france/building/planning/framework/

5.4. Financial Costs

There are no carbon taxes or carbon markets in France, despite Grenelle de l'environnement calling for the introduction of a carbon tax.

The government in France intended to introduce a tax in 2009 to be set at €17 / tonne of carbon dioxide.

The level of this tax was widely expected to increase significantly over time and was scrapped in the face of opposition from, to varying extents, industry and the public.

5.4.1. Plans to Introduce a Carbon Tax in 2009

BBC Article, 10 September 2009

French President Nicolas Sarkozy has announced plans for a new carbon tax aimed at combating global warming. The tax will be introduced next year and will cover the use of oil, gas and coal, he said. The new tax will be 17 euros (£15) per tonne of emitted carbon dioxide (CO2). It will be phased in gradually. It will apply to... enterprises, but not to... firms included in the EU's emissions trading scheme.

The carbon tax plans have already encountered stiff opposition across the political spectrum. France's Le Monde newspaper says the tax will cover 70% of the country's carbon emissions and bring in about 4.3bn euros (£3.8bn) of revenue annually.

Mr Sarkozy insists the new tax is all about persuading the French to change their habits and cut energy consumption, the BBC's Emma Jane Kirby reports from Paris. Critics say it is just a ploy to boost ailing state finances. Two-thirds of French voters say they are opposed to the new levy, fearing they will struggle to pay higher bills.[39]

5.4.2. Decision to Scrap the Plans for the New Carbon Tax

Telegraph Article, 23 Mar 2010

[39] http://news.bbc.co.uk/1/hi/8248392.stm

President Nicolas Sarkozy scrapped the country's proposed carbon tax[40] and reshuffled his cabinet in populist tilt after suffering a crushing electoral defeat over the weekend, when his Gaulliste UMP party lost every region other than in its bastion of Alsace and the Indian Ocean island of Reunion.

...The government said its energy tax was being postponed indefinitely in order not to "damage the competitiveness of French companies", fearing that it would be too risky for France to go it alone without the rest of the EU.

France's green groups wrote a joint letter to Mr Sarkozy saying they were "scandalised" by his decision, accusing him of tearing up a pledge to put climate change at the centre of his presidency.

Medef, France's business lobby, said the demise of the carbon levy was a "relief". The tax would have been €17 a tonne compared to around €100 in Sweden, but business feared that this would creep up over time.

[40] http://www.telegraph.co.uk/finance/newsbysector/energy/7507015/France-ditches-carbon-tax-as-social-protests-mount.html

5.5. Financial Incentives

5.5.1. The Tax Credit

France has established a tax credit, created in 2005, that has been extended until 2012.
The benefit of the tax credit is focused on residential property (with some equipment only eligible for older properties)[41] and is granted to tax payers who purchase new equipment.

The tax credit is intended to promote the installation of the most efficient systems for which the market has not yet arrived at maturity.

Whilst this legislation focuses on the domestic sector and, as such, is not of benefit to the data centre industry, it is important to note that there is a precedent of tax incentives for low carbon technologies.

5.5.2. Advanced Renewable Tariffs (Tarife Equitable) 2006[42]

A major national consultation, the "Grenelle Environment Forum," was held from July to November 2007 and led to the emergence of priority targets in terms of controlling energy consumption and promoting renewable energies. The Grenelle Environment Forum provides for a reduction of 38% in consumption by housing by 2020.

A large-scale thermal renovation project driven by various financial incentives is in progress. The scheme provides for the insulation of the entire building stock and the installation of several million heating devices and renewable energy production systems (including heat pumps, wood-fired heating systems, solar heating and photovoltaic solutions).

The legislation also supported the introduction of the Feed-in Tariff to support the development of the market for photovoltaic (solar electricity) systems.

Renewable Feed-in Tariffs (FITs)

---

[41] National action plan for the promotion of ren energies 2009-2020.pdf (Page 56)

[42] http://ec.europa.eu/energy/renewables/transparency_platform/doc/updated_nreap_france_en.pdf

The renewable energy Feed-in Tariff (FIT) legislation is provided as a result of legislation that was effective in January 2010 and modified in 2011. The policies in this area are changing quickly across Europe with fluctuation in demand, PV prices and broader economic conditions. As such, the specific policies in the specific locations at specific times should be investigated in detail in advance of any investment decisions being made. The current document should not be relied upon for such decisions.

In March 2011, France adjusted its FIT system for electricity from solar PV plants. In fact, the support framework is now structured along two main systems:

- A FIT, adjusted every trimester, for building installation no bigger than 100 kW
- Tenders for building installations larger than 100kW and ground mounted plants

In cases where solar PV installed capacity reaches or exceeds the fixed cap of 100 MW per year for residential and 100 MW per year for non-residential, tariffs will drop by 2.6% each trimester (or about 10% annually). They will drop by less if the installation rate slows down.

As of March 2011, building-integrated photovoltaic installations (BIPV) enjoy tariffs as follows:

- No larger than 9kW are entitled a EUR 0.46/kWh
- Installation between 9 -36 kW are entitled to EUR 0.40/kWh

Simplified building integrated PV systems:

- EUR 0.30/kWh for plants no larger than 36kW
- EUR 0.29/kWh for plants between 36 and 100kW; the system must be safely installed parallel to the roof, and fulfil cover and staunchness requirements

As of 2010, **ground-mounted solar arrays** benefit from a base tariff of:

- EUR cent 31.4/kWh for systems under 250 kW
- For systems greater than 250 kW, the tariff varies according to a regional coefficient ranging from 1 to 1.2, offering higher tariffs for less sunny regions. In Corsica and overseas regions, the tariff is EUR cent 40/kWh[43].

[43] https://www.iea.org/textbase/pm/?mode=cc&id=4486&action=detail

France's FITs for building-integrated PV (BIPV) and simplified BIPV systems are, however, facing a new round of cuts. This comes shortly after reduced and more complex levels that took effect on March 10, 2011 -- only three months after the government placed a moratorium on applications for systems over 3 kW. These moves are made to stop what the government described as a speculative market that would raise the cost of electricity for ratepayers as the tariffs and the nature of PV systems has been so attractive.

Given the rapidly changing context, it is recommended that prior to any investments the latest and detailed information on the opportunities be explored in detail.

5.5.3. Certificat d'économie d'énergie (Energy Saving Certificates)[44]

The aim of Energy Saving Certificates is to raise awareness among all sectors of society and encourage a sense of responsibility.

They were created on 13 July 2005 by the French Energy Law, which focused on energy policy priorities and was later modified on 7 December 2006. The target for the first three years (2006-2009) was 54 TWh in final cumulative realized energy saved.

The government compels energy suppliers (electricity, gas, LPG and oil for heating and cooling systems) such as EDF and Gaz de France to reduce energy consumption over a given period and to achieve energy savings via their customers. It also supports ADEME's website. (ADEME is the French Environment and Energy Management Agency.)

Providers are free to decide what type of action to implement in pursuit of this objective: informing customers about how they can reduce their energy consumption, running promotions in association with equipment retailers or the like.

If the set targets are met in time, providers will receive certificates as an attestation of the total savings achieved. On the other hand, providers will be fined by the treasury if they fail to meet their targets. Certificates obtained can be traded to finance energy savings.

---

[44] National action plan for the promotion of ren energies 2009-2020.pdf (Page17)

The “obliged” suppliers can either:

- Take actions to obtain the certificate (through delivering energy savings to its customers)
- Purchase certificates from other suppliers (that have made more energy savings than required)
- Pay the penalty (2c€/kWh).

This penalty fixes the maximum price of the certificates that can be sold.

Standardised methodologies are being set up for saving calculations. “Renewable Heat Production for district heating” (Operation n° RES-CH-01) is one method that deals with deep geothermal energy in Metropolitan, for example.

The amount of the certificate is calculated with a formula (depending on the operation):

- Amount of certificates = annual energy savings * lifetime of the action * discount factor (4%)

More administrative points are described at
http://www.drire.gouv.fr/ile-de-france/energie/cee/faq_cee.htm#ModalitéDépotInstruction

This legislation offers significant opportunity for delivering carbon savings, however it is not clear to what extent the commercial sector and data centres in particular would be able to benefit.

5.6. Voluntary Mechanisms

5.6.1. Energy Star

Energy Star is an important energy labelling scheme that has been adapted to Europe. Further information on Energy Star can be found in Section 2.4.5.

5.6.2. HQE Environmental Assessment Certification

France's HQE (High Environmental Quality) focuses on reducing consumption of natural resources and discharge of pollutants, as well as enhancing the comfort and health conditions of buildings. It is concerned with the design and the construction of both refurbishment and new building projects[45].

HQE is issued by Certivéa when the level is sufficiently reached within 14 targets achieved. A building may get several certifications (e.g., LEED and HQE). Energetic performance labels can also be obtained in France: HPE (High Energy Performance) or THPE (Very High Energy Performance).

The proliferation of international and national certifications complicates the understanding of the country-specific market impact of business and management approaches..

In France, a commercial building can enter an HQE ® "Operation." This new standard was approved 20 July 2009 and is based on three concepts:

- Environmental Quality in Building Operations (QEBE) joins the HQE with 14 targets representing environmental issues on the frame, but adds to the maintainability and continuous performance improvement.
- System Management Operations (SMEX) that is based on the series of ISO 14000 and encompasses all of the requirements management system to be implemented to carry out the operation and meet performance.
- Environmental Quality Practice (QEP) which deals with good practice user/users and is structured into seven topics (optimization of energy, water, waste, purchasing policy, travel, practice managerial, sanitation and comfort).

[45] http://www.eurofins.com/product-testing-services/topics/green-buildings/french-hqe.aspx

Certification of the building may be issued either to the master authority or the operator, with the consent of the owner or the user.

Initiatives are in progress to simplify reference and understanding of the certifications of buildings that are so prolific. Thus, 15 June 2009, the Center Scientifique et Technique du Bâtiment (CSTB) in France and its British counterpart, the Building Research Establishment (BRE), signed an agreement to harmonize their environmental quality benchmarks buildings (HQE ® and BREEAM) methodologies.

5.6.3. DETIC

Since 2007, a "Green IT" working party (DETIC) has been focusing on options and proposals for reducing energy consumption and for the re-use of heat produced by data centres.

The broad aims of the initiative include the encouragement of the installation of data centres in France with three goals: sustainable development, competitiveness of France and land planning.

The working party have also been considering the future (or the Data Centre 2020) and has considered areas such as:

The report "Eco-responsible development and ICT (DETIC)" can be found at www.ladocumentationfrancaise.fr/rapports-publics/094000424/index.shtml and produced the following recommendations:

- Put in place a policy of support for the ICT components and more sustainable products industry by leveraging the underlying programs and including environmental criteria in the selection of innovative projects with a focus on the interoperability of systems and hardware.
- Influence international standardisation bodies and promote standards and labels.
- Promote the uses of ICT for environmental benefit both in terms of their own consumption and that of their users.
- Promote to the public good practices for saving energy by the dissemination of guides by professional federations for optimal use of ICT by the public.
- Increase engineers' and technicians' training in the field of ICT and include concepts of eco-design and responsible practices.

- Assess the energy efficiency and carbon footprint of ICT goods from 2012.
- Promote the installation of French data centres.
- Conduct a review on the future data centre.
- Establishing an observatory on "cloud computing."
- Support innovation around data centres.
- Support the evolution of regulations to take into account the internet and "cloud computing."
- Foster remote working for ecological and planning benefits and promote the development of "telecentres."

6 Germany

6.1. EU and International Policies

6.1.1. European Performance of Buildings Directive and Energy Performance Certification

The Energy Performance of Buildings Directive introduced the legal requirements for non-domestic buildings regarding energy efficiency. Since December 2006, an energy performance certificate (EPC) that shows a building's theoretical energy efficiency must be issued at the point of a building's completion, sale or lease.

The certificate is usually valid for 10 years and must be generated by an accredited assessor.
Germany requires EPCs for all buildings and stipulates that the certificate be on display for buildings larger than 1,000m2. The UK, for example, only requires Display Energy Certificates to be provided at public buildings.

The EPBD also introduced requirements for annual boiler and air conditioning system inspections to be undertaken by accredited assessors. In Germany, annual boiler checks had already been required under the Small & Medium Combustion Plant Ordinance and Environmental Law, respectively.

Please see Section 2 for further information.

6.1.2. The Energy Labelling Directive (92/75/EEC)

The Energy Labelling Directive applies to IT and electronic appliances and is detailed in Section 2.1.3.

6.1.3. EU Ecolabel/Flower

The EU Ecolabel Flower labelling is a voluntary system across Europe, designed to encourage businesses to market products and services that are kinder to the environment. More details can be found in Section 2.1.4.

6.1.4. Eco-Design Directive for Energy-Using Products (2005/32/EC)

The Eco-Design Directive for Energy-Using Products established a framework under which manufacturers of energy-using products are obliged, at the design stage, to reduce the energy consumption and other negative environmental impacts occurring throughout the product's life cycle. Further information on the Directive is provided in Section 2.1.7.

6.1.5. Certain Fluorinated Greenhouse Gases (EC Regulation 842/2006)

A number of ozone-depleting substances that were used in the manufacture of cooling equipment are now banned in most instances under this directive, known as the F Gas Regulation. Further information on this Directive is provided in Section 2.1.9.

6.1.6. EU GHG Emission Trading Scheme (Directive 2003/87/EC)

In January 2005, the European Union Greenhouse Gas Emission Trading Scheme (EU ETS) commenced operation as the largest multi-country, multi-sector greenhouse gas emission trading scheme focused on large energy intensive installations.[46] Further information on the EU ETS can be found at Section 2.1.10.

The EU ETS covers large combustion installations (larger than 20 MW thermal) within EU member states. Sectors covered by the system include power generation, cement, glass, ceramics, the steel industry and so forth, with the aviation industry included from 2013.

[46] Europa http://ec.europa.eu/environment/climat/emission/index_en.htm

6.2. National Policy Context

6.2.1. Energy Concept for Environmentally Friendly, Reliable & Affordable Energy Supply

On 28 September 2010, The German Federal Government presented its "Energy Concept for an Environmentally Friendly, Reliable and Affordable Energy Supply." The Energy Concept not only sets out a long-term strategy until the year 2050, but also contains the federal government's short- and medium-term legislative carbon reduction programme[47]. The central objectives of the Energy Concept 2050 include:

- Reduction in greenhouse gas emissions of 40% by 2020 and 80% by 2050 (compared with 1990 levels)
- Reduction in primary energy consumption of 20% by 2020 and 50% by 2050 (compared with 2008 consumption)
- Reduction in electricity consumption of 10% by 2020 and 25% by 2050 (compared with 2008)
- Increase the share of renewable energy in gross final energy consumption to 18% by 2020 and 60% by 2050
- Increase the share of gross final electricity consumption to 35% by 2020 and 80% by 2050
- Following the March 2011 Fukushima nuclear accidents, Germany's coalition government announced a policy that will see all the country's nuclear power plants phased out by 2022. This decision makes Germany the biggest industrial power to confirm plans to give up nuclear energy and will result in yet further drivers for sustainable energy policy.

The strategy for delivering on energy efficiency focuses on three types of policy mechanism:

- Regulatory policies setting out minimum legal requirements
- Promotional programmes, incentivising low carbon technologies
- Market transformation policies, addressing market failure through awareness and building knowledge

[47] http://www.wfw.com/Publications/Publication732/$File/IJ%20%20New%20German%20Energy%20Concept.pdf

the green grid®
get connected to efficient IT

6.3. Mandatory Obligations

The body in Germany responsible for planning is The Federal Ministry of Transport Building and Urban Development.

The Environmental Policy, Infrastructure and Policy Issues Directorate-General develop and implement key strategic policies.

The Spatial Planning, Urban Development and Housing Directorate-General are responsible for urban development and spatial planning, building and housing law and rent law.

The Building, Construction Industry and Federal Buildings Directorate-General is responsible for building policy issues, improving the energy efficiency of buildings, public procurement, Baukultur (improving the quality of the built environment), civil engineering and the construction industry.

6.3.1. Building Regulations: Energy Saving Ordinance

Energy Saving Regulations EnEV 2009 (Energieeinsparverordnung)

The federal government's resolutions for an integrated energy and climate programme (IEKP) have been implemented in relation to buildings, by amending the energy saving (and heating cost) regulations.

Compliance with minimum standards for energy efficiency in buildings and heating/cooling systems applies in new construction and renovation of residential and non-residential buildings. As with other countries, such as the UK, the German building regulations demand ever-tightening requirements for energy performance and specific details should be examined for any new developments.

The federal government resolved to amend the energy saving regulations (EnEV) on 18 June 2008. On 6 March 2009, the Bundesrat (Federal Council of the German Parliament) gave approval, subject to a few amendments that were adopted by the federal government on 18 March 2009. The amendment to the energy saving regulations came into force on 1 October 2009.

The aim of the amended regulations is to reduce the energy requirements for heating and provision of hot

water in buildings by around 30%. In a further step, under the integrated energy and climate programme (IEKP), the energy standards are to be increased by up to a further 30 % as of 2012.

A summary of the amendments to the EnEV 2009 includes:

- New buildings: the upper limit for the allowable annual demand for primary energy will be tightened by an average of 30%.
- New buildings: the energy requirements for thermal insulation of the building envelope will be increased by an average of 15%, i.e., the thermal insulation of the building envelope must achieve an average 15% more performance than before.
- Modernised older buildings: when modernisation of older buildings includes major structural changes to the building envelope (e.g., replacement of the façade, windows, and roof), the energy requirements for building components will be tightened by an average of 30%. Alternatively, the owner/developer can decide to refurbish to 1.4 times the standard required for new buildings. This refers to the requirements for annual primary energy requirements and for thermal insulation of the building envelope.

In the case of air-conditioning installations that are intended to change the humidity of indoor air, an obligation to retrofit equipment for the automatic control of humidification and dehumidification is planned. In larger buildings, electric night storage heaters that are more than 30 years old must be taken out of service and replaced by more efficient heating systems. This affects residential buildings with at least six apartments and non-residential buildings with a lettable area of more than 500m2. The obligation to take these heaters out of service will be applied in stages up to 1st January 2020.

6.3.2. Renewable Energies Heat Act[48] (EEWärmeG)

The Renewable Energies Heat Act (EEWärmeG) aims to increase the share of renewable energies in heat provision to 14% by 2020. The Act makes the use of renewable energy for space and hot water heating mandatory for new buildings. It also stipulates budget requirements to this end for the Market Stimulation Programme.

[48] http://www.iea.org/textbase/pm/?mode=weo&id=4168&action=detail

The legislation came into force in January 2009 with the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) responsible.

Owners of buildings that are to be newly erected are obliged by the EEWärmeG to use a certain percentage of renewable energy for heating purposes (water and space heating). The minimum percentage depends on the renewable energy technology used, as follows:

- Solar thermal installations are required to secure a 15% renewable energy heating contribution.
- Gaseous biomass installations are required to secure a 30% renewable energy heating contribution (under certain restrictions).
- Other biomass installations, use of liquid biomass, ambient heat and geothermal heat installations are to secure a 50% renewable energy heating contribution.

6.4. Financial Costs

There are no significant carbon pricing policies that are being employed to deliver on Germany's carbon reduction targets other than the EU ETS previously discussed.

Rather, the country focuses on fewer, robust policies including:

- Tough building regulations requirements, including renewable energy technologies, through development
- A long-standing Feed-in Tariff to support renewable energy
- Implementation of the EPBD to increase awareness

6.5. Financial Incentives

6.5.1. Feed-in Tariffs: Renewable Energy Act (EEG)[49]

The most important legal instrument in Germany to support the production of electricity from renewable sources is the Renewable Energy Source Act (EEG), which first came into action in the year 2000. Since then, the EEG has been amended in 2004 and recently in 2008 to cope with the changing requirements.

The objective of this legislation, which applies to all property including data centres, is to increase the share of renewable energy in electricity generation.

The EEG regulates the preferential connection of plants that produce electricity from renewable energy sources and the purchasing, transmission and payment of electricity by the operator of the grid.

The EEG defines payment rates for every kilowatt hour of renewable electricity that is fed into the public grid. The basic payments differ according to the type of renewable energy source, the conversion technology and the capacity of the plant.

The legislation started in April 2000 (as a follow-up regulation to the Electricity Feed Act of 1991). Amendments were then made in 2004 and 2009, with the latest revision being in 2011. The law is not limited in time. The policy is the responsibility of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU).

On 1 January 2009, the amendment of the Renewable Energy Sources Act (EEG) came into force. It provides a higher Feed-in Tariff for wind energy and other measures to stimulate the development of both onshore and offshore wind power.

Photovoltaic Tariffs:

For solar PV, tariffs under the new law decreased for all capacity sizes. For roof-mounted facilities, these were (in EUR cents):

[49] http://ec.europa.eu/energy/renewables/transparency_platform/doc/national_renewable_energy_action_plan_germany_en.pdf

- 43.01/kWh up to 30kW
- 40.91 / kWh from 30 to 100kW
- 39.58 / kWh from 100kW to 1MW
- 33 /kWh for installations over 1MW
- For free-standing facilities the tariff decreased to EUR cents 31.94/kWh

On 1 January 2010 the PV tariffs decreased by 9% for roof systems and on-site consumption, and 11% for the remaining categories. Two further cuts took place during the year 2010 and by 1 July tariffs decreased by a further 13%, to which another 3% cut was added by 1 October.

The government has not made the cuts in the tariff retrospective and, as such, projects installed prior to the cuts still enjoy the favourable tariff.

These cuts in the tariff have been (at least partially) mitigated by the significant reductions in panel costs. However, the economics of the Feed-in Tariff (FIT) have been changing rapidly over recent years and months (both in terms of installation cost and FIT prices), so a more detailed assessment of the specific installation would be required prior to making any investment decisions.

For detailed pricing applicable to other technologies, please refer to https://www.iea.org/textbase/pm/?mode=cc&id=4054&action=detail

6.5.2. Combined Heat and Power Act (KWKG)

The Combined Heat and Power Act (KWKG) came into effect in April 2002 and was amended in January 2009. The legislation provides a key component for increasing the contribution of electricity from CHP plants (even if not exclusively from renewable energies) and promoting construction and development of heating networks.

The local, cogeneration of heat and electricity (albeit from gas) is more efficient than the centralized generation of electricity (where two thirds of energy is wasted through heat and distribution losses).

Investors / operators of CHP benefit from the following incentives (EUR cents / kWh for different sized systems):

- Up to 50kW systems: 5.11 ct/kWh electricity for 10 years
- 50kW to 2MW systems: 2.1 ct/kWh electricity for 6 years (up to 30,000 hours operation)
- Over 2MW systems: 1.5 ct/kWh electricity for 6 years (up to 30,000 hours operation)

The legislation supports both new construction and the modernisation and operation of CHP plants and heating networks, which could be well suited to data centres where the heat generated could be utilized for the purposes of meeting cooling demands through CCHP (combined cooling, heat and power).

6.6. Voluntary Mechanisms

6.6.1. Building Certification

Whilst building certification codes such as LEED can, and have been, applied in Germany, in January 2009, Germany adopted its own Sustainable Building Seal (**DNGB certifications**[50]) tool. This certification scheme is most appropriate for offices and administration properties. This tool evaluates all aspects of sustainable buildings including ecological, economic, and socio-cultural, plus technology, processes and location quality factors.

6.6.2. Energy Star

Energy Star is an important energy labelling scheme that has been adapted to Europe. Further information on Energy Star can be found in Section 2.4.5.

6.6.3. Energy-Efficient Data Centres—Best Practice and Blue Angel Ecolabel

In Germany, on behalf of the Federal Ministry of the Environment, the Borderstep Institute has undertaken Green IT research and published best practice guides, including "Energy-Efficient Data Centers—Best Practice Examples from Europe, the USA and Asia."

The Blaue Engel (Blue Angel) ecolabel is awarded to resource conscious companies committed a long-term strategy of improving the efficiency of their data centre with respect to IT services. Companies are required to frequently monitor and optimise the data centre operations. The Blue Angel ecolabel provides industry with a means of measuring the environmental performance of data centre providers.

To access the platform, please see the following link:
http://blauerengel.ikm.tu-berlin.de.

[50] DGNB certification http://www.dgnb.de/_en/index.php

7 Spain

7.1. EU and International Policies

7.1.1. European Performance of Buildings Directive and Energy Performance Certification

The Energy Performance of Buildings Directive introduced the legal requirements for non-domestic buildings regarding energy efficiency. Since December 2006, an energy performance certificate (EPC) that shows a building's theoretical energy efficiency must be issued at the point of a building's completion, sale or lease. The certificate is usually valid for 10 years and must be generated by an accredited assessor.

Spain implemented the policy nationally (via a Royal Decree) in 2007, requiring an Energy Performance Certificate to be provided to buyers or renters of buildings.

Building on the procedures set out in the (central) Royal Decree, regional governments develop specific procedures, register certificates and undertake inspections locally.

As in other countries, the certificate assigns an energy class to each building in the form of an energy efficiency label ranging from class A, for the most efficient, to class G, for the least efficient[51].
Please see Section 2 for further information on the EPBD.

7.1.2. The Energy Labelling Directive (92/75/EEC)

The Energy Labelling Directive applies to IT and electronic appliances and is detailed in Section 2.1.3.

7.1.3. EU Ecolabel/Flower

The EU Ecolabel Flower labelling is a voluntary system across Europe, designed to encourage businesses to market products and services that are kinder to the environment. This system is detailed in Section 2.1.4.

[51] http://www.idae.es/index.php/mod.pags/mem.detalle/relcategoria.1030/id.25/relmenu.53

7.1.4. The European Commission Code of Conduct on Data Centre Energy Efficiency

The European Commission's Voluntary Code of Conduct on Data Centre Energy Efficiency[52] was launched in November 2008, following input from the data centre industry, to provide education and guidance for stakeholders. This code of conduct is detailed in Section 2.1.5.

7.1.5. Eco-Design Directive for Energy-Using Products (2005/32/EC)

The Eco-Design Directive for Energy-Using Products established a framework under which manufacturers of energy-using products are obliged, at the design stage, to reduce the energy consumption and other negative environmental impacts occurring throughout the product's life cycle. Further information on the Directive is provided in Section 2.1.7.

7.1.6. Certain Fluorinated Greenhouse Gases (EC Regulation 842/2006)

A number of ozone-depleting substances that were used in the manufacture of cooling equipment are now banned in most instances under this directive, known as the F Gas Regulation. Further information on this Directive is provided in Section 2.1.9.

7.1.7. EU GHG Emission Trading Scheme (Directive 2003/87/EC)

In January 2005, the European Union Greenhouse Gas Emission Trading Scheme (EU ETS) commenced operation as the largest multi-country, multi-sector greenhouse gas emission trading scheme focused on large, energy intensive installations.[53] Further information on the EU ETS can be found at Section 2.1.10.

The EU ETS covers large combustion installations (larger than 20 MW thermal) within EU member states. Sectors covered by the system include power generation, cement, glass, ceramics, the steel industry and so forth, with the aviation industry included from 2013.

---

[52] EU CoC Voluntary Code, Guide Version 1 (30th October 2008)
http://re.jrc.ec.europa.eu/energyefficiency/html/standby_initiative_data%20centers.htm

[53] Europa http://ec.europa.eu/environment/climat/emission/index_en.htm

7.2. National Policy Context

7.2.1. Energy Saving and Efficiency Plan 2008-11[54]

The energy saving plan sets out key strategies for driving down carbon reductions, including specific (albeit non-binding) obligations:

- Establishing temperature limitations for non-residential air-conditioned buildings, excluding certain property types such as hospitals (with minimum temperatures for the summer of 26 ^{0}C, and maximum winter temperatures of 21^{0}C)
- A portion of the existing funding for renovating tourism infrastructures (EUR 500 million in 2009) will be set aside to finance investments that promote energy savings
- The Royal Decree on Energy Efficiency in New Buildings will be modified so as to require new Spanish general administration buildings to achieve a high energy ratings
- Work will be carried out with the EC to completely eliminate low-efficiency light bulbs by 2012

The following provides a link to further information on energy legislation in Spain
http://www.cne.es/cgi-bin/brscgi.exe?cmd=verlst&base=publ&docs=1-20&opdef=&&sort=-fech&separador=&titu-c=&op1=y&codi-c=normativa+ingles&op1=y&audp-c=&op2=y&mate-c=&op2=y&desc-c=&op2=y&desc-c=&op3=y&@fech-ge=&op4=y&@fech-le

7.2.2. The Savings Plan and Energy Efficiency 2011-2020

In response to the European Directive requirement for Member States to develop a strategy to contribute to European targets for 20% carbon reductions by 2020, The Cabinet approved the Savings Plan and Energy Efficiency 2011-2020.

The new Action Plan gives priority measures proposed for delivering a 15.6% carbon reduction in the building sector through measures related to the building envelope: thermal performance, lighting and appliances.

[54] http://www.mityc.es/energia/en-US/novedades/Paginas/PAAEE_2011_2020.aspx

7.3. Regulatory Obligations

7.3.1. Building Regulations

Spanish legislation at the national level regarding energy efficiency and renewable energy in the building sector was the result of the transposition of Directive 2002/91/EC of the EU.

A series of standards and codes resulted from this process in Spain in an attempt to cover the requirements laid down in Directive 2002/91/EC -- namely a Royal Decree establishing the following mandatory measures:

- The Technical Building Code (CTE)
- The basic procedure for the energy efficiency certification of new buildings
- The regulation governing thermal installations in buildings

The Technical Building Code was established under Building Planning Law by Royal Decree 314/2006 and sets out the basic safety and habitability requirements. The associated documents (Basic Documents or “DB”) define the technical rules for the Building Code.

The DB-HE "Energy Saving" is among the seven Basic Documents detailing specific requirements for the rational use of energy in buildings and reducing consumption to sustainable levels. It includes a requirement that a proportion of energy consumption comes from renewable energy sources. Spain's 2006 Technical Building Code, the new Regulation, which came into force on 29 February 2008, revokes and replaces the previous Regulation on Thermal Installations in Buildings.

Spain's 2006 Technical Building Code, the new Regulation, which came into force on 29 February 2008, revokes and replaces the previous Regulation on Thermal Installations in Buildings.

The DB-HE “Energy Saving” is broken down into five sections, as follows:

- Limitations on energy demand (heating and air-conditioning)
- Performance of thermal installations/air-conditioning systems
- Efficiency in the indoor lighting installations
- Minimum solar thermal and PV contributions

New and refurbished buildings must, in addition to other energy requirements, be equipped with solar thermal and photovoltaic energy. In the case of solar thermal technology, it establishes a minimum share of energy depending on the climate zone and demand for hot water. In the case of solar photovoltaic energy, it establishes a minimum share of electrical energy depending on the type of building and climate zone.

For further information and technical guidelines on The TBC, please refer to the following:
http://www.estif.org/no_cache/policies/solar_ordinances/?sword_list%5B%5D=code
http://www.iea.org/textbase/pm/?mode=weo&action=detail&id=2439
http://www.isisrome.com/data/mure_pdf/SPA36.PDF

7.3.2. Regulation on Indoor Heating and Air-conditioning Systems (RITE)

The Regulation forms the basic legislative framework for energy efficiency and safety requirements to be met by heating and cooling systems in buildings, with a view to meeting comfort and hygiene demands, during their design and sizing, construction, maintenance and use. It also specifies compliance procedures[55].

The Autonomous Regions therefore need to implement the relevant complementary regulations in order for it to be applied. This means that Autonomous Regions may introduce additional requirements covering the same topics, which are applicable to installations located in their territory.

The following provides a document that lays down the technical Guides on Energy Efficiency and Saving in Heating and Air-conditioning Systems aimed at designers, installers, maintenance engineers, inspectors and users:
http://www.idae.es/index.php/id.27/relcategoria.1030/relmenu.53/lang.uk/mod.pags/mem.detalle

Towards "Zero Carbon" Development:

The Spanish government has laid out its route to achieving a "Near Zero Energy Building" objective by 2020, in line with the objectives set out by the EPBD 2002/91/EC, through revisions to the building code (CTE) from 2011 to 2015 and then 2020.

[55] http://www.idae.es/index.php/id.27/relcategoria.1030/relmenu.53/lang.uk/mod.pags/mem.detalle

7.4. Financial Costs

7.4.1. Feed-in Tariffs (FITs)

Spain, along with Germany and Japan, led the development of the PV market through support provided to the industry in the form of Feed-in Tariffs (FITs).

In 2008, Spain installed 45% of all photovoltaics worldwide, with favourable solar conditions combined with extremely generous tariffs.

Since then, however, the government has changed this law, limiting the FIT, resulting in significant drops in the rate of new installations. In 2010, the Spanish government introduced a 45% retrospective cut in tariffs for ground-based PV panels. Subsidies for large roof-based systems were also reduced by 25%[56]. This has, of course, significantly impacted investor sentiment to such investments in Spain.

As with the FIT policies in other countries over recent years, rapid changes in the economic environment, public finances and panel prices have resulted in rapid changes in the policy support provided. For example, the Spanish government faces multiple lawsuits over its Royal Decrees that cut the FIT for Solar PV Installations.

These laws were passed in Dec 2010 as part of the comprehensive review of the Renewable Energy Subsidies by the government. While Wind Energy and Solar Thermal Subsidies were changed earlier, the controversy over the Solar PV subsidies had forced the government to delay the change until the last minute.

This illustrates the uncertainty and rapid changing nature of FITs, in particular for the most popular and readily deployable technologies such as PV.

7.4.2. Support for Energy Efficiency in Buildings

This scheme is part of the Plan de Ahorro y Efiaciencia Energética (national Energy Savings and Efficiency Plan, PAEE, 2008-2012). The Plan is managed by the IDAE (Instituto para la Diversificación y el Ahorro Energético, Institute for Energy Diversification and Savings). Policies are developed at a regional level by the Autonomies'

[56] http://www.pv-tech.org/news/spanish_solar_investors_seek_compensation

(the seventeen administrative Communities into which Spain is divided) governments, and cover only existing residential and public buildings.

Grants and preferential loans are issued from a budget of €804m allocated to energy efficiency in buildings for the full period. Subsidies are available for the following works: thermal rehabilitation of existing buildings, improvement of energy efficiency in thermal installations of existing buildings, and improvement of energy efficiency in light installations in existing buildings. For planned cuts in energy consumption of 20%, 22% of the necessary investment in subsidised. This can be up to 27% if the building aims to achieve an energy efficiency rating of B and 35% to achieve an A rating.

The current status of the policy is under consultation with the recent change in government and current economic crisis.

For example, a property rated A and housing a single family would receive 50€/m2. Further information can be obtained at the following location:
http://www.mityc.es/energia/es-ES/Novedades/Documents/Anexo%20PA2011_2020Definitivo.pdf

7.5. Financial Incentives

7.5.1. Tax incentives and grants

Spain provides tax-based incentives to householders to invest in low carbon technologies. The Royal Decree-law 6/2010, for example, includes a deduction on income tax for improvements to residential housing and a reduction in VAT for renewal and repair work on "the main residence." In addition, grants are provided to assist in the increasing of energy performance, with greater awards granted for those properties securing better ratings (for example a property rated A and housing a single family might receive 50€/m2).
Such incentives are, however, focused on the domestic sector and, hence, do not benefit the data centre industry.

7.5.2. Interest-Free Loans

There are small budgets available to support the financing of low carbon technologies. Funds are made available and managed by IDEA to integrate thermal renewable energy technologies into building for biomass, geothermal and solar energy. These funds are delivered through Energy Service Companies (ESCOs) qualified by IDEA, which provides low-interest financing to the ESCOs that invest in low carbon projects. Interest is then charged at a rate of 1.5% to 2.2% depending upon the technology. Budgets of €5 million are available for biomass, €3 million for geothermal and €5 million for solar projects.

7.6. Voluntary Mechanisms

7.6.1. VERDE. Building Evaluation and Environmental Certification Method

The Green Building Council España's Technical Committee has put together criteria and established rules to define the requirements a building must meet to be qualified as sustainable in order to obtain a GBC España Certificate-VERDE.

The evaluation system is based on a feature evaluating method, in accordance with the CTE (Código Técnico de la Edificación, Technical Building Code) and European Guidelines.

The evaluation criteria are grouped into the following subjects:

- Site selection, project planning and development
- Energy and atmosphere
- Natural resources
- Indoor environmental quality
- Service quality
- Social and economic aspects

A benchmark, or reference score, is assigned to each criterion and a score is awarded between 0 (meeting compliance requirements) to 5 (implying the best possible practice with an acceptable cost).

The final score is obtained by comparing and adjusting the impact in relation to the reference building, and weighted for the significance assigned to each of the aspects.

7.6.2. Energy Star

Energy Star is an important energy labelling scheme that has been adapted to Europe. Further information on Energy Star can be found in Section 2.4.5.

8 Netherlands

8.1. EU and International Policies

8.1.1. European Performance of Buildings Directive & Energy Performance Certification

The Energy Performance of Buildings Directive introduced the legal requirements for non-domestic buildings regarding energy efficiency. Since December 2006, an energy performance certificate (EPC) that shows a building's theoretical energy efficiency must be issued at the point of a building's completion, sale or lease. The certificate is usually valid for 10 years and must be generated by an accredited assessor.

The Netherlands was quick to implement the policy at the national level, and has had such a requirement as part of its Energy Performance Standard (EPN) since 1995. Furthermore, the Netherlands had begun work requiring the display of Energy Performance Certificates in public buildings with a useful floor area of over 500 m2.

The EPBD also introduced requirements for annual boiler and air conditioning system inspections to be undertaken by accredited assessors. In the Netherlands, annual boiler checks had already been required under the Small & Medium Combustion Plant Ordinance and Environmental Law, respectively.

Please see Section 2 for further information.

8.1.2. The Energy Labelling Directive (92/75/EEC)

The Energy Labelling Directive applies to IT and electronic appliances and is detailed in Section 2.1.3.

8.1.3. EU Ecolabel/Flower

The EU Ecolabel Flower labelling is a voluntary system across Europe designed to encourage businesses to market products and services that are kinder to the environment. More details can be found in Section 2.1.4.

8.1.4. European Commission Code of Conduct on Data Centre Energy Efficiency

The European Commission's Voluntary Code of Conduct on Data Centre Energy Efficiency[57] was launched in November 2008, following input from the data centre industry, to provide education and guidance for stakeholders. This code of conduct is detailed in Section 2.1.5.

8.1.5. Eco-Design Directive for Energy-Using Products (2005/32/EC)

The Eco-Design Directive for Energy-Using Products established a framework under which manufacturers of energy-using products are obliged, at the design stage, to reduce the energy consumption and other negative environmental impacts occurring throughout the product's life cycle. Further information on the Directive is provided in Section 2.1.7.

8.1.6. Certain Fluorinated Greenhouse Gases (EC Regulation 842/2006)

A number of ozone-depleting substances that were used in the manufacture of cooling equipment are now banned in most instances under this directive, known as the F Gas Regulation. Further information on this Directive is provided in Section 2.1.9.

8.1.7. EU GHG Emission Trading Scheme (Directive 2003/87/EC)

In January 2005, the European Union Greenhouse Gas Emission Trading Scheme (EU ETS) commenced operation as the largest multi-country, multi-sector greenhouse gas emission trading scheme focused on large energy intensive installations.[58]

The EU ETS covers large combustion installations (larger than 20 MW thermal) within EU member states. Sectors covered by the system include power generation, cement, glass, ceramics, the steel industry and so forth, with the aviation industry included from 2013.

Further information on the EU ETS can be found at Section 2.1.10.

---

[57] EU CoC Voluntary Code, Guide Version 1 (30th October 2008)
http://re.jrc.ec.europa.eu/energyefficiency/html/standby_initiative_data%20centers.htm

[58] Europa http://ec.europa.eu/environment/climat/emission/index_en.htm

8.2. National Policy Context

8.2.1. Decree Energy Performance of Buildings (BEG)

From 2015, the government will regulate how much green electricity power companies must produce. The goal is that by 2020, 35% of the Dutch usage of electricity must be sustainable.

The Decree on Energy Performance of Buildings (BEG), the Regulations on Energy Performance of Buildings (REG) were issued in December 2006, forming the key framework for Netherland's commitment to carbon reduction and in support of implementation of EPBD locally.

The Energy Performance Standard (EPN) had been introduced in 1995, already contributing to Netherlands' commitment to the EU EPBD requirements to adopt a strategy for delivering carbon reductions.

The Dutch sustainable building policy, according to Luciana Melchert in 2005[59], has transitioned from the 1970s attempt to improve the environmental performance of building stocks by means of renewable energy technologies, to adopting a framework to improve the environmental performance of building stocks through a focus on more energy efficient technologies.

The new government (of October 2010) announced a radical overhaul of Dutch energy policy early in 2011, cutting subsidies for most forms of renewable energy significantly (although not retrospectively), ending subsidies for offshore wind, solar and biomass projects. It also announced that nuclear power stations would be welcomed. Indeed Prime Minister Mark Rutte indicated on 18 March 2011 that there were no plans to change operations at Borssele nuclear power plant and called the German moratorium "curious."

Moreover, the Dutch government has reduced its target for the generation of electricity from renewable sources from 20% to 14% by 2020.

[59] Luciana Melchert, a Faculty of Architecture and Urbanism, University of São Paulo, Rua do Lago, 876, CEP 05508.900, São Paulo SP, Brazil (September 2005).

8.3. Regulatory Obligations

8.3.1. Building Regulations: Bouwbesluit

The **Bouwbesluit**[60] are the technical building regulations in the Netherlands, laid down in the Building Decree to unify performance. These performance-based regulations, with which all structures must comply, are set at the national level.. Performance relates to a range of issues with requirements including:

- Safety (e.g., the mechanical strength, fire safety and user safety such as requirements for stairs and availability of emergency appliances)
- Health (e.g., ventilation, sound insulation)
- Usefulness (e.g., accessibility for disabled people, habitable space toilet compartment, communal store for domestic waste)
- Energy-saving (e.g., thermal insulation, energy performance, air tightness)

http://www.rijksoverheid.nl/#ref-vrom

The calculated energy performance coefficient (EPC), based on the building and installation design, is a measure for the expected energy use of a building or a building function (a lower value is better). The maximally allowed value is determined by legislation and was changed in 1995 (value 1.9) and in 2000 (value 1.6). A building permit is only obtained when these conditions are met.

Towards Energy-Neutral Buildings[61]

The Netherlands strengthened standards for newly built houses by 25% in 2011 and by 50% in 2015 compared to the standard in 2007. As of 2017, newly built non-residential buildings have to be 50% more energy efficient compared to the 2007 standard. Whilst this law will apply to data centres, it should be noted that investigation of the detailed policy requirements should be conducted to determine the impact of this legislation, as it may well be the case that the "regulated emissions" considered do not relate to the operational energy consumption associated with the data centre and, as such, may be less challenging than it might otherwise appear.

[60] Dutch Building Code http://www.rijksoverheid.nl/

[61] http://www.agentschapnl.nl/programmas-regelingen/energieneutraal-bouwen

The energy-neutral building in 2020 is a goal of European Union, expressed through the EPBD and to be implemented over time through The Bouwbesluit by the Dutch government.
Energy performance requirements for new buildings will be steadily tightened to zero-energy or nearly zero-energy level by 2020, in line with the requirements of EPBD.

For retrofitting existing buildings, requirements for building envelope components and installations will be increased and/or introduced within one or two years.

8.3.2. Planning: Spatial Planning Act

The Spatial Planning Act of 1965 is based on the premise that the principles of spatial planning policy find their way into the physical plans of local authorities more or less automatically. The latest Spatial Planning Act was updated in July 2008.

Since 1965, a large number of amendments have been passed. The last major alteration involved changing Section 19 to include an independent project procedure for local authorities. This has led to the establishment of a law that provides for many eventualities but has also become extremely complicated and confusing in practice. The Council of State has even compared it to a “patchwork quilt.” The Second Chamber of the Netherlands parliament concurs with this opinion and, because of this, the government has decided to fundamentally revise the act.

8.3.3. Spatial Planning Act (Wet op de ruimtelijke ordaening)

While national policy on spatial planning is determined by the Ministry of Infrastructure and Environment, provincial government is responsible for translating these guidelines into the regional context. The 12 provincial governments develop regional policy and draw up regional plans setting out the zoning guidelines for the location and expansion of residential, industrial and commercial areas within cities, towns and villages.

Municipal Government

Implementing national policy and strategy on spatial planning is largely decentralised to municipal government.

These authorities prepare local regulations and detailed land-use plans and have both the legal and financial means to implement and enforce decisions and regulations[62].

The details of the Act can be found at:
http://www.internationalplanninglaw.com/files_content/081006%20English%20text%20Wro.pdf

8.3.4. Environmental Management Act (2004)

The Netherlands replaced the Environmental Protection (General Provisions) Act 1986 to incorporate the Environmental Impact Assessments as a legal requirement to ensure that environmental concerns are accounted for in planning and decision-making processes.

62 http://english.verkeerenwaterstaat.nl/english/topics/spatial-planning/roles_and_responsibilities_other_authorities/

8.4. Financial Costs

8.4.1. NOx emissions trading

In addition to participation in the EU GHG Emissions Trading Scheme (detailed in Section 2), the Dutch have an established emissions trading program for NOx. This scheme was developed as part of its national policy to comply with the EU directive on National Emission Ceilings (NEC Directive). Whilst other countries have elected to limit NOx emissions through other regulatory mechanisms, the Dutch government has elected to implement a trading policy to meet this requirement.

In order to implement the NOx emission trading schemes, a new chapter on emissions trading was added to this Act: EMA Chapter 16 CO2 emissions trading act:
http://www.acdi-cida.gc.ca/INET/IMAGES.NSF/vLUImages/ea%20summaries/$file/Net.pdf

For further information, see the following link:
http://climate.bna.com/climate/document_climapedia.aspx?id=157552&hhterm=KGNsYXNzX25hbWUgY29udGFpbnMgRXVyb3BlKQ%3d%3d&hhtype=Qm9vbGVhbg%3d%3d

8.4.2. Carbon Taxes

In July 2008, the Netherlands introduced a “flight tax” of €11.25 for a trip within the EU and €45 per flight outside of the EU. After the introduction, airports just across the Dutch border saw a significant increase in the number of Dutch passengers. In July 2009, protests from airlines and Dutch airports led to the abolishment of the tax.

Based upon this experience and actions of the current administration, it is not likely that significant new taxes on carbon would be rapidly adopted.

8.5. Financial Incentives

8.5.1. Tax incentive: EIA (Energy Investment Allowance)

Since 1997, the energy investment deduction tax rule allows Dutch companies additional tax reductions after investments in energy efficiency and renewable energy have been made. Companies investing in approved efficient equipment and renewable energy technologies can deduct 44% of the investment amount from their pre-tax profits in the calendar year in which the equipment was procured.[63] To be eligible, Bureau Investeringsregelingen en Willekeurige Afschrijving (IRWA) forms must be completed within three months of the investment[64].

An Energy List determines which types of equipment qualify for the IRWA programme. The programme includes the cost of obtaining energy advice, provided that the advice results in an investment in energy-saving equipment.[65]

8.5.2. Financing Support and Interest-Free Loans

In April 2011, the government outlined a new Energy Strategy and promised to come up with a set of policy initiatives under the name of a "Green Deal." The aim of this plan is to stimulate initiatives for energy efficiency and local sustainable energy projects. As part of this Green Deal, the government, working in partnership with the private sector, will facilitate the funding to finance energy saving initiatives.

One such "Green Deal" commits Tata Steel's plant in Ijmuiden to three projects totalling €10 million that should lead to annual energy savings of 83,333 MWh.

The government's coalition will make agreements with citizens, companies and NGOs to stimulate the development of plans that combine economic growth and sustainability.

---

[63] Agentschap (Dutch Agency responsible for Subsidy Programme) "Energy Investment Allowance (EIA) 2009"leaflet http://www.agentschapnl.nl/nl/programmas-regelingen/energie-investeringsaftrek-eia

[64] Agentschap NL (Dutch Agency responsible for Subsidy Programme) Energy Investment Allowance (EIA) 2009 Leaflet http://www.agentschapnl.nl/nl/programmas-regelingen/energie-investeringsaftrek-eia

[65] Agentschap (Dutch Agency responsible for Subsidy Programme) http://www.agentschapnl.nl/nl/programmas-regelingen/energie-investeringsaftrek-eia

So far over 58 wide-ranging initiatives have been selected including biogas from sewage sludge, domestic solar projects and using temporarily unused lands for wind turbines.

8.5.3. Feed-in Tariffs (FITs)

The Dutch Cabinet had agreed to implement a Feed-in Tariff (FIT) on 27 March 2009, complementing its subsidies available for various technologies, notably wind combined with the tax incentives for investing in low carbon technologies (44% of the total cost can be written off against tax in the first year).

The FIT regime, however, has been scaled back and capped significantly (albeit not retrospectively), with tariffs provided (and associated caps) as follows:

- Wind power (on shore) €0.118
- Wind power (off shore €0.186
- Solar PV €0.459 - 0.583
- Biomass €0.115 - 0.177
- Hydro €0.073 - 0.125

It should be noted that the FIT in the Netherlands indicated above excludes a deduction of the average electricity price. As such, as electricity prices increase to the value of the FIT, so the FIT becomes zero.

The result of this policy is that the investor in the technology receives a constant return. This is because as the electricity price goes up, the tariff goes down. As such, the investor gains from the increasing electricity price, but suffers from a reducing tariff. These differences balance each other out to result in a constant return for the investor.

The benefit to the public sector is that this policy also limits the investment in the scheme where energy prices increase, as the tariff reduces when electricity prices go up.

The value of FIT in the Netherlands is capped, and so availability of the tariff should be considered prior to any investment being made.

8.6. Voluntary Mechanisms

8.6.1. BREEAM-NL

The DGBC translated the original English version into Dutch. In April 2008, the council worked out the first adaptation of BREEAM-NL New Buildings to the local situation in the Netherlands. Five working groups comprised of retail, residential, office, industrial and regional constituents offered their feedback in May, and this input was used to form an optimal rating scheme for each building type and region. The next step was to implement what the Dutch GBC had learned.

Thirteen pilot projects commenced in February 2009. In March 2009, DGBC launched the beta version of BREEAM-NL New Buildings. The addition “NL” makes clear that this is the Dutch version.

The beta version was designed to be used for testing. Besides the thirteen official pilots, many other organisations and individuals downloaded and tried the beta version. A dedicated Wikipedia page was opened to allow for anyone to assist in the development. Their findings, comments and questions contributed to the completion of BREEAM-NL.

In September 2009, the council formally approved BREEAM-NL 2010 Version 1.0 for new buildings. This scheme can be used for individual offices, schools, shops, industrial buildings and major renovation projects. On October 1, the scheme was publicly launched.

The council will further develop the In Use and Area Development labels. The Ministry of Housing, Spatial Planning and the Environment (VROM) provides information on environmental legislation.

8.6.2. Green Fan

Green Fan is an Evoswitch initiative that provides an opportunity for organisations to display the Green Fan logo, demonstrating that they are actively making a positive contribution to reducing CO2 emissions.
The Green Fan provides end-users with a “guarantee” that the collective IT infrastructure is supplied in an efficient and environmentally friendly manner, with a commitment to a reduction in CO2 emissions and the use of sustainable energy.

8.6.3. More with Less Programme

The More with Less Programme is a joint initiative from the Dutch government, energy retailers, social housing providers, and construction and installation companies. It aims to make 500,000 buildings 30% more energy efficient in the period 2008 - 2011, increasing to 2.4 million buildings by the year 2020. This policy is not specific to data centres.

8.6.4. InfoMil

The Dutch knowledge centre InfoMil is a key source of information and best practices in matters of environmental legislation and policy in The Netherlands.

Since its foundation in 1995, InfoMil has provided up-to-date, unbiased and practical information to policymakers and to those who implement and execute policy, such as licensing officers and inspectors[66].
http://www.ecn.nl/docs/library/report/2010/e10049.pdf

8.6.5. Energy Star

Energy Star is an important energy labelling scheme that has been adapted to Europe. Further information on Energy Star can be found in Section 2.4.5.

[66] http://www.infomil.nl/english/about-infomil/

9 Italy

9.1. EU and International Policies

9.1.1. European Performance of Buildings Directive & Energy Performance Certification

The Energy Performance of Buildings Directive introduced the legal requirements for non-domestic buildings regarding energy efficiency. Since December 2006, an energy performance certificate (EPC) that shows a building's theoretical energy efficiency must be issued at the point of a building's completion, sale or lease. The certificate is usually valid for 10 years and must be generated by an accredited assessor.

In Italy, the Ministry of Economic Development, in collaboration with the Ministry of Environment and the Ministry of Infrastructure, are in charge of the regulation on Energy Conservation of Buildings (ECB).

The most significant advancement in the new national regulations was made on the 25th of July 2009, when a new Ministerial Decree entered into force, adopting the National Guidelines on Energy Certification of Buildings.

As of July 2009, all existing residential and non-residential buildings need to be certified when they are sold. There was no obligation for rented buildings at the national level, but the obligation exists in 8 Regions out of the 10 that have produced regional legislation. The Legislative Decree transposing the Directive 2009/28/EC, recently approved by the government, has corrected this item, requiring that both sale and rental contracts mention that the EPC was presented to the buyer or renter. Even if for rental, this is limited to cases where the EPC is already available.

National Guidelines for Energy Certification Scheme of Buildings

There are guidelines that apply to Regions that have not as yet implemented provisions under the EPBD for building certification and apply until any regional legislation takes effect. Regions are to harmonise their implementation of the Directive with the guidelines.

The guidelines specify the information that needs to be contained in the certificate: technical reference standards and methodologies for calculating the energy performance of buildings. The building certificates are valid for 10 years but must be updated following significant interventions that either improve or deteriorate

energy performance (e.g., renovation of at least 25% of building envelope or replacement of air conditioning or hot water systems)[67].

Please see Section 2 for further information.

9.1.2. The Energy Labelling Directive (92/75/EEC)

The Energy Labelling Directive applies to IT and electronic appliances and is detailed in Section 2.1.3.

9.1.3. EU Ecolabel / Flower

The EU Ecolabel Flower labelling is a voluntary system across Europe designed to encourage businesses to market products and services that are kinder to the environment. This system is detailed in Section 2.1.4.

9.1.4. The European Commission Code of Conduct on Data Centre Energy Efficiency

The European Commission's Voluntary Code of Conduct on Data Centre Energy Efficiency[68] was launched in November 2008, following input from the data centre industry, to provide education and guidance for stakeholders. This code of conduct is detailed in Section 2.1.5.

9.1.5. Eco-Design Directive for Energy-Using Products (2005/32/EC)

The Eco-Design Directive for Energy-Using Products established a framework under which manufacturers of energy-using products are obliged, at the design stage, to reduce the energy consumption and other negative environmental impacts occurring throughout the product's life cycle. Further information on the Directive is provided in Section 2.1.7.

9.1.6. Certain Fluorinated Greenhouse Gases (EC Regulation 842/2006)

A number of ozone-depleting substances that were used in the manufacture of cooling equipment are now banned in most instances under this directive, known as the F Gas Regulation. Further information on this Directive is provided in Section 2.1.9.

---

[67] https://www.iea.org/textbase/pm/?mode=cc&id=4450&action=detail

[68] EU CoC Voluntary Code, Guide Version 1 (30th October 2008)
http://re.jrc.ec.europa.eu/energyefficiency/html/standby_initiative_data%20centers.htm

9.1.7. EU GHG Emission Trading Scheme (Directive 2003/87/EC)

In January 2005, the European Union Greenhouse Gas Emission Trading Scheme (EU ETS) commenced operation as the largest multi-country, multi-sector greenhouse gas emission trading scheme focused on large energy intensive installations.[69]

The EU ETS covers large combustion installations (larger than 20 MW thermal) within EU member states. Sectors covered by the system include power generation, cement, glass, ceramics, the steel industry and so forth, with the aviation industry included from 2013.

Further information on the EU ETS can be found at Section 2.1.10.

[69] Europa http://ec.europa.eu/environment/climat/emission/index_en.htm

9.2. National Energy Policy Context

Italy has an energy reduction target of 9.6% in final energy consumption by 2016. A key contribution to this will come from a legal obligation (white certificate scheme) placed upon electricity and gas distributors to save 6 Mtoe primary energy by 2012.

In addition, legally binding targets are in place for renewable systems as follows:

- 17% of electricity are to be generated from renewable energy sources by 2020
- 4.5% biofuels target to be met by 2012
- A CHP target of 0.8 Mtoe savings per year by 2016

The targets set are driven by a need to comply with EU Directives, notably the Energy Saving Directive and the RES Directive.

9.2.1. National Energy Efficiency Action Plan

In accordance with EU Directive 32/CE/2006, Italy submitted its National Energy Efficiency Action Plan in July 2007. The plan considers measures already undertaken under the budgetary law of 2007 and other measures, such as application of energy efficiency standards in buildings and the promotion of high efficiency CHP plants. The proposed measures aim to achieve an energy saving target of 9.6% by 2016, comprising 118,464 GWh.

In the private sector, including data centres, measures include:

- Efficient lamps and control systems
- Replacement of 1-90 kW electric motors by class Eff2 to Eff14
- Installing inverters on 0.75-90 kWh5 electric motors
- High-efficiency cogeneration
- Use of mechanical vapour compression

There are no legal obligations for businesses to implement the NEEAP. However, each region has its own building policy and standards that must be followed by business and should align with the above.

9.2.2. Climate Change Action Plan

In June 2007, the Italian parliament's environment committee set out a comprehensive action plan to comply with greenhouse gas reduction targets under the Kyoto protocol.

Among the proposals was a ban on the sale of household appliances ranked below A on the EU energy efficiency labelling scale and a ban on low efficiency incandescent light bulbs from 2012. The industrial sector would be encouraged to switch to low energy devices and install more efficient engines and motors.

9.3. Regulatory Obligations

9.3.1. Planning and Building Control

In Italy, planning and building control, environmental matters, and the system of regulation of sustainability aspects of construction is the responsibility of its 20 Regions. Of these, five regions have a particular degree of legislative and financial autonomy and, as a special case, there are two regions that have their own construction regulations owing to their alpine geography.

9.3.2. Draft Law on Building Quality (Legge per il Sistema Casa Qualitá)

As of the end of 2010, it has been reported that seven of the 20 Regions had implemented laws to transpose the energy labelling requirements of EPBD and another seven had implemented broader sustainability laws. As described above, the methodologies adopted by the various regions differ.

A need was seen for legislation at the national level to create a common approach and methodology. In 2009, a Draft Law on Building Quality was drawn up (Disegno di legge AC1952 'Sistema casa qualità), which would supersede the regional codes on sustainable building amongst other provisions.

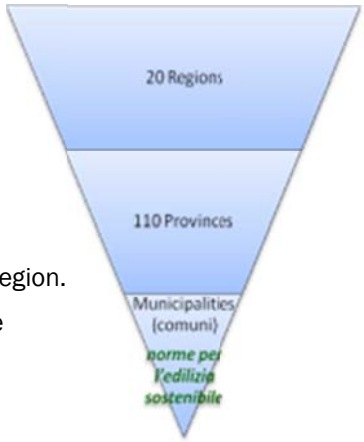
Art. 3 of the Draft Law sets the specific guidelines for the calculation method and the minimum requirements of the "quality building" system, based on the general principles of:

- Energy efficiency
- Satisfaction of the physical and psychological needs of the user
- Satisfaction of ecological impact requirements

As of the end of 2010, it appears the draft law was still in the consultation process.
All new buildings are obliged to satisfy at least 50% of hot water demand by means of solar generation.

9.3.3. Regional Policies

The Regions are subdivided into Provinces, and these into municipalities (comuni). Each of these comuni implements its own building regulations with their own sustainable building codes (norme per l'edilizia sostenibile), but based on Regional guidelines. Building control is enshrined in regional/provincial structure plans and by each comune in a Piano Regulatore Generale (General Regulatory Plan).



A province is composed of many municipalities and usually several provinces form a region. The region of Aosta Valley is the only one that, strictly speaking, has no provinces. The administrative functions of its province are provided by the corresponding regional government. However, loosely speaking, it is seen as a single province.

The three main functions devolved to provinces are:

- Local planning and zoning
- Provision of local police and fire services
- Transportation regulation (car registration, maintenance of local roads, etc.)

Regions:

Abruzzo, Aosta Valley, Apulia, Basilicata, Calabria, Campania, Emilia-Romagna, Friuli-Venezia Giulia, Lazio, Liguria, Lombardy, Marches, Molise, Piedmont, Sardinia, Sicily, Tuscany, (Trentino-Alto Adige/Südtirol), Umbria, Veneto.

The following provides links to four key regional provinces' policies:

MILAN	http://www.provincia.milano.it/	http://www.comune.milano.it/portale/wps/portal/CDMHome
TURIN	http://www.provincia.torino.it/ http://www.provincia.torino.it/territorio/sezioni/pian_territoriale/presentazione	http://www.comune.torino.it/ http://www.provincia.torino.it/ambiente/energia/normativa
ROME	http://www.provincia.roma.it/	http://www.comune.roma.it/wps/portal/pcr http://www.urbanistica.comune.roma.it/assessorato.html

MODENA	http://www.provincia.modena.it/	http://www.comune.modena.it/edilizia/

9.4. Financial Costs

In addition to the indirect impacts of the EU ETS (acting as an indirect cost of carbon), in January 1999, the Italian government enacted a carbon tax that was to be phased in over five years. The aim was that the tax would deliver significant carbon reductions as part of Italy's Kyoto Protocol targets.

It was intended that over time the taxes on petrol, diesel, coal, heating oil and natural gas would increase to 2005. However, the tax increases have been halted since 2000 and the implementation of the "Green Tax Reform" postponed.

9.5. Financial Incentives

9.5.1. Regional Variations in Incentives

The regionalization of energy policy is not limited to the regulatory and planning policy framework. Financial structures are in place to provide incentives for energy efficiency in buildings and are largely administered on a regional level in Italy.

Again, implementation of policy in Italy is done at the regional level and several have taken initiative and launched their respective energy efficiency measures and incentive programs.

The following provides just a two notable examples of individual regions' energy policies.

Val d'Aosta

In January 2006, the Val d'Aosta launched a program to offer financing and credit for the installation of systems for[70]:

- The rational use of energy
- Energy efficiency improvements in buildings
- Use of renewables energy sources

Sardinia

In 2006, the Sardinia Regional Authority established financial incentives for local enterprises to conduct energy audits and to invest in energy conservation through efficient production and operation and through the development of local renewable energy sources.

9.5.2. Tax Incentive:

A 55% tax credit is distributed (over 10 fiscal years) for the following building energy efficiency measures:

- Electric, absorption cycle, and geothermal heat pumps
- Condensing boilers and solar thermal collectors
- Retrofitting of the building envelope that secures an energy performance less than 20% of the requirements in force

[70] http://www.iea.org/textbase/pm/?mode=weo&id=2642&action=detail

Measures must be applied to those existing buildings that are equipped with a heating system (apart from the installation of solar thermal) and, as such, have limited impact on data centres (where heating is not required).

9.5.3. Feed-in Tariffs: RES Promotion - Decree Implementing Directive 2009/28/EC

The Decree No. 28 of May 3rd, 2011, transposes into Italian law the EU Directive 2009/28/EC provisions on the promotion of the use of energy from renewable sources. The Decree sets specific targets required to achieve the national renewable energy target of 17% of gross final consumption of energy by 2020[71].

Feed-in Tariff (FIT) for Photovoltaic Systems (adjusted 2011)

The Ministerial Decree of 19 February 2007 introduced a new version of the FIT scheme applied to photovoltaic plants connected to the grid with a nominal capacity higher than 1 kWp realised by individuals, registered companies, condominiums and public bodies.

The decree provided a set of tariffs, valid for a period of 20 years, with a bonus in case of high degree of photovoltaic integration in the buildings.

Three types of systems are considered, each with different tariff regimes:

- Not building integrated
- Partially building integrated and
- Full building integrated

For 2010, the premium for building integration of the systems varies, from a minimum of EUR 0.346/kWh (for un-integrated plants with capacity less than 20 kW) to a maximum of EUR 0.471/kWh (for fully integrated plants with capacity between 1 and 3 MW). A tariff bonus of 5% is provided for:

- Energy self-producers, as defined by the Decree 79/1999
- Installations integrated to building substituting asbestos roofs

The details relating to the tariff and specifications can be found at:
http://www.iea.org/textbase/pm/?mode=weo&id=4106&action=detail

[71] https://www.iea.org/textbase/pm/?mode=cc&id=4848&action=detail

http://www.gse.it/attivita/Incentivazioni%20Fonti%20Rinnovabili/Pagine/default.aspx

The FIT regime in Italy, as with other countries, has been evolving rapidly. As such, the current tariffs (if any) are likely to be different to those detailed above. Therefore, a specific review of the legislation should be completed prior to any investments being made.

9.6. Voluntary Mechanisms

9.6.1. Italy First EU Nation to Adopt LEED Building Rating System

The Italian Green Building Council (GBC) has become the first to implement a tailored version of the US GBC LEED green building rating system in Europe.

The GBC Italia version of LEED will reference local standards and codes, include Italian-specific units and outline alternative compliance paths appropriate to the region.

The agreement will also see the two building councils share tools, research and information about green building[72].
http://www.energiesensibili.it/numero8/efficienza-energetica/leed

Please see Section 2 for further information on the LEED certification system.

9.6.2. Energy Star

Energy Star is an important energy labelling scheme that has been adapted to Europe. Further information on Energy Star can be found in Section 2.4.5.

9.7. Useful Links:

Government of Italy, Ministry of the Environment and Territory
http://www.reeep.org/514.1700/government-of-italy-ministry-of-the-environment-and-territory.htm
www.minambiente.it

[72] http://www.energyefficiencynews.com/i/3046/

10 Switzerland

10.1. EU Policies

As Switzerland is not in the EU, there are no EU policies applicable to the country.

10.2. National Policy Context

10.2.1. Energy Strategy 2050

The Federal Council aims to safeguard Switzerland's energy security without nuclear energy. Existing nuclear power plants are to be decommissioned at the end of their life and not be replaced by new nuclear power plants. The Federal Council, as part of its new Energy Strategy 2050, places emphasis on energy efficiency, hydropower and new renewable energies.

10.2.2. SwissEnergy Programme (EnergieSchweiz)

Referring to it as "a platform for an intelligent energy policy," in January 2001, energy minister Moritz Ellenberger launched the SwissEnergy Programme with the objectives of reducing fossil fuel consumption and increasing the contribution of renewables to energy supply.
Its measures, in line with the Swiss approach to sustainable energy more generally, are primarily based on the principle of market let and voluntary action.

10.2.3. Energy Strategy 2006-2011

The energy strategy for 2006-2011 was adopted at the EnDK/EnFK spring meeting of 29 April 2005. The key focus of the Energy Strategy 2006 -2011 is to reduce the energy in the building sector, with the area identified as having the greatest potential as the upgrading of existing buildings. The following link provides further information on the Energy Strategy 2006-2011:
http://www.bfe.admin.ch/themen/00526/00528/index.html?lang=en&dossier_id=00729

10.2.4. A Focus on the Market Rather than Subsidy to Stimulate Change

Switzerland’s approach to sustainable energy has been to set high standards in building regulations and fund research and development, then enable the market to deliver efficient buildings.

At the US – Swiss Dialogue on Clean Tech in 2010, for example, Doris Leuthard, President of the Swiss Federation, stated that, in Switzerland, they do not prefer to give subsides and tend to focus more on market-based policy and incentives, giving these technologies a push by investing in research and development rather than focusing on subsides that are provided in other European countries[73].

10.2.5. SwissEnergy – Working in Partnership with Cantons and Municipalities

Since 1990, all cantons have drawn up their own energy legislation and regulations and, with the enactment of the Federal Energy Act and the Federal Energy Ordinance on 1 January 1999, the Federal Council fulfilled the mandate it had received.

SwissEnergy works in partnership with cantons, cities and municipalities to promote energy efficiency in the built environment, and thus contributes to Switzerland's CO2 objectives of:

- Reduction of CO2 emissions from combustibles by 15% versus the 1990 level
- Reduction of CO2 emissions from motor fuels by 8% versus the 1990 level
- Maximum increase in electricity consumption by 5% versus the 2000 level

Note that the above objectives are general targets rather than specific to, for example, data centres.
In line with the government's market-focused approach, the federal government promotes research, development and pilot projects aimed at transferring best practices to the market.

The cantons are SwissEnergy's partners in the delivery of energy-saving policies and initiatives, with responsibility for the enforcement of relevant legislation, the co-ordination of cantonal regulations, and the introduction and implementation of building efficiency standards through delivery of advisory centres supported centrally by SwissEnergy.

The SwissEnergy "Municipalities Programme" supports municipalities through provision of financial and advisory support.

[73] http://www.minergie.ch/home_en.html

SwissEnergy encourages large-scale consumers to commit themselves to the declared objectives of SwissEnergy and thus play an exemplary role. Measures include complying with the MINERGIE standard for buildings and entering into target agreements with the Energy Agency for Industry.

10.2.6. Links to Swiss Energy Policy and Initiatives

Energy Strategy 2050

Energy efficiency action plan

Renewable energy action plan

Annual reports

Cantons and municipalities

Services in my canton

Energy in buildings research programme

SwissEnergy for infrastructure plants

MINERGIE

Energy Agency for Industry (EnAW)

10.3. Building Obligations

10.3.1. Mustervorschriften der Kantone im Energiebereich (MuKEn)

Mustervorschriften der Kantone im Energiebereich (MuKEn) are the model building regulations in Switzerland. These regulations are the responsibility of the 26 cantons that make up the federal state of Switzerland. Since 2000, cantons have been harmonising their building regulations according to Model Cantonal Building Prescriptions (MuKEn). 23 cantons have already adopted the basic MuKEn module into their energy legislation[74].

These regulations have been revised and the cantons are expected to approve the more stringent model standards in 2008, with the key revision concerning the limits on the maximum annual energy requirement for space and water heating.

The cantons define the energy performance requirements for the building shells as their highest priority, along with the optimisation of building services and support of the utilisation of waste heat and renewable forms of energy to meet the remaining energy demand, in line with their local priorities.

The details of the development and regulations for the individual cantons can be found at:
http://www.dasgebaeudeprogramm.ch/index.php/fr/le-programme-batiments/financement

The revised guidelines of the base module of the model regulation were adopted by the cantons in the spring session of April 2008. These require new properties to consume 4.8 litres heating oil equivalents (hoe) of thermal energy for new builds. Fully refurbished buildings are to consume approximately 9 litres hoe.

[74] http://www.bfe.admin.ch/themen/00526/00528/index.html?lang=en

10.4. Financial Costs

10.4.1. Carbon Tax

Switzerland introduced a CO2 tax set at 11.41 USD per tonne, enabled by Switzerland's 1999 Federal Law on the Reduction of CO2 (CO2 Law). Although Switzerland prefers to rely on voluntary actions and measures to achieve emissions reductions, the CO2 Law mandated the introduction of a CO2 tax if voluntary measures proved to be insufficient.

In 2005 the federal government decided that additional measures were needed to meet its Kyoto Protocol commitments and in 2010, the highest tax rate was tripled from its introductory rate to US $34.20 per tonne CO2.

The tax was initially revenue neutral, with redistribution of the funds received back to companies in proportion to the payroll of their employees. For example, an energy intensive company responsible for large amounts of carbon, but having relatively few employees, will pay a relatively large tax but gain in return a small recycling payment.

In 2009, the Swiss Parliament decided to allocate a third of the carbon tax revenue to a 10-year building program for low-carbon building renovations and, as such, the tax is no longer revenue neutral to industry.

10.4.2. Carbon Trading

Companies can exempt themselves from the tax by participating in a Swiss cap and trade emissions trading scheme where they voluntarily commit to legally binding targets to reduce their CO2 emissions.

Under this scheme, emission allowances are given to companies for free and, each year, emission allowances equal to the amount of CO2 emitted must be surrendered by the company.

Companies are allowed to sell or trade excess permits. However, should a company fail to surrender the correct amount of allowances, they must pay the CO2 tax retroactively for each tonne of CO2 emitted since the exemption was granted.

About 400 companies take part in trading CO2 emission credits under this program and most have successfully reduced emissions and so were able to return sufficient credits to the Swiss government (and avoid the carbon tax).

10.5. Financial Incentives

10.5.1. Financing support and Interest-Free Loans: Energy Contracting

Swiss Contracting is an energy services forum in Switzerland that promotes the development of energy contracting in Switzerland. It is a national association that represents the market participants, providing a platform for contractors, design engineers, financiers and insurance companies involved in contracting projects.

Energy contracting provides users with heat and electricity at a lower cost than they would otherwise pay for their energy consumption. The energy efficiency gains deliver sufficient cost savings to cover the cost of the energy contracting provider, as well as the cost of capital associated with energy efficiency investments that are made.

In doing so, companies are able to gain a reduced energy cost and carbon footprint with no investment and at no risk (as the energy contracting provider takes on the risk).

Energy contracting services are available in many countries but, in line with Swiss policy on delivering market let approaches, such forums are encouraged and supported to facilitate market-led developments such as energy contracting.

10.5.2. Feed-in Tariffs

Switzerland introduced the so-called "Cost covering remuneration for feed in to the electricity grid (CRF)" on 1 May 2008. The CRF applies to:

- Hydropower (up to 10 megawatts)
- Photovoltaics
- Wind energy
- Geothermal energy
- Biomass and waste material from biomass

It will be applicable for a period of between 20 and 25 years, depending on the technology, and is implemented through the national grid operator SWISSGRID[75].

Around 247 million Swiss francs per annum were made available for offsetting the difference between remuneration and market price.

The Swiss system pays a renewable energy generator for every kWh of electricity generated.

The Swiss tariffs were initially set aggressively and were the first to include a specific tariff for small wind turbines (less than 10 kW) of US $0.20/kWh for 20 years. The tariffs for solar PV put Switzerland on a par with Germany and France and had a contract period of 25 years. For rooftop systems of less than 10 kW, the tariffs were 0.75 SWF/kWh. For building integrated solar PV, the tariffs rivalled those in France with systems less than 10 kW enjoying tariffs of US $0.88/kWh.

A gradual downward curve in FIT was foreseen in view of the anticipated demand. The system is funded through the addition of a very small amount to the cost of energy within the country (a systems benefits charge) of around 0.006 SWF/kWh for all electricity used. 50% is then added to this value, which sets the cap for renewable energy to be installed. This is then distributed to the different technologies (e.g., 5% to solar).

The result is that the attractive tariff has seen significant demand. However, large numbers of projects are left waiting to be included.

The provisions governing cost-covering remuneration are laid down in the amended Swiss Federal Energy Ordinance and will enter into effect on 1 January 2009. Facilities that were put into operation after 1 January 2006 can benefit from this form of remuneration and their operators can register these facilities with Swissgrid (the national network operator). Information about the registration procedure can be found on the Swissgrid website:
http://www.swissgrid.ch/swissgrid/de/home.html

[75] http://www.swissgrid.ch/swissgrid/en/home/future/renewable_energies.html

10.6. Voluntary Mechanisms

10.6.1. MINERGIE and the MINERGIE-P (Switzerland's Green Building Standard)

MINERGIE is the Swiss building standard for lower energy consumption at a higher level of comfort. Around 14,000 buildings are already certified to this voluntary standard.

A MINERGIE building consumes around 60% less energy than a conventional building through, for example, building form, air tightness, thermal insulation and the use of renewable energy.

The standard started from the "basic" MINERGIE standard in 1998, with the supplementary MINERGIE-P, MINERGIE-ECO and MINERGIE-P-ECO standards developed in 2007. MINERGIE-P reduces the energy consumption by a further 20 to 30% compared with a normal MINERGIE building. For example, a MINERGIE 2009 property typically consumes 93 gallons heating oil equivalent (hoe), whilst Swiss Model Building Regulation 2008 is 121 gallons hoe.

MINERGIE is designed to be economically competitive and, therefore, one of its rules is that the construction costs of new MINERGIE buildings should not be more than 10% higher than the average conventional building. The technical details as well as the standards for architects with respect to the design and energy requirements can be found at:
MINERGIE Standards

10.6.2. Intelligent Building (bau-schlau)

Developers and property owners can obtain information and support on energy efficient construction and renovation from cantonal energy offices and advisory centres and at www.bau-schlau.ch.

10.6.3. Green Power Label "naturemade[76]"

The naturemade label provides recognition for green energy supply and provides two distinct standards -- naturemade basic (for electricity

[76] Energy and Climate Change Study 2005- 2007; Policy Report Switzerland

generated through renewable energy sources) and naturemade star (for renewable energy projects specifically utilising organic materials).

10.6.4. Energy Star

Energy Star is an important energy labelling scheme that has been adapted to Europe. Further information on Energy Star can be found in Section 2.4.5.

11 South Africa

11.1. National Policy Context

11.1.1. 2008 White Paper

In South Africa, energy was generally taken for granted. In 2008, however, electricity demand outstripped supply, blackouts frequently occurred and load shedding had to be implemented. Consumers and businesses demanded action from government and from the suppliers.

The White Paper on Energy Policy (1998) implemented a number of measures, but was limited to setting standards and appliance labelling; these were amongst the first energy efficiency measures to be put in place.

In 2005, a white paper was published that set out targets for energy savings and a number of initiatives such as the implementation of a programme of energy efficient measures in government buildings. Again, however, specific policies and legislative requirements were limited.

In 2008, a review of the white paper was carried out and more specific policies were introduced, focusing on the following key sectors:

- The commercial building sector, specifically the hospitality industry (given the rapid increase in construction) and including the data centre sector
- The industrial and mining sectors (accounting for over two-thirds of national electricity usage)
- The transport sector, using three-quarters of South Africa's petroleum products
- The domestic sector (given the large scale National Housing Programme)

The following targets have been set out:

- A final energy demand reduction of 12% by 2015
- Commercial and public building sector final energy demand reduction of 20% by 2015
- Renewable energy target of generating 10,000 GWh by 2013, with project subsidies offered through REFSO
- These targets apply generally to each of the above sectors and do not specifically apply to individual properties or sub-sectors (such as data centres)

The solar water heating market grew in 2008 and 2009, driven largely by subsidies. However, apart from this, few renewable energy projects for electricity generation had been deployed by 2010.

11.1.2. 2020 Targets Set at Copenhagen, 2020

During the 2009 Copenhagen climate change negotiations, South Africa voluntarily announced that it would act to reduce domestic GHG emissions by 34% by 2020 and 42% by 2025 from business as usual, subject to the availability of adequate financial, technological and other support.

11.1.3. Vision, Strategic Direction and Framework for Climate Policy, 2010

This bill, announced by the Ministry of Environmental Affairs and Tourism and approved by the Cabinet, is the basis of the Draft "Zero" Climate Change Policy, launched in late 2010 with a view to being converted into law by 2012.

The document results from a public consultation process with civil society and business and proposes action in the following areas:

- GHG emission reductions
- Vulnerability and adaptation
- Alignment, coordination and cooperation among stakeholders
- The Treasury is charged with studying the implementation of a carbon tax, starting at low levels (which are not detailed) and escalating by 2018-2020
- Emission reduction targeting GHG emissions are set to stop increasing at the latest by 2020-2025, to stabilise for up to 10 years and then to decline in absolute terms
- The renewable energy sector is viewed as a key growth sector with the aim of diversifying the energy mix away from coal
- Mandatory targets are to be set for electricity generated from renewable and nuclear energy sources by 2028, laying basis for a net zero carbon electricity sector in the long term
- Current energy efficiency and electricity demand-side management initiatives are to be scaled up, reinforced and rendered mandatory through regulatory and other mechanisms
- The government's energy efficiency policies and strategies are to be continuously reviewed and amended to reflect more ambitious national targets aligned

the green grid
get connected to efficient IT

11.2. Regulatory Obligations

11.2.1. National Building Regulations and Building Standards

The South African National Standard (SANS 10400-XA: 2011) deals with the application of the National Building Regulations. The Act was amended in September 2011 with the introduction of requirements for energy usage in buildings, which come into effect from 11 November 2011.

SANS 10400-XA specifies the requirements for compliance with Part-XA (Energy Usage) of the National Building Regulations and covers the following issues:

- Part V: Space heating
- Part X: Environmental sustainability
- Part XA: Energy usage in buildings

The following are the key energy efficiency requirements, specifying the maximum power and energy consumption for different property types within different parts of the country:

Table 2 — Maximum energy demand per building classification for each climatic zone

1	2	3	4	5	6	7	8
Classification of occupancy of building	Description of building	Maximum energy demand[a] VA/m^2					
		Climatic zone[b]					
		1	2	3	4	5	6
A1	Entertainment and public assembly	85	80	90	80	80	85
A2	Theatrical and indoor sport	85	80	90	80	80	85
A3	Places of instruction	80	75	85	75	75	80
A4	Worship	80	75	85	75	75	80
F1	Large shop	90	85	95	85	85	90
G1	Offices	80	75	85	75	75	80
H1	Hotel	90	85	95	85	85	90

[a] The maximum demand shall be based on the sum of 12 consecutive monthly maximum demand values per area divided by 12/m^2 which refers to the nett floor area.

[b] The climatic zones are given in annex B.

the green grid
get connected to efficient IT

Table 3 — Maximum annual consumption per building classification for each climatic zone

1	2	3	4	5	6	7	8
Classification of occupancy of building	Description of building	Maximum energy consumption kWh/(m²·a)					
		Climatic zone[a]					
		1	2	3	4	5	6
A1	Entertainment and public assembly	420	400	440	390	400	420
A2	Theatrical and indoor sport	420	400	440	390	400	420
A3	Places of instruction	420	400	440	390	400	420
A4	Worship	120	115	125	110	115	120
F1	Large shop	240	245	260	240	260	255
G1	Offices	200	190	210	185	190	200
H1	Hotel	650	600	585	600	620	630
NOTE 1 The annual consumption per square metre shall be based on the sum of the monthly consumption of 12 consecutive months. NOTE 2 Non-electrical consumption, such as fossil fuels, shall be accounted for on a non-renewable primary energy thermal equivalence basis by converting mega joules to kilowatt hours.							
[a] The climatic zones are given in annex B.							

Data centre developers must determine in which above classification (if any) they would fit and how the maximum energy consumption would be determined.

The policy also drives the adoption of certain technologies, for example:
"A minimum of 50% by volume of the annual average hot water heating requirement shall be provided by means other than electrical resistance heating, including, but not limited to solar heating, heat pumps, heat recovery from other systems or processes.[77]"

11.2.2. Planning

Our research suggests that the planning policy framework does not provide significant drivers for energy efficiency or renewable energy in South Africa.

[77] http://ae-africa.com/read_article.php?NID=3354

11.3. Financial Costs

11.3.1. Carbon Taxes: The Carbon Tax Option, December 2010

The National Treasury released a discussion document for public comment in December 2010 entitled, "Reducing Greenhouse Gas Emissions, the Carbon Tax Option."

Three carbon taxes are considered in the paper:

- An emissions tax
- An excise tax on energy inputs
- A sales tax on the outputs of energy-intensive sectors

The discussion paper suggests introducing a tax at a relatively low rate of R75 per ton of CO2 and increasing to around R200 per ton CO2 (at 2005 prices). This, the paper suggests would be both feasible and appropriate to achieve the desired behaviour changes and emission reduction targets.

The tax could come in to force by 2012. However, in the absence of concerted international action, there is a risk that such an additional cost could lead to the (significant) energy intensive industries of South Africa opposing its introduction.

For further information see the following link:
http://www.treasury.gov.za/public%20comments/Discussion%20Paper%20Carbon%20Taxes%2081210.pdf

11.4. Financial Incentives

11.4.1. Tax incentive: Taxation Laws Amendment Bill, 2009 (Sections 12K and 12L)

This law came into force in 1 September 1 2009 and grants income tax exemption to the sale of certified emission reductions derived from Clean Development Mechanism (CDM) projects in the context of the Kyoto Protocol.

Section 12L: “Allowance for energy efficiency,” grants businesses notional deductions for income tax purposes for energy efficiency savings.

“Putting a price on carbon Section 12K” provides income tax exemptions granted to any person who engages in a qualifying Clean Development Mechanism project.

Section 12L grants income tax reductions for energy efficiency savings from certified baselines based on “energy efficiency savings certificates” issued by an organization determined by Regulations from the Ministry of Energy.

These Regulations are in line with the National Energy Act, 2008. The measure applies to the taxable income of any persons in any year of assessment until January 2020.

11.4.2. Feed-in Tariffs: REFIT

South Africa Renewable Energy Feed-in Tariff (REFIT), Regulatory Guidelines 26 March 2009

Renewable Energy Feed-in Tariff (REFIT) is designed to support the governments’ 10,000 GWh 2013 Renewable Energy Target, providing investors in renewable energy technologies with a guaranteed payment for each unit of energy generated.

South Africa's National Energy Regulator (NERSA) announced on 31 March 2009 the introduction of a system of Feed-in Tariffs designed to produce 10 TWh of electricity per year by 2013. The Feed-in Tariffs announced were substantially higher than those in NERSA's original proposal. The tariffs, differentiated by technology, will be paid for a period of 20 years.

South Africa has a high level of renewable energy potential and presently has in place targets of 10,000 GWh of renewable energy by 2013. To contribute towards this target and socio-economic and environmentally sustainable growth and to kick-start and stimulate the renewable energy industry in South Africa, there is a need to establish an appropriate market mechanism.

REFIT only includes power generation from generators connected to the Transmission System and Distribution System and excludes off-grid power generation. The selection will be on the basis of a competitive bid process. A Qualifying Renewable Energy Power Generator will be defined as new investments in electricity generation using the following technologies:

- Landfill gas power plant
- Small hydro power plant (less than 10MW)
- Wind power plant
- Concentrating Solar Power (CSP) plant

Bidding Process

The important dates for the bidding process are as follows:

- 31 August 2011 – bidders to submit questions to be dealt with at the bidders' conference
- 31 August 2011 - bidders to notify DoE of intention to submit a bid in respect of the first or second windows
- 14 September 2011 – bidders' conference (attendance is mandatory); 7 October 2011 – deadline for last submission of clarificatory questions
- 14 October 2011 – deadline for last issuing of briefing notes by DoE; 4 November 2011 – first window bid submission deadline;
- 25 November 2011 – selection of preferred bidders in respect of the first window
- 19 June 2012 – deadline for signature and effective date of PPAs, Implementation Agreements, and Connection Agreements, and financial closing

Further information:

http://www.info.gov.za/view/DownloadFileAction?id=99318

http://www.nortonrose.com/knowledge/publications/54959/south-africa-renewable-energy-ipp-request-for-proposals

http://www.renewableenergyworld.com/rea/news/article/2009/04/south-africa-introduces-aggressive-feed-in-tariffs

11.5. Voluntary Mechanisms

11.5.1. Green Star SA Certification

The Green Building Council of South Africa developed the Green Star SA rating tools, based on the Australian Green Building Council tools, to provide the property industry with an objective measurement for green buildings and to recognise and reward environmental leadership in the property industry. Each Green Star SA rating tool reflects a different market sector (office, retail, residential, etc.)[78].

The following provides the link to the tool: www.gbcsa.org.za/greenstar/ratingtools.php.

The new SANS 10400 part XA refers in many areas to the SANS 204 guidelines, which have been available in draft format since 2008. These are used by the GBCSA as a minimum energy requirement for projects seeking a Green Star SA certification and as the basis of the reference building used in the energy modelling required in Green Star SA.

These new SANS standards do not address existing buildings (unless they are refurbished) and this is where the biggest stock exists. This is a sector where the GBCSA hopes to play a significant role through its Operational Energy & Water Benchmarking Tool currently under development, to be launched in mid 2012. This will be based on actual measured annual performance of existing buildings, not on design or design standards. The GBCSA sees this tool working hand in hand with the SANS 10400 part XA which addresses design of new and refurbished buildings, including the following sectors:

- Office
- Retail Centre
- Multi Unit Residential
- Public & Education Building PILOTGreen Star SA rating tools

[78] http://www.gbcsa.org.za/home.php

To achieve certification, building owners submit documentation to the Green Building Council of South Africa, which employs independent assessors to assess the submission and score the building. Certification is awarded for 4-Star, 5-Star or 6-Star Green Star SA ratings.

The Green Star SA - Office rating tool is for use by new office construction projects and base building refurbishments. Two different certifications are awarded through the same tool: (i) Green Star SA - Office Design, at the end of the design phase of the project and (ii) Green Star SA - Office As Built, following construction completion.

To be eligible for Green Star SA assessment, projects must meet each of the following four eligibility criteria:

1. Spatial Differentiation
2. Space Use
3. Conditional Requirements
4. Timing of Certification

For specific details pertaining to the energy consumption, refer below link:
Green Star Rating Tools

Links:

For the Guide to the certification, please see the following link:
http://www.gbcsa.org.za/docs/greenstar/GSSA_Office_v1_Energy_Guide_20100701.pdf
Overview of eligibility criteria:
http://www.gbcsa.org.za/docs/GSSA%20Eligibility%20Criteria%2020100512.pdf
Green Star SA – Office v1 rating Tool Fact Sheet:
http://www.gbcsa.org.za/docs/greenstar/Factsheet_GBCSA_Green%20Star_SA_Office%20_V1.pdf

12 Russia

12.1. National Policy Context

The Energy Strategy of Russia up to 2020 was endorsed in May 2003 and was approved by the Government decree №1234-r on 28.08.03.

One of the basic statements of the Strategy is to encourage GDP growth by 5-6% annually. It is possible that the energy sector will not be able to meet the growth of demand for energy resources.

Therefore, the strategy highlights the significant opportunities for improved energy efficiency across all sectors, with targets established to:

- Reduce the energy intensity of the Russian economy by 40% by 2020
- Increase the share of renewable energy in total energy generation to 4% by 2020 (from the very low levels currently installed)

Russia ratified the Kyoto Protocol in late 2004, resulting in perhaps the key sustainable energy policy mechanisms coming into force in February 2005.

Most notably, this provides the financial mechanisms to support carbon reductions through:

- International Emissions Trading (IET)
- Joint Implementation

Given the significant, cost effective opportunities for carbon reduction in Russia, these mechanisms provide a means for financing carbon savings as projects in Russia attract funding from countries where carbon savings may be more expensive to deliver.

Continuing reforms to the energy sector have supported opportunities for energy efficiency. For example, the establishment of a set schedule for gas price increases has supported the business case for investment in energy efficiency over recent years.

The following sustainable policy documents are in effect in Russia today:

- Energy Efficiency Law
- Sustainable Development Concept, accepted in 1996
- Energy Strategy until 2020, (2003)
- Ecological Doctrine (2002)
- Renewable Energy Law
- Small (decentralised) Energy Law

Of most significance with the greatest direct impact are the Energy Efficiency Law, Renewable Energy Law and Small (decentralized) Energy Law. The other policies provide a more strategic framework for the nation as a whole.

12.2. Regulatory Obligations

12.2.1. Federal law No.261-FZ (2009 Energy Efficiency Legislation)[79]

The Law on Energy Efficiency was adopted in 2009 and adopted by the government of the Russian Federation in January 2011. Its aim is to drive higher standards of energy performance in all buildings, although a number of sectors are exempt (such as places of worship and auxiliary premises). The law is required to be implemented at all stages during the design, building, reconstruction, major repairs of buildings and refurbishment of property.

12.2.2. Federal Level Codes

At the federal level, a number of relevant building codes are in force. These are made up of two types of documents:

- SNiP (Stroitelnye Normy i Pravila, or Construction Codes and Regulations) contain prescriptive and performance requirements
- GOST (Gosudarstvennye Standart, or State standard) provide protocols for measuring and reporting performance

The following lists the codes that are in force:

- The new code “Thermal Performance of Buildings” (SNiP 23-02, 1 adopted late 2003)
- The new code of practice “Design of Thermal Performance of Buildings” (SP 23-101)
- The standard for indoor climate (GOST 30494 [3])
- Two new standards on building energy audits (GOST 31167 [4], GOST 31168 [5])
- A standard on the detection of concealed defects of building thermal insulation (GOST 26629)
- Sections entitled “Energy Conservation” and “Sanitary-Epidemiological Requirements” in two new residential codes (SNiP 31-01 and SNiP 31-02)

All the above codes have been adopted and, in accordance with the Russian Federation law “On Technical Regulation,” they are mandatory unless regional codes are in place. The regional codes are required to meet or exceed the standards set out in the federal codes (as well as local and climatic variations).

[79] http://www.salans.com/en-GB/Locations/~/media/Assets/Salans/Publications/2011/20110301-Creation%20of%20Regulatory%20Standards%20for%20Ecological%20Construction%20in%20Russia.ashx

Regional codes are mandatory for all Russian and foreign entities involved with construction in the given region, even in isolated cases where federal codes do not apply. They may be consistent with federal codes or more stringent. Regional codes also contain detailed climate parameters not contained in the federal code, including heating-season degree days and solar radiation under real cloud conditions. In a few regions, climate data are provided on a district-by-district basis.

The following provides examples of some relevant requirements contained within the codes:

- Limits of flow and return temperatures are detailed
- Requirements are included for the separation of facilities and jobs in the unheated and heated rooms for certain temperature

The code for “Thermal Performance of Buildings” establishes two means for achieving compliance:

- A prescriptive path, with required thermal resistance values for individual building envelope elements. These values have been defined so as to be consistent with whole-building specific energy consumption requirements and have been retained from the former SNiP for continuity.
- A performance path, with required specific energy consumption levels for heating the whole building, allowing for trade-offs in the energy performance of individual envelope elements (except the buildings for industry), taking account of heating controls and heat-supply system efficiency. The performance path includes precise instructions on how to calculate the specific energy consumption for a building.

The choice of which of these options to use is left to the owner and/or designer. Methods and paths for achieving these requirements are chosen during the design process.

12.2.3. Classification and Rating Buildings on the Basis of Energy Performance[80]

The new federal code, in contrast to previous codes, applies not only to new and renovated buildings, but also to existing buildings already in operation, with instructions for evaluating and monitoring thermal performance and energy parameters during both design and operation. Specific actions regarding the rating of existing buildings, awarding of incentives, requiring upgrades, and levying sanctions are left to regional and municipal agencies.

Table 1 below shows a set of rating categories based on the degree to which design or normalized measured parameters for specific energy consumption deviate from required values from the new code. This classification applies both to newly constructed and renovated buildings designed according to the new code, as well as to operating buildings built according to previous codes -- even those from before 1995.

- Buildings whose designs have been developed according to the new code can be assigned to classes A, B and C.
- In the process of real operation, the energy efficiency of such buildings may deviate from design data into better classes (A or B) within certain limits shown in Table 1.
- Where classes A and B are earned, the use of economic incentive measures by local government agencies or investors is recommended.
- Classes D and E apply to operating buildings, built under codes in force at the time of construction. Class D corresponds to code-compliant levels from before 1995. These classes give information to local government agencies or building owners on the necessity of immediate or less immediate measures for increasing energy efficiency.

[80] http://www.imt.org/Papers/TokyoSB2005.pdf

Table 1 Classes of Energy Efficiency for Buildings

Letter grade and graphical representation	Name of the class	Deviation of design or normalized measured specific energy consumption from code-stipulated level, %	Recommended measures
For new and renovated buildings			
A	*Very high*	less than –51	economic incentives
B	High	From -10 to -50	as above
C	**Normal**	from +5 to –9	-
For existing buildings			
D	Low	from +6 to +75	Renovation desirable
E	*Very low*	greater than +76	Upgrades urgently required

12.2.4. Energy Passports[81]

The federal SNiP and regional codes require the completion of an "Energy Passport" for the building, a document that verifies energy performance in design, construction and operation.

Energy Passports give potential buyers and tenants information on what they can expect regarding the building's energy efficiency and real costs, helping to stimulate market preferences for high-performance buildings (as with an EPC).

[81] http://www.imt.org/Papers/TokyoSB2005.pdf

12.3. Financial Incentives

12.3.1. State Policy of Energy Efficiency increase through Renewables

The State Policy of Energy Efficiency Increase through Use of Renewables[82] was adopted in 2009 (guidelines approved by Government decree No.1-r) and sets out a vision to 2020. The stated targets for renewable energy include a target for 1.5% of energy supplied in 2010, rising to only 4.5% in 2020[83].

Whilst Russia has not yet implemented a Feed-in Tariff, the federal grid plans to guarantee renewable producers 7 cents per kilowatt hour, for a 20 year term. That justifies producer start-up costs.[84].

This policy was, however, focused on inward investment to support renewable energy capacity and the incentives are not set to favour widespread adoption of renewable energy technologies at a smaller scale.

12.3.2. Tax Incentive

Investment in energy efficient technologies can offer tax benefits to investors in the form of tax credits. The value of these could be up to 30% for companies investing in energy efficiency technologies, with accelerated depreciation of energy efficiency technology assets[85].

[82] http://www.globeinternational.info/wp-content/uploads/2011/04/FINALRussia.pdf

[83] These targets are assumed to exclude hydro electricity generation capacity

[84] http://rt.com/business/news/renewable-energy-russian-kick/

[85] http://www.globeinternational.info/wp-content/uploads/2011/04/FINALRussia.pdf

12.4. Voluntary Obligations

12.4.1. Energy Performance Certificate[86]

From January 2012, computers, devices and office facilities will be required to indicate information on their energy efficiency class in the technical specification, attached to the product, marking and labels.

The Compliance Certificate of the Voluntary Certification System allows the applicant to display the energy efficiency class of produce by an independent third party.

12.4.2. "Green" Standards[87]

2010 not only saw certification of the first buildings in Russia under international "green" standards of LEED and BREEAM, but also the creation of the first Russian voluntary certification system for real estate, the “Green Standards.”

The “Green Standards” certification system builds on the experience of LEED.
The criteria of “Green Standards” are grouped into the following 13 sections, detailing the requirements for achieving certification of a property’s environmental performance, including:

- Pollution prevention
- Presence of infrastructure
- Preservation or restoration of habitat
- Reduced light pollution
- Regulation of storm drainage
- Rational water utilization
- Energy savings

[86] http://rostandart.ru/en/cost_of_services/energy_performance_certificate/

[87] http://www.salans.com/en-GB/Locations/~/media/Assets/Salans/Publications/2011/20110301-Creation%20of%20Regulatory%20Standards%20for%20Ecological%20Construction%20in%20Russia.ashx

- Recycling

Securing certification under the “Green Standards” can offer the following benefits:

- Possibility of receiving investment tax credits
- Possibility of applying a more rapid depreciation factor to provide additional tax benefits (article 259.3 of the Tax Code of the Russian Federation)
- Supports the possibility of receiving grants from the federal treasury for the cost of connecting to the grid for decentralised renewable energy projects for projects of less than 25 MW (Governmental order of the Russian Federation No. 850 from October 20, 2010)

13 United Arab Emirates

13.1. National Policy Context: Plan 2030

Booming economic growth across the UAE has led to massive increases in the demand for electricity. Current estimates suggest that the domestic demand will more than double by 2020.

With limitations on how fast traditional resources like natural gas can be brought to market, as well as concerns about climate change, the UAE government has launched various initiatives aimed at identifying alternative means for producing the power needed to fuel its economy.

A significant and long-term investment plan is in place to achieve its ambitions to reduce energy consumption as set out in Abu Dhabi's Plan 2030.

The UAE has its own alternative energy policy. Abu Dhabi’s seven percent renewable energy target and the Masdar initiative are the two main features of its alternative energy policy.

13.2. Regulatory Obligations

13.2.1. Building Regulations

The UAE only recently established set of standards that came into effect in January 2010. The government of the Emirate of Abu Dhabi, through the Department of Municipal Affairs (DMA), adopted the world state-of-the-art leading family of building and construction codes and standards -- the International Codes -- published by the International Code Council.

The new Abu Dhabi Code is comprised of eight of the International Building Codes, including the International Energy Conservation Code (along with others such as the International Building Code and International Fire Code).

While all new buildings would have to comply with the regulations, existing structures would not require retrofitting. Additions and extensions, however, would have to adhere to the codes, which are meant to protect the health, safety and general welfare of all building occupants, as well as create a safe and cost-effective environment[88].

Energy efficiency requirements include:

- Buildings will be tested during construction for air leakage rates, which would not be allowed to exceed two litres per square metre
- Shading devices must be part of buildings, including tinted glazing and awnings for windows
- With some exceptions, windows will be restricted to 30% of a wall's area to reduce thermal energy, allowing for less air conditioning to be used
- If a residential high-rise has offices, there should be an occupancy light sensor and time-clock controls to automatically turn off the lights
- Rooftops should have a reflective coating. A 35˚C day would raise temperatures on a black rooftop to 77˚C; temperatures on a white rooftop would not exceed 49˚C[89]

[88] http://www.adsg.ae/Lists/Latest%20News/DispForm.aspx?ID=14

[89] http://www.thenational.ae/news/uae-news/environment/building-standards-to-make-life-in-abu-dhabi-easier?pageCount=2

The following provides a link to the Building Codes, including the International Building Codes' technical details on page 121 and the Energy Conservation Code on Page 202:
http://abudhabibuildingcodes.ae/page/newsdetails/76.html
http://abudhabibuildingcodes.ae/page/building_codes.html

The development of the codes was to be implemented in the following three phases:

- Immediate adoption of the codes generally in January 2010
- A second phase in 2011 to make refinements to meet local conditions
- A final phase to integrate and create the Abu Dhabi International Building Codes, is expected to be complete in early 2012

13.2.2. Permits for Development

Renewable energy projects in the UAE do not follow the same approval process as other utilities, given that each Emirate has its own set of requirements.

Generally, the key bodies involved in UAE's permitting process include the municipality, road and transport authorities, water and electricity department, environmental societies and the master developer.

The permitting process not only varies from location to location, it also varies between master developments. This is because each master development has in place its own permitting process, in addition to municipal requirements.

Masdar City for example is subject to its own regulations and requirements.

13.2.3. Local Plans

Plan Abu Dhabi 2030

Plan Abu Dhabi 2030 is the cornerstone document defining the future of development in the capital city. All new developments are required to comply with the vision of Plan Abu Dhabi 2030. Project teams should be familiar with the document in its entirety and adhere to its principles.

Plan Al Ain 2030

Plan Al Ain 2030 is the central planning document for Al Ain and sets the scene for future development that respects history and culture while encouraging sustainable growth.

Western Region

Plan Al Gharbia 2030 is the central planning document for Al Gharbia and is designed to aid in moving Al Gharbia toward the future with managed, responsible growth. Respect for the environment, social health, cultural identity and economic development all share equal status.

13.2.4. Estidama (Sustainability): Pearl Building Rating System (PBRS)

Abu Dhabi's Plan 2030 establishes a vision for sustainability as the foundation of any new development occurring in the Emirate and capital city of Abu Dhabi.

The Estidama Pearl Building Rating Scheme is a certification scheme tailored to the Middle East and implemented by the UPC (Abu Dhabi Urban Planning Council).

The Estidama PRS Version 1.0 (PRS V1.0) was launched at CityScape April 2010. Following a year of implementation, UPC has updated the PRS into V2.0 following a consultation process with stakeholders.

The Pearl Building Rating System applies to all non-residential buildings and multi-residential buildings of more than three stories. The following defines those buildings requiring compliance with the Pearl Building Rating System:

- All new, permanent buildings that require a building permit
- The property incorporates air conditioning
- Peak electrical loads exceeds 15kW

An Executive Council Order of May 2010 states that all new buildings must meet the 1 Pearl requirements starting in September 2010, whilst all government funded buildings must achieve minimum 2 Pearls.

Further information on the Pearl Building Rating System can be found through the following links:
http://estidama.org/template/estidama/docs/1-Pearl%20Building%20Guide%20for%20Consultants%20english%20v1.0.pdf
http://estidama.org/pearl-rating-system-v10/pearl-building-rating-system.aspx
http://estidama.org/template/estidama/docs/1-Pearl%20Building%20Guide%20for%20Consultants%20english%20v1.0.pdf

13.3. Tax and Carbon Prices

There are no significant carbon taxes or carbon markets in place in the UAE.

13.4. Financial Incentives

13.4.1. Feed-in Tariffs (FITs)

It understood that, at the time of writing, no FITs are in place. However, there are broad, high-level talks on the implementation of solar FITS, with both Abu Dhabi and Saudi Arabia considering the adoption of a Feed-in Tariff.

The move has also been backed by the International Renewable Energy Agency. Interim Director General Helene Pelosse is quoted on the Emirates Business website as saying:

"GCC countries are considering policy initiatives to meet their targets of achieving an appreciable amount of power supply from renewable sources by 2015."

http://solarairtech.com/news/25-abu-dhabi-and-saudi-arabia-back-solar-power.html

13.5. Masdar

The Masdar Initiative was launched by the UAE in April 2006. The main goal of Masdar is advancing the development, commercialisation and deployment of renewable and alternative energy technologies and solutions in the UAE. It is a key element of the Abu Dhabi 2030 Plan and the government of Abu Dhabi's strategic policy framework.

Masdar is a wholly owned subsidiary of the Abu Dhabi government-owned Mubadala Development Company. Established in April 2006, Masdar (the Abu Dhabi Future Energy Company) has the goal of commercialising and deploying clean technologies, in particular renewable energy. Masdar has three business units and an investment arm, as follows:

- Masdar Carbon specialises in developing energy efficiency and clean fossil fuel projects
- Masdar City is a clean technology cluster on the outskirts of Abu Dhabi that will be powered entirely by renewable energy
- Masdar Power builds and invests in utility scale renewable energy power projects
- Masdar Venture Capital manages the Masdar Clean Tech Funds, building portfolios of direct investments in clean technology and renewable energy

There were plans to include four data centres at Masdar (which was a member of the Green Grid). However, in 2010, these were cut.

Masdar Power:

The investment in renewable energy is done by this government-funded vehicle.

Masdar Power is a developer and operator of renewable power generation projects. In building a portfolio of strategic utility-scale projects, Masdar Power makes direct investments in individual projects in all areas of renewable energy, with a focus on Concentrating Solar Power (CSP), photovoltaic solar energy and on- and off-shore wind energy[90]. It also provides the key delivery vehicle for Abu Dhabi's plan to generate 7% of electric generation from renewable sources by 2020, requiring the installation of 1,600 MW of capacity[91].

[90] http://www.masdar.ae/en/Menu/index.aspx?MenuID=48&CatID=29&mnu=Cat

[91] http://www.eia.gov/countries/country-data.cfm?fips=TC

The following provides two examples of projects being delivered:

- The connection of the 10MW solar power plant to Abu Dhabi's electrical grid was a joint effort by Masdar, Abu Dhabi Distribution Company and the Emirate's regulatory body, the Regulation and Supervision Bureau.
- Masdar Power is currently constructing the 100MW Shams One, one of the largest concentrated solar power plants of its kind in the world and the largest in the Middle East. Located at Madinat Zayed, 120km southwest of Abu Dhabi city, the project is on schedule for completion towards the end of 2012.

13.6. UAE Energy Initiatives

The following are some of the key aims of the UAE energy policy, which are focused on centrally managed projects and initiatives more than policies and regulations:

- **Energy Efficiency**: A new energy efficiency label and standard scheme was launched in the UAE by the Emirates Authority for Standardisation and Metrology (ESMA).
- **Solar**: Abu Dhabi is set to install a solar plant with an approximate capacity of 100MW, which will contribute towards Abu Dhabi's target of achieving 7% renewable energy power generation capacity by 2020. Masdar, the U.A.E. government's renewable energy consortium, has appointed the consortium of Total and Abengoa Solar as a partner to own, build and operate the installation, set to be the largest concentrated solar power plant in the Middle East.
- **Wind**: The UAE has recently constructed a wind power plant on Sir Baniyas Island, the first complete wind project in the UAE.
- **Geothermal**: Masdar has begun drilling two geothermal wells in Masdar City, the country's renewable energy and energy efficiency research hub. This is the first geothermal power project to get underway in the Middle East.
- **Biomass**: Masdar City has, within it, a research centre for aviation biofuels, funded in part by Boeing and Etihad Airways. The Sustainable Bioenergy Research Project is looking to integrated saltwater agricultural systems to produce the fuel. Construction is also underway of an Ethos Fuel Reformulating (EFR) plant in the country, proposed by Californian firm Joseph and Gionis (J&G).

13.7. Voluntary Mechanisms

13.7.1. Zayed Prize

The Zayed Future Energy Prize is awarded every two years, recognising and promoting pioneering contributions in the field of environment and sustainable development.

The key criteria upon which projects or contributions are judged include:

- Impact innovation
- Long-term vision
- Leadership in renewable energy and sustainability

13.7.2. The Abu Dhabi Sustainability Group[92]

The Abu Dhabi Sustainability Group (ADSG) is a membership organisation whose mission is to "promote sustainability management in Abu Dhabi by providing learning and knowledge sharing opportunities for government, private companies and not for profit organisations in a spirit of cooperation and open dialogue." The initiative is not specific to sector and would be applicable to data centre developers and operators.

The ADSG was established in June 2008 as a forum of members who have signed the ADSG Declaration, committing to adopt best practices of sustainability management and reporting and to actively participate in ADSG activities. The ADSG is open to new members that are committed to the practice and the promotion of sustainability.

The ADSG provides the following services to its members to help improve their sustainability management and reporting practices:

- Improving and sharing knowledge
- Training and building capabilities
- Advocacy
- Supporting networks
- Manage and reporting performance

[92] http://www.adsg.ae/about/default.aspx

14 Saudi Arabia

14.1. National Policy Context

Whilst Saudi Arabia is the most prolific oil producing country in the world, with approximately one-fifth of the world's oil reserve, local energy demand is a concern.

The Saudi Arabian electricity generating capacity has a reserve margin of only 3%, compared to a global average of 10%, and demand growth continues to outstrip growth in supply. This has led the Saudi Electric Company (SEC) to withhold supplies to some areas during peak demand times.

Despite the need for investment in sustainable energy, Saudi Arabia still lacks a substantial policy framework, but currently relies upon:

- Renewable energy and energy efficiency initiatives, often as joint ventures
- Building regulations
- Energy efficiency labelling for products such as air conditioning
- Certification

Importantly, power cost subsidies are being reduced in Saudi Arabia. In 2005, Saudi oil products, natural gas and electricity subsidies were the fourth highest in the world[93]. Saudi Arabia is attempting to increase revenues by reducing state subsidies on gasoline, diesel fuel and electricity.

[93] http://www.google.co.uk/url?sa=t&rct=j&q=%22energy%20cost%22%20%2B%20%22saudi%20arabia%22%20%2B%20subsidies&source=web&cd=1&ved=0CB8QFjAA&url=http%3A%2F%2Fwww.unep.org%2Fpdf%2Fpressreleases%2Freforming_energy_subsidies.pdf&ei=WFzVTsaVE4LOhAfwm4IJ&usg=AFQjCNFj1e0tTrBJdP8iLDfynigjlxWXFQ&sig2=Mrg_oytH4f8rlWhmQ_gTug

14.2. Energy Efficiency Initiatives

NEEP: Saudi Arabia has a National Energy Efficiency Program (NEEP, www.neep.org.sa), responsible for programs to reduce peak demand, apply co-generation techniques to the energy market, and promote responsible energy usage, as well as provide industrial and commercial regulations on energy efficiency.

Energy Conservation Projects: Current energy efficiency policies are limited. However, particular energy conservation projects (e.g., collaborations between the Ministry of Water and Electricity and the Saudi Electric Company) led to peak load savings of more than 871 MW in 2001. Policies and programs are being developed for broader public awareness, energy regulation and legislation, and energy information and programming.

14.3. Renewable Energy Initiatives

- **Solar Powered Desalination Plants**: The national science agency recently announced a new initiative to construct solar-powered desalination plants, with construction of the first stage, a 30,000 m3/day plant in Al-Khafji, due for completion in late 2012.
- **Geothermal**: Despite the potential availability of geothermal sources, the Kingdom has not made any serious advances in the sector, with only 10 thermal springs identified.
- **Hydropower**: Saudi Arabia has no economically viable hydro-electric power sources.
- **Biofuels**: Partnerships have been formed between Saudi companies and foreign investors for the production of biofuels, but governmental support for the technology is low.
- Wind: Saudi Arabia has high wind energy potential, but only a few sites have been identified as having suitable potential.
- **National Renewable Energy Policy**: The Electricity and Cogeneration Regulatory Authority (ECRA), chaired by the Minister of Water and Electricity, is developing a National Renewable Energy Policy.
- **The King Abdullah City for Atomic and Renewable Energy** is the agency in charge of promoting alternative energy.
- **Renewable-energy "city"**: The Saudi ruler, King Abdullah, issued a royal decree in April to order the creation of The King Abdullah City for Atomic and Renewable Energy (KACARE). It will serve as a centre for renewables research and for co-coordinating national and international energy policy[94].

Renewable Energy Studies

Renewable Energy Scenarios for the Kingdom of Saudi Arabia – Tyndall Center, UK

Renewable Energy Potentials in Saudi Arabia - S. A. M. Said, I. M. El-Amin and A.M. Al-Shehri

[94] http://physicsworld.com/cws/article/news/42552

14.4. Regulatory Obligations

14.4.1. Building Regulations: Saudi Building Code Requirements

The Saudi Building Code (SBC) is a set of legal, administrative and technical regulations and requirements that specify the minimum standards of construction for building in order to ensure public safety and health. A Royal Decree dated 11th June 2000 ordered the formation of a national committee composed of representatives of Saudi universities and governmental and private sectors. In September 2001, the Council of Ministers approved the general plan of the National Committee to develop a national building code for the Kingdom of Saudi Arabia.

The Saudi Building Code Energy Conservation Requirements (Saudi Building Code 601) was based on the International Energy Conservation Code (IECC).

The development process prescribed in the Building Code intends to compose a comprehensive set of provisions for the following areas:

- Building envelope requirements
- Building mechanical systems
- Service water heating
- Electric power and lighting systems
- Total building performance

The International Code Council (ICC) signed a memorandum of understanding (MOU) with the Saudi Building Code National Committee (SBCNC) to share building safety knowledge and technical expertise.

The 2003 and 2006 International Codes (I-Codes) were used to form the basis for a new Saudi Building Code set for implementation later this year.

Under the agreement, representatives from the ICC and the SBCNC will meet in the U.S. and Saudi Arabia to exchange technical expertise in support of building code-related activities and the promotion of technologies, research, publications and services[95].

[95] http://www.ihs.com/news/saudi-bulding-icodes.htm

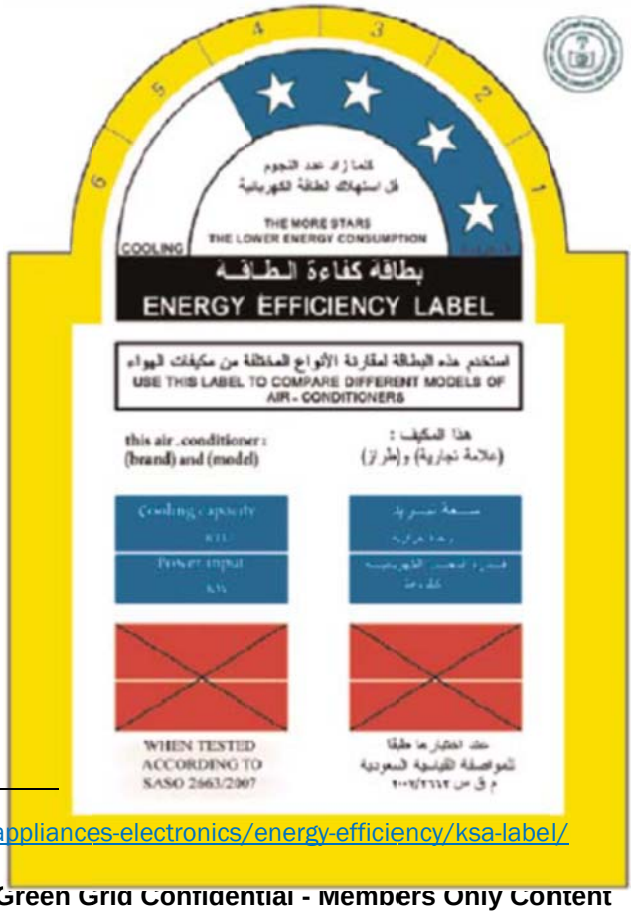
the green grid®
get connected to efficient IT

The Saudi Building Code can be found at the following link:
http://www.alriyadh.gov.sa/ar/subsites/Documents/books/%D9%85%D8%AA%D8%B7%D9%84%D8%A8%D8%A7%D8%AA%20%D8%AA%D8%B1%D8%B4%D9%8A%D8%AF%20%D8%A7%D9%84%D8%B7%D8%A7%D9%82%D8%A9.pdf

14.4.2. Mandatory Energy Efficiency Labelling

The Kingdom of Saudi Arabia's new energy labelling program took effect on 27 April 2010[96]. From this date forward, all products being sold in Saudi Arabia, within the scope of this program, must comply with mandatory energy efficiency standards.

Products covered under the Kingdom of Saudi Arabia's Energy Labelling Program include, for example, air conditioning systems, heat pumps and air-to-air heat pumps.



[96] http://www.intertek.com/appliances-electronics/energy-efficiency/ksa-label/

14.5. Financial Incentives

14.5.1. Feed-in Tariffs: Market – Responsive Feed-in Tariff[97]

Saudi Arabia has considered the adoption of Feed-in Tariffs (FITs) focused on solar technologies. It is proposed that the tariff would incorporate a competitive tender process to obtain the most appropriate prices. At the first stage it would use a competitive tender, which would provide the price-setting signal for the FIT price. The competitive bid process would be used in conjunction with a FIT as the price-setting mechanism for future revised FIT prices.

This approach would instil greater investor confidence to enable a robust local industry to develop, while avoiding the risks related to setting the FIT too high or low (as has been experienced in other countries).

This type of policy, however, is most suited to the investment in large-scale renewable energy and, for clarity, is not in force.

14.6. Voluntary Mechanisms

The Saudi Green Building Council (SGBC) works to deliver high environmental performance standards in the built environment through promoting, advising and educating all stakeholders by raising awareness, providing education on green building practice in Saudi Arabia and greening supply chains and promoting green labelling.
http://www.saudigbc.com/about.htm

[97] http://social.csptoday.com/emerging-markets/saudi-arabia-first-adopt-market-responsive-feed-tariff

15 Qatar

15.1. Policy Context

15.1.1. National Policy Context

Electricity demand in Qatar has grown rapidly in recent years, with demand increasing at around 8% per annum in recent years. This demand for energy is expected to soar even further over the coming years as Qatar pursues its policies of economic diversification into areas such as pharmaceuticals and heavy industry.

Despite Qatar's current fossil fuel reserves, the emirate is progressing with investment in renewable energy technologies, albeit on a centralized project basis.

Our research, supported by REEP, indicates that there are as yet no dedicated legal or regulatory frameworks for the increased uptake of sustainable energy in the country[98]. Rather, all companies work to their own sets of policies.

KAHRAMAA (Qatar General Electricity and Water Corporation), for example, pledges to implement codes of practice in transmission and distribution of energy and sets end-user tariffs. There are no other government departments that take an active role in energy regulation.

Whilst Qatar does not have specific legislation in place to drive the increased uptake of sustainable energy, the emirate is actively investing in renewable energy projects and making investments in the development of renewable energy technologies. Qatar has also embarked on series of policy initiatives at global level.

These initiatives are summarised in the sections that follow.

15.1.2. International Energy Policy Initiatives

- **Participation in the International Renewable Energy Agency:** Qatar is a member of the International Renewable Energy Agency (IRENA). In 2009, 146 states and the European Union had signed IREMA's statute, each pledging to advance renewable energy through their national policies.

[98] http://www.reeep.org/index.php?id=9353&special=viewitem&cid=111

- **Collaboration with the US Department of Energy**: Qatar and the US Department of Energy have in place a memorandum of understanding to partner on the development and deployment of cost-effective and sustainable low carbon technologies through joint research, development and deployment of initiatives. The following are the key areas of focus of the partnership:
    - Advanced cooling technologies, systems integration and building controls
    - Renewable power generation, e.g., integrated photovoltaic systems
    - Energy storage, including high energy density electric and thermal storage for CHP
    - Carbon capture and sequestration technologies and methods
    - Water treatment systems, including efficient desalination techniques
    - Fostering scientific exchanges and research and utilising Qatari facilities as test beds for large-scale demonstration of US and Qatari technologies

15.2. Regulatory Obligations

15.2.1. Building Regulations

For some time now, there have been efforts made to design building regulations for Qatar. A number of laws have been promulgated and, from them, a variety of regulations published by different agencies. These do not, however, fall into a coherent collection.

In 2009, following the Qatar Today Round Table, tentative steps were taken towards the implementation of green building regulations through recommendations of a panel of industry experts. The process was reported to see "a lively exchange of views concerning the effect of Qatar's construction boom on the natural environment."[99]

Announcements have, however, been made that progress is being made and that a green set of regulations will be produced following the institution of a Green Building Council (http://www.qatargbc.org).
In this, they are following the approach of the UAE, which established both a Green Building Council and associated regulations in 2006.

15.2.2. 2010 Law on the Conservation of Water and Energy

In January 2010, KAHRAMAA announced their intention to enforce a new law on the conservation of water and energy. This law requires the installation of water and electricity meters in all new buildings, as well as improving the minimum standards for insulation in the buildings.

[99] http://www.arabianbusiness.com/property/article/542966-qatar-takes-steps-towards-green-building-regulations

15.3. Sustainable Energy Initiatives in Qatar

Whilst Qatar does not, at present, have specific legislation to facilitate the development of renewable energy, it is implementing significant renewable energy projects, as seen in the following examples:

- **Qatar Solar Technologies (QST)** will establish the first production facility for polysilicon on the Arabian Peninsula. The Qatar Foundation has a 70% stake in the US$500 million production facility planned to commence during the third quarter of 2012.
- **Solar powered cooled stadiums** are planned for the 2022 World Cup. All five stadiums will use solar technology. Generators using biofuels will supplement electricity from solar to ensure that there is enough capacity to cool the stadium during matches, making the facility carbon neutral.
- **Chevron Qatar Energy Technology and GreenGulf** has signed a memorandum of understanding for a joint study to test solar energy technologies and their application in Qatar. The research will be performed at Qatar Science & Technology Park (QSTP).
- **Solar-powered desalination plant**: Kahramaa's Chairman, Essa bin Hilal Al Kuwari also announced that the company is building Qatar's first solar-powered desalination plant.
- **Clean Energy Investment Fund**: A clean-energy investment fund totalling some US$400 million has been set up in partnership between Qatar and the UK. The fund is intended to aid the creation of clean-energy companies in the country.
- **The Qatar Sustainable Energy and Water Utilisation Initiative (QWE)** is a project to improve desalination technologies and promote public awareness of sustainable use of energy. The technical areas covered by the program include:
    - Environmental impact assessment of water and energy utilization
    - Minimization of water consumption and discharge
    - Maximization of industrial energy efficiency, reduction of greenhouse-gas emissions, improved technologies for desalination
    - Efficient reuse and recycling strategies
    - Effective integration of water and energy systems

15.4. Voluntary Mechanisms

15.4.1. QSAS Building Certification

Qatar Sustainability Assessment System (QSAS) provides a set of performance-based standards that address the specific regional needs and environment of Qatar, with the aim of creating a sustainable built environment that minimises ecological impact.

QSAS consists of several categories, criteria, and measurements that are associated with environmental goals. Goals define values to be achieved to lower impact on the environment. Categories are the key aspects that affect the overall building sustainability. Criteria specify the intent and are linked to measurements that are performance-driven and objective, if possible.

Measurements are further broken down into three components, or measurement principles, measurement methods, and demonstration requirements.

SECTION 4:

LIST OF

POLICIES

the green grid®
get connected to efficient IT

16 Summary of key policies and implications for the Data Centre Industry by Country

The following tables provide an overview of the key policies based upon the extent of the commercial impacts upon the data centre industry.

Note: Policies with most significant impacts within each group (cell within the table) are highlighted in bold.

- For Regulatory Obligations and Financial Costs: red indicates a high cost/operational impact, orange indicates a moderate impact
- For Voluntary Mechanisms and Financial Incentives: green (dark) indicates a high financial / reputation incentive, green (light) indicates a moderate impact
- For Summary of Commercial Impact: blue indicates the overall commercial level impact

	Build → Operate			
	Regulatory Obligations	**Voluntary Mechanisms**	**Financial Incentives**	**Financial Costs (Costs Carbon and Energy)**
United Kingdom	**Building Codes, leading to zero carbon development** **Planning policy supporting renewable energy** ***Mandatory energy performance intended from 2018 for letting property (future policy)*** **Energy Performance Certificates**	**BREEAM (for new build)** **BREEAM In Use** **EC Code of Conduct on Data Centre Energy Efficiency** **EU Ecolabel** **EU Energy Star** **ETSI / CEN / CENELEC / ISO 50001** **ITU Sustainable ICT Specification**	**Enhanced Capital Allowance** **Feed-In Tariffs** **Carbon trust Interest-Free Loans** ***Renewable Heat Incentive (imminent policy)***	**CRC** **The Climate Change Levy** **Indirect costs associated with the EU ETS**

the green grid®
get connected to efficient IT

	Build ← Operate			
	Regulatory Obligations	Voluntary Mechanisms	Financial Incentives	Financial Costs (Costs Carbon and Energy)
France	▪ Building Regulations Code de l'Urbanisme & Certificat d'Urbanisme (CDU) ▪ The Réglementation Thermique 2012 (RT 2012) ▪ Label HPE 2005 (Very High / High energy performance standard) ▪ Energy Performance Certificate	▪ HQE Environmental Assessment Certification ▪ DETIC ▪ EC Code of Conduct on Data Centre Energy Efficiency ▪ EU Ecolabel ▪ EU Energy Star ▪ ETSI / CEN / CENELEC / ISO 50001 ▪ ITU Sustainable ICT Specification	▪ Advanced renewable Tariffs (Tarife Equitable) 2006 ▪ The Tax Credit (domestic sector currently) ▪ Energy Saving Certificates	▪ Certificat d'économie d'énergie (Energy Saving Certificates) affecting energy suppliers ▪ Indirect costs associated with the EU ETS
Germany	▪ Energy saving regulations EnEV 2009 (Energieeinsparverordnun) ▪ Renewable Energies Heat Act (EEWärmeG) ▪ Energy Performance Certificates	▪ Building Certification: DNGB certifications ▪ Energy-Efficient Data Centers—Best Practice Examples ▪ EC Code of Conduct on Data	▪ Feed-in Tariffs: Renewable Energy Act (EEG) ▪ Combined Heat and Power Act	▪ Indirect costs associated with the EU ETS

the green grid®
get connected to efficient IT

	Build ← Operate			
	Regulatory Obligations	Voluntary Mechanisms	Financial Incentives	Financial Costs (Costs Carbon and Energy)
		Centre Energy Efficiency ▪ EU Ecolabel ▪ EU Energy Star ▪ ETSI / CEN / CENELEC / ISO 50001 ▪ ITU Sustainable ICT Specification		
Spain	▪ The Technical Building Code ("CTE") ▪ Regulation on Indoor Heating and Air-conditioning Systems (RITE)	▪ Green Building Council España Certificate-VERDE ▪ EC Code of Conduct on Data Centre Energy Efficiency ▪ EU Ecolabel ▪ EU Energy Star ▪ ETSI / CEN / CENELEC / ISO 50001 ▪ ITU Sustainable ICT Specification	▪ Feed-in Tariffs ▪ Tax Incentives and Grants ▪ Interest-Free Loans	▪ Indirect costs associated with the EU ETS
Netherlands	▪ Building Regulations: Bouwbesluit ▪ The Decree on Energy Performance of Buildings (BEG),	▪ BREEAM-NL ▪ Green Fan ▪ EC Code of Conduct on Data	▪ Tax incentive: EIA (Energy Investment Allowance) ▪ Feed-in Tariffs	▪ NOx emissions trading ▪ Indirect costs associated with the EU ETS

the green grid®
get connected to efficient IT

	Build ←			→ Operate
	Regulatory Obligations	Voluntary Mechanisms	Financial Incentives	Financial Costs (Costs Carbon and Energy)
	▪ Spatial Planning Act (Wet op de ruimtelijke ordaening) ▪ Energy Performance Certificates	Centre Energy Efficiency ▪ EU Ecolabel ▪ EU Energy Star ▪ ETSI / CEN / CENELEC / ISO 50001 ▪ ITU Sustainable ICT Specification	▪ Green Deal ▪ More with Less programme	
Italy	▪ **Law on Building Quality ('Legge per il Sistema Casa Qualitá')** ▪ **Norme per l'edilizia sostenibile** ▪ Regional variations ▪ Energy Performance Certificates	▪ **The Italian Green Building Council (GBC)** ▪ EC Code of Conduct on Data Centre Energy Efficiency ▪ EU Ecolabel ▪ EU Energy Star ▪ ETSI / CEN / CENELEC / ISO 50001 ▪ ITU Sustainable ICT Specification	▪ **Feed-in Tariffs: RES Promotion**	▪ Indirect costs associated with the EU ETS
Switzerland	▪ **Building Regulations: Mustervorschriften der Kantone im Energiebereich (MuKEn)**	▪ **MINERGIE and MINERGIE-P (Green Building Standard)** ▪ Intelligent building (bau-schlau)	▪ **Feed-in Tariffs** ▪ Financing support and Interest-Free Loans: Energy	▪ Carbon Tax ▪ Carbon Trading

the green grid®
get connected to efficient IT

	Build			Operate
	Regulatory Obligations	Voluntary Mechanisms	Financial Incentives	Financial Costs (Costs Carbon and Energy)
		▪ Energy Star ▪ Green Power Label "naturemade" ▪ ITU Sustainable ICT Specification	Contracting	
South Africa	▪ **South African National Standard (SANS 10400-XA: 2011)**	▪ Green Star SA Certification ▪ Energy Star ▪ ITU Sustainable ICT Specification	▪ Tax incentive: Taxation Laws Amendment Bill, 2009 ▪ **Renewable Energy Feed-in Tariff (REFIT)**	
Russia	▪ **Building Regulations (2009 Energy Efficiency Legislation)** ▪ **SNIP (*Stroitelnye Normy I Pravila*, or Construction Codes and Regulations)** ▪ GOST (*Gosudarstvennye Standart*, or State standard) ▪ Energy Passports	▪ **Green Standards (Local implementation of LEED)** ▪ Energy Performance Certificates, rating computers, devices and office facilities ▪ Energy Star ▪ ITU Sustainable ICT Specification	▪ **Tax Incentives through tax credits of up to 30%**	
United Arab Emirates	▪ **Estidama Pearl Building Rating System (mandatory in some areas)**	▪ **Estidama Pearl Building Rating System**	▪ Sovereign wealth funds investment in large projects	

the green grid®
get connected to efficient IT

	Build ←			→ Operate
	Regulatory Obligations	Voluntary Mechanisms	Financial Incentives	Financial Costs (Costs Carbon and Energy)
	▪ Local plans ▪ Local Codes (e.g. Abu Dhabi Code)	▪ Zayed Prize ▪ Energy Star ▪ ITU Sustainable ICT Specification	(e.g. Masdar)	
Saudi Arabia	▪ **Saudi Building Code (SBC)** ▪ Mandatory Energy Efficiency Labelling	▪ Saudi Green Building Council ▪ Energy Star ▪ ITU Sustainable ICT Specification	▪ Potential for market responsive Feed-in Tariffs	
Qatar	▪ Law on the Conservation of Water and Energy	▪ Qatar Sustainable Energy and Water Utilisation Initiative (QWE) ▪ Energy Star ▪ ITU Sustainable ICT Specification	▪ Renewable Energy Initiatives supported by sovereign wealth funds	

Note: Policies with most significant impacts within each group (cell within the table) are highlighted in bold

17 About The Green Grid

The Green Grid is a global consortium of companies, government agencies, and educational institutions dedicated to advancing energy efficiency in data centres and business computing ecosystems. The Green Grid does not endorse vendor-specific products or solutions, and instead seeks to provide industry-wide recommendations on best practices, metrics, and technologies that will improve overall data centre energy efficiencies. Membership is open to organizations interested in data centre operational efficiency at the Contributor, General, or Associate member level. Additional information is available at www.thegreengrid.org.