Policy Exchange

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The Full Cost to Households of Renewable Energy Policies

Analysis of government's annual energy policy statement

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Executive Summary

Reducing carbon emissions is one of the most important policy challenges facing the world. Over the last 18 months, Policy Exchange has developed a '*Greener, Cheaper*' agenda to secure UK climate and energy policies which are more cost-effective: to reduce the costs on householders and businesses from unnecessarily expensive emissions reduction, and to better focus policy on achieving lowest cost emissions reduction and stimulating the most valuable low carbon innovations. The more cost-effective emissions reduction policies are, the more likely they are to be politically sustainable, and thus successful in achieving the long-term carbon emissions reduction that scientific consensus indicates we need over the coming decades.

Part of ensuring sustainable climate policies is having full clarity about the impacts, costs and the benefits of different policies. Energy and Climate Change Secretary, Chris Huhne, recently gave the government's second annual energy policy statement. The headline message of this statement was that the government's carbon and renewable energy policies would actually reduce households' average energy bills by 7% by 2020 compared what they would have been without the policies.

Unfortunately this claim fails the test of full clarity, hiding much of the most important information about the impacts of government policies – both on households and on the goal of carbon emissions reduction:

- As an *average bill* figure, the headline message obscures the fact that energy *prices* will be substantially inflated by government policies (such as the Renewables Obligation, Electricity Market Reform and Feed-in Tariffs for small-scale renewable) and that an estimated **two-thirds of households** – those with least scope for improving energy efficiency – **will have higher energy bills as a result of government policies (even under DECC's calculations)**.

- The government's **headline *energy bill* figures exclude a large part of the *full* impact on households of carbon and renewable energy policies**. It excludes costs paid through general

taxation, increased costs of the products and services that households' buy, and energy system costs such as grid upgrades.

- Most importantly, by lumping together a diverse set of policies, the government's message **disguises the very wide range of value for money from different policies**. A number of the biggest policies that householders are paying for are hugely and unnecessarily expensive ways to deliver emissions reduction. **Wasteful policies are not rendered acceptable simply because their costs are projected to be offset in average bills by savings from better policies.**

The government's renewable energy deployment subsidies constitute the largest and most unnecessarily expensive policies. In this research note, Policy Exchange has estimated the *full* impact on households of funding such renewable subsidies. **Policy Exchange estimates the full impact of renewable energy subsidies on an average household by 2020 (through bills, tax and costs of products and services) to be £400 per year – equivalent to 2.5p on VAT.**[1] This implies that by 2020 the total net cost (not just through energy bills) to the average household of carbon and renewable policies will be *equivalent* to around 15% of the (without policies) energy bill.[2]

There is a good case for government supporting learning and innovation in relation to a range of promising early stage low carbon energy technologies (those with potential to become cost-competitive and to have significant global impact). But the vast majority of current subsidies support mass short-term deployment of a few preferred renewable technologies – particularly hugely expensive offshore wind – in order to meet the 2020 EU Renewable Energy Target. This is an unnecessarily expensive way to reduce carbon emissions, is a poor way of targeting resources for stimulating low carbon learning and innovation, and (for the preponderant renewable generation subsidies) delivers no carbon reduction by 2020 which would not automatically have been delivered (more cheaply) under the EU Emissions Trading System cap.

In a series of reports over the last 18 months, Policy Exchange has made a range of recommendations to improve the cost-effectiveness of climate policy, including moving away from the wasteful Renewable Energy Target, in order to improve the prospects for sustained emissions reduction.

[1] 2011 tax base.

[2] The two sets of estimates (DECC's and Policy Exchange's) are not fully comparable. For example, the combined *total household impact* figure does not include pass through of the non-household costs of the EU ETS and Carbon Price Floor, nor does it net out the Exchequer revenues from those two policies.

Detail

Most households will pay higher energy bills in 2020 as a result of carbon and renewable policies

The government's headline message – that its carbon and renewable energy policies will reduce households' energy bill by 7% by 2020 compared with what they would be without the policies – refers to *average* energy bills. This misleadingly nets off projected increases in *prices* per unit of energy used as a result of policies against an assumed average household reduction in energy used (and any rebate). Increased energy prices will apply to all households, but only some households will be able to take advantage of significant demand reduction (or a rebate).

The government projects that household energy *prices* will be significantly higher in 2020 than they would have been in the absence of carbon and renewable policies: 27% higher for electricity and 7% higher for gas. The scale of any reduction in a household's energy demand will depend on whether it has or will be able to benefit from policies to insulate the home, to install renewable energy, or to secure more energy efficient products (e.g. boilers). (We have not, in this research note, examined whether DECC's assumptions about the energy savings from particular energy efficiency measures are credible, and simply accept them.)

According to the documentation accompanying Chris Huhne's annual energy policy statement[3], only a third of households are expected to be able to benefit from at least one insulation, renewable energy or rebate measure by 2020. For the poorest households (in the bottom three expenditure deciles) only slightly more – 40% – of households could benefit from at least one of these measures.

In addition, the poorest households are likely to replace their energy-using products less often than average households, and to buy more second-hand products, and so will benefit less from energy efficient 'products policies'. The government expects savings from its products policy to offset more than half of other energy policy costs, so if poorer households are unable to buy sufficient new, more energy efficient products they will be hit harder by the policy costs.

The government's *average bill* headline message hides the fact that energy prices will be substantially inflated by carbon and renewable policies. Two-thirds of households (and 60% of the poorest) – those unable to reduce demand sufficiently – will (even on DECC's calculations) actually have higher energy bills in 2020 as a result of government policies. Such a distribution of costs and benefits would be expected to increase fuel poverty.

The government's headline message hides the full impact of policies on households

The government's headline message that carbon and renewable energy policies would reduce households' energy bills by 7% by 2020 compared with what they would be without the policies falls far

[3] DECC (2011), *Estimated impacts of energy and climate change policies on energy prices and bills*

short of capturing the full impact of policies on households. Additional impacts include:

- **The costs of policies paid for through general taxation, rather than through energy bills**. For example, since the 2010 Annual Energy Policy Statement, the government decided to pay for the Renewable Heat Incentive through general taxation rather than energy bills. While this decision has reduced the government's energy bill projections, it has not reduced the impact on householders' pockets.[4]

- **Higher prices for more energy efficient products.** The government projects that its 'products policy' – including standards for more energy efficient products – will make a large contribution to reducing energy consumption. But increasing energy efficiency standards must be expected to cost the manufacturers of the products more. Such costs do not show up in the government's energy bill projections, but do put upward pressure on the prices householders pay to buy their energy-using products.

- **Knock-on costs from businesses' higher energy bills.** Higher energy prices increase not just households', but also businesses', costs, and businesses ultimately pass on much of these additional costs to household consumers. Even if businesses absorb a part of the costs, this is likely to impact employees and/or shareholders (i.e. pension funds), which also ultimately passes the costs onto householders.[5]

As well as these policy costs which fall outside energy bills, the government appears also to have omitted a major set of relevant costs from energy bills themselves.

The policy-driven increase in low carbon generation will require a major expansion in the electricity grid, including greater interconnection with Scotland where much of the wind generation is being built, an offshore wind grid, and associated grid reinforcement. In addition, much of the renewable generation will be intermittent, and this will require additional flexible generation capacity, storage and/or international interconnection, in order to ensure security of supply. DECC appears not to have attempted to include these policy costs in their projected impacts on household bills.

Government figures hide the wide range in value for money from different policies

As well as not capturing the full impact of policies on households, the government's headline message hides the very different kinds of policies being lumped together.

Full clarity about carbon and renewable policies should include helping householders to understand

[4] Households also gain a benefit where policies generate revenue for the Treasury, which offsets current or future general taxation. This occurs mainly in relation to the EU ETS and Carbon Price Support policies.

[5] A proportion of increased energy costs may lead to improved process efficiency, and some of the costs may be borne by non-UK residents if products are exported.

both the costs and outcomes they are being asked to pay for under each policy. The public are more likely to accept paying climate policy costs if they are confident that their money is being well spent.

Unfortunately, DECC combines a smorgasbord of different 'energy' policies together, in an attempt to justify its approach and headline message about the impact on households. This hides the fact that while some policies are very good value for money, others are hugely and unnecessarily wasteful of householders' money. For example, the EU ETS is saving carbon emissions at a marginal cost of only £5-15 per tonne of carbon, and the Green Deal and many other energy efficiency measures are estimated to have a net negative cost, but Round 3 offshore wind needs a subsidy equating to around £300 per tonne of carbon saved.[6]

Wasteful policies are not rendered acceptable simply because their costs are projected to be offset in average bills by savings from better policies. The potential savings to customers from demand reduction policies must not be squandered on – and used to disguise – unnecessarily expensive policies.

Estimating the full cost to households of renewable energy subsidies

Renewable energy deployment subsidies, driven by the need to meet the EU 2020 Renewable Energy Target, constitute the largest and most unnecessarily expensive policies. Policy Exchange has attempted an estimate of the *full* cost to households of these subsidies in 2020, not only those costs funded directly through households' energy bills.

DECC does not make it straightforward to calculate the impact of renewable subsidies on household bills in its 2011 Annual Energy Policy Statement. It gives costs for the Renewable Obligation (RO) and for the Feed-In Tariffs (for small-scale renewables). But the cost projections for 'Electricity Market Reform' (EMR), which is proposed to replace the RO, wraps up support for a wider range of generation technologies, and is anyway unlikely to represent a credible cost projection, given that the design of EMR is still at an early stage with legislation not even drafted.

So we use a combination of the Feed-in Tariff (FiT) cost estimate from the 2011 annual energy policy statement and the RO figure from the *2010* statement. We consider this approach is fairly robust[7] to

[6] It is very hard to project what subsidies would be needed to bring forward Round 3 (i.e. deep water) offshore wind through to 2020. We take Mott McDonald's figures for the levelised costs of Round 3 offshore wind (£190/MWh) and compare them the £80/MWh levelised costs for new gas generation, the likely alternative generation in the absence of policies. The additional cost for offshore wind saves 300g CO2/MWh at a consequent cost of £366 per tonne of CO2 saved. This does not include the extra system costs also required by increasing penetration of offshore wind. The figure we use of £300 per tonne of carbon saved may therefore be quite conservative.

[7] In its recent RO 'banding' review, DECC proposed a range of revised subsidy levels for renewable technologies. It outlined that these revisions could reduce overall costs a little up to 2016/17. DECC did not identify the impact of the revisions in 2020, but since the subsidy level for offshore wind (which will account for most subsidy) was revised up after 2015, it does not seem likely that RO costs in 2020 would

both the subsequent RO 'banding review'[8] and EMR proposals.[9] This gives a cost to an average household of renewable electricity subsidies of £100 a year in 2020.[10]

But this is far from being the full cost to households of renewable energy subsidies. To calculate the full costs we also need to take the following elements into account:

The pass-through to households of renewable subsidy costs in business customers' energy bills

About 70% of UK electricity is consumed by the non-household (business) sector, which also pays a share of the costs of renewable energy subsidies. We assume that 80% of the renewable subsidy costs on non-households are ultimately borne by households.[11] This amounts approximately to an additional £185 a year per household by 2020.

Additional electricity system and grid costs arising from increasing subsidised renewable energy

One estimate of extra system operation costs has been made by Colin Gibson (formerly Power Networks Director at National Grid), in a working paper published by the Institution of Engineers and Shipbuilders in Scotland (IESIS).[12] This work attempted to estimate the costs of:

- fast response plant to address the intermittency of wind in the operational timescale;
- planning reserve (maintaining an underutilised conventional generation fleet equivalent to peak load plus a margin to cover periods when output from the wind fleet falls to extremely low levels); and
- additional transmission grid infrastructure needed to transport energy from renewable sites to consumers.

Using this work the Renewable Energy Foundation (REF) estimated £5 billion a year in total extra system costs.[13]

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be much or at all lower as a result of the banding review. The Government's July 2011 EMR White Paper estimated the impact of EMR options on average annual electricity bills for domestic consumers relative to baseline policies. For the Government's preferred package (FiT Contracts for Difference plus a reliability market) the estimated bill saving in the period 2016-2020 was negligible.

[8] DECC (2011), *Renewable Obligation banding review consultation*

[9] DECC (2011), *Planning our electric future: A white paper for secure, affordable and low-carbon electricity*

[10] The Committee on Climate Change gives a slightly different figure of a £50-60 increase in bills in 2020, in its Renewable Energy Review (2011). What this figure precisely describes is not completely clear, not why it differs from DECC. We take DECC's figures. The difference between the two is small in relation to the overall £400 impact on households calculated in this research note.

[11] Reduced from 100%, to be allowance for a proportion of increased energy costs leading to improved process efficiency, and some costs being borne by non-UK residents.

[12] C Gibson (2011), *A Probabilistic Approach to Levelised Cost Calculations for Various Types of Electricity Generation*, IESIS, Edinburgh. http://www.iesisenergy.org/lcost/.

[13] J Constable et al (2011), *Energy Policy and Consumer Hardship*, Renewable Energy Foundation.

Another estimate, by Professor Richard Green, now at Imperial College, (in the 2009 *The Economics and Politics of Climate Change*[14]) put the addition annual costs in 2020, from renewable deployment, at £1.2 billion for transmission and £1.3 billion for the costs of system integration of intermittency. Green's estimate for the costs of intermittency is consistent with the Committee on Climate Change's figures in *Building a low carbon economy – The UK's contribution to tackling climate change* of an additional cost of 1-2p/KWh of intermittent electricity in 2020.[15]

We take Professor Green's £2.5 billion a year estimate (and not Gibson/REF's larger figure) for the extra system and grid costs of renewable generation, which implies an additional cost of about £75 per household.[16]

Renewable Heat Incentive

Subsidies for renewable heat deployment (as opposed to renewable electricity) are funded from general taxation, through the Renewable Heat Incentive (RHI), which has just got underway. The Committee on Climate Change, in its *Renewable Energy Review*[17] estimated that the RHI would need to spend £2 billion a year by 2020 to meet the EU Renewable Energy Target.

Different taxes have different bases, but most of them, whether fuel duty, income tax, VAT or corporation tax, are ultimately paid by households. We assume that households pay for 80% of the cost of the RHI, amounting to another £55 a year in 2020.

Therefore, Policy Exchange's analysis estimates that by 2020 the full cost per average household of the government's renewable subsidies will be around £400 a year[18] paid through a combination of energy bills, general taxation and higher prices for goods and services.

If these additional renewable subsidy costs to households identified by Policy Exchange are added to DECC's figures, then the total net cost (not just through energy bills) to the average household of carbon and renewable policies will be *equivalent* to 15% of the (without policies) energy bill.[19]

By clarifying the full impact on households in this way, it does not mean that Policy Exchange is arguing against the importance of spending money on reducing carbon emissions. Far from it. What we want to

[14] R Green (2010), *Climate Change Mitigation from Renewable Energy,* in D Helm and C Hepburn, *The Economics and Politics of Climate Change,* OUP

[15] Committee on Climate Change (2008), *Building a low carbon economy – The UK's contribution to tackling climate change.* Assuming 1.5p/KWh and 25% intermittent generation in 2020 gives around £1.3 billion additional system integration costs of intermittency.

[16] Costs to non-households are passed through to households at the same 80% rate as before. We assume 29 million UK households in 2020.

[17] Committee on Climate Change (2011), *The Renewable Energy Review*

[18] Policy Exchange's calculation results in a figure of £415, but a rounded £400 headline figure is appropriate given the difficulties and uncertainties in the estimate.

[19] The two sets of estimates (DECC's and Policy Exchange's) are not fully comparable. For example, the combined *total household impact* figure does not include pass through of the non-household costs of the EU ETS and Carbon Price Floor, nor does it net out the Exchequer revenues from those two policies.

see are policies which can command sustained public support over the long-term timescales needed to address climate change (i.e. cost-effective policies). Greater transparency on the impacts on households is needed both to focus minds on how the cost-effectiveness of climate policies can be improved, and to build long-term sustained public support for climate action.

A weak case for current renewable energy deployment subsidies

One of the most important ways to improve the cost-effectiveness of climate policy, as Policy Exchange has argued in a previous report,[20] would be for the UK to renegotiate the EU 2020 Renewable Energy Target that drives the large, and poor value for money, spending on renewable subsidies.

Reducing wasteful renewable generation deployment subsidies[21] would have *no effect* on carbon emissions in 2020. EU electricity carbon emissions in 2020 will be determined by the EU Emissions Trading System cap. If a UK household pays £300 to subsidise Round 3 offshore wind and thus reduces carbon emissions by one tonne, this enables an emitter somewhere in the EU to emit one *extra* tonne of carbon than they would otherwise have done. The Renewable Energy Target simply makes it more expensive to meet the carbon cap. It squanders resources which could be much better used to accelerate research, development and demonstration of a wider range of promising low carbon technologies, to accelerate energy efficiency improvements, and to help households struggling to heat their homes.

Policy Exchange is not arguing that renewable energy technologies have no significant role to play in a future decarbonised energy mix. Indeed a number are sure to play an important role. There is a good case for government supporting learning and innovation in relation to a range of promising early stage low carbon energy technologies (those with potential to become cost-competitive and to have significant global impact). But the vast majority of current subsidies support mass short-term deployment of a few preferred renewable technologies – particularly hugely expensive offshore wind – in order to meet the 2020 Renewable Energy Target. This is an unnecessarily expensive way to reduce carbon emissions in the short-term and poorly targets resources for stimulating low carbon learning and innovation, reducing UK policy's global impact.

Many politicians understand that much of the current renewable generation subsidies are a wasteful approach to emissions reduction. So they fall back on other – dubious – arguments for spending £400 a year of each household's money by 2020 on renewable energy deployment subsidies, including:

[20] S Moore (2011), *2020 Hindsight: Does the EU Renewable Energy Target help the UK decarbonise?* Policy Exchange.

[21] Renewable heat subsidies, comprising about a sixth of the overall costs of renewable energy subsidies in 2020, relate to emissions outside the EU ETS cap, and so could have a positive (though largely expensive) impact on carbon emissions.

- *to protect households from rising gas prices* – despite the fact that future gas prices are unknowable and even DECC's central projections are for UK wholesale gas prices for 2020 and beyond (68p per therm) are little or no higher than levels seen in recent months;

- *to protect the economy from gas price volatility* – while burdening the economy with – almost certainly more damaging – *guaranteed* high energy prices; and

- *to create new renewable energy export industries* – despite the many past failures of government industrial policy to 'pick winners', and the serious doubts about the UK's ability through creating comparative advantage to capture a significant future export market in renewable energy.[22]

Recommendations

Policy Exchange reports over the last 18 months have made recommendations to improve the cost-effectiveness of climate policies, including:

Transparency in costs (Green Bills, 2010)[23]

1. **Energy bills should give a breakdown of the bill's components including the costs of government policies. The Treasury should explicitly report on the policy 'levies' within energy bills, alongside reporting revenues from other taxes.**

So far, the Treasury introduced, in the 2010 Spending Review, a new 'Control Framework for DECC levy-funded spending'. But the government needs to give consumers and taxpayers clearer information about the impact, costs and benefits from each carbon and renewable energy policy.

Small-scale renewable subsidies (Greener, Cheaper, 2010)[24]

2. **The hugely expensive Feed-in Tariffs (FiTs) scheme for small-scale renewables should be abolished, and the most expensive parts of the proposed Renewable Heat Incentive (RHI) should be scaled back.**

So far, the government capped and then (belatedly) scaled back subsidies under the FiTs. The government's approach to implementing the RHI has scaled-back some of the expensive elements. The government needs to continue to cut back those subsidies which are unnecessarily expensive ways to cut carbon.

Carbon consumption accounts (Carbon Omissions, 2010)[25]

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[22] S Less (2011), We need to focus on growth and being greener – not 'green growth', in M Oakley (ed) (2011), *Looking to the Future of Growth*, Policy Exchange
[23] S Less (2010), *Green Bills: An analysis of the projected policy levy in energy bills,* Policy Exchange
[24] R McIlveen (2010), *Cutting the Cost of Cutting* Carbon, in S Less, Ed., *Greener Cheaper*, Policy Exchange

3. **Having calculated that up to 30% of the UK's total carbon *consumption* emissions were produced abroad (in the manufacture of imports), Policy Exchange recommended that:**

   - **the government should publish regular estimates of carbon emissions on a consumption basis;**

   - **policy should move away from the current disproportionate focus on technologies (such as offshore wind) that mainly address domestic emission reduction, and instead recognise the UK's wider climate impact and goals, and reprioritise resources towards low carbon technologies most likely to make a substantial contribution to *global* carbon reduction.**

So far, the Commons Energy and Climate Change Committee is holding an inquiry to investigate the case for consumption-based greenhouse gas emissions reporting in the UK.

Electricity Market Reform (Re-Monopolising Power, 2010)[26]

4. **The government should exploit the power of market processes to innovate and discover over time the best routes to decarbonisation. The complex accretion of regulatory interventions should be rolled-back to achieve a simpler regulatory framework that enables market processes to function well. A key part of that is having a credible, long-term carbon pricing framework, and policy and political effort should be focused on achieving that.**

Unfortunately, at present, the government continues to go in the opposite direction. Its Electricity Market Reform proposals move substantially back towards a centrally-planned electricity system, with complex and risky proposals that will damage market processes and increase decarbonisation costs. The planned Carbon Price Support to 2020 falls well short of a credible, long-term carbon pricing framework, and distorts the EU ETS.

Renewable Energy Target (2020 Hindsight, 2011)[27]

5. **The UK should explore the scope for renegotiating the 2020 Renewable Energy Target. No further technology-specific targets for renewable energy should be set for the period after 2020. EU and UK policy must instead focus on overall emissions, not deploying specific technologies.**

6. **If rapid renegotiation of the EU renewables target proved unachievable, then savings of £9-12.5 billion by 2020 could be made by planning to buy renewable credits from other countries, tackling planning barriers to onshore wind and prioritising more biomass (both technologies cheaper than offshore wind), and upping efforts on energy efficiency.**

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[25] A Brinkley (2010), *Carbon Omissions: Consumption-based accounting for international carbon emissions*, Policy Exchange

[26] S Less (2010), *Re-Monopolising Power: Ten principles for electricity market reform,* Policy Exchange

[27] S Moore (2011), *2020 Hindsight: Does the Renewable Energy Target help the UK decarbonise?* Policy Exchange

So far, the government has said that it will take powers to trade renewable energy credits under the flexibility mechanisms in the Renewable Energy Directive (and has agreed an All Islands Approach with Ireland to exploiting renewable energy resources); increased support for biomass co-firing; announced some additional incentives for domestic energy efficiency measures under the Green Deal; and the Draft National Planning Policy Framework makes a presumption in favour of sustainable development, recognising the need to move to low-carbon energy. The Committee on Climate Change also backed a moderation of the government's 2020 ambition for expensive offshore wind, in its *Renewable Energy Review*.

But the government has taken a wrong step in increasing the post-2014 subsidy level for offshore wind. It needs to go further in reducing the damaging effects of the Renewable Energy Target. The Dutch government has unilaterally scaled back its subsidies for renewables from €4 billion per year to €1.5 billion per year, committing to focus only on cost-effective technologies such as onshore wind and biomass.

Low carbon research, development and demonstration (Climate Change Policy: Time for Plan B, 2011)[28]

7. **Policy resources should focus (a) on supporting technologies that are or will become affordable, and that can be deployed globally at greatest scale (i.e. unlike offshore wind); and (b) on bringing down costs, which is often best achieved through a greater focus on research, development and demonstration, rather than early large-scale deployment.**

While the government has yet to reprioritise resources away from offshore wind deployment, it has maintained its commitment to funding a Carbon Capture and Storage Demonstration project, and is broadly protecting overall research and development spending levels from cuts.

Energy efficiency incentives for businesses and public sector (Boosting Energy IQ, 2011)[29]

8. **A more cost-effective approach to incentivising business and public sector energy efficiency would be to scrap the flawed and burdensome Carbon Reduction Commitment; and instead simplify carbon pricing across the non-domestic sector, reducing price distortions between different types of customer and different fuels; and introduce mandatory carbon reporting for up to 24,000 large organisations.**

So far, the government is set to consult on draft legislation for simplifying the Carbon Reduction Commitment, and ministers have asked officials to look again at the Impact Assessment case for mandatory reporting.

[28] B Moselle (2011), *Climate change Policy: Time for Plan B,* Policy Exchange
[29] G Newey (2011), *Boosting Energy IQ: UK energy efficiency policy for the workplace*, Policy Exchange

About the Author

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