# Are current policies promoting a change in behaviour, conservation and sufficiency? An analysis of existing policies and recommendations for new and effective policies

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# Introduction (1)

- There is a strong consent that energy efficiency alone is not enough to reach ambitious climate and energy targets.
- The EU 2020 and 2030 energy (efficiency) saving target of -20% and – 27 (30%) are expressed as a maximum consumption level.
- Given the magnitude and the nature of the EU 2020 and 2030 energy saving  and climate targets, a change in the behaviour of citizens and organisations will be requested in order to achieve the requested energy reduction.

# Introduction (2)

Energy savings (ES) and reduction in energy demand can be achieved:

- by improving the energy efficiency (EE) of the services provided (technological aspect); or
- by changing the energy consumption pattern without necessarily making technological improvements (behavioural aspect, for instance avoiding overheating/ overcooling or driving in favour of cycling); or
- a combination of the two above;

# Introduction (3)

- EE describes how much useful work, activity or service can be generated for each unit of energy consumed.
- EE is an important component to achieve ES, as it allows having the same services and goods with reduced energy consumption.
- However, improved EE - i.e. replacing an installed technology with a more energy efficient one - does not *per se* assure ES, and there are some examples where introducing a more efficient technology results in an increase of the actual consumption, due to the rebound effect.

# Introduction (4)

- One example is the increase in consumption when replacing an old inefficient appliance with more efficient one, though larger (e.g. doubling the size of a refrigerators, the energy label may improve, but the energy consumption may also increase)

- Other examples could be adding an A-class air conditioner where there was none before or leaving an energy efficiency TV always on to hear music, etc.

- There is a general trend to add more appliances and equipment (and of bigger size) resulting in the EU residential electricity consumption is slightly increasing despite all the progress in "efficiency" of appliances.

# Traditional Policies (1)

- Most of the barriers hindering the uptake of EE improvements have been investigated.
- To overcome these barriers, governments have introduced policies and programmes over the last 30 years focusing on improving **energy efficiency** of equipment and technical systems.
- Traditional policies includes labels and standards, building codes, information campaigns, voluntary agreements, energy/carbon taxation, investment subsidies, suppliers' obligations and financial incentives.

# Traditional Policies (2)

- Some **equipment minimum efficiency standard** or energy labels may be **more favourable** to larger equipment as these tend to be more efficient for technical reasons, when the efficiency is defined as energy consumption divided size or volume.

- This was the case in the EU for refrigerators where the efficiency was defined as consumption per unit of volume and larger refrigerators with a more favourable surface to volume ratio have a better energy efficiency rating.

- Also building performance certificates (as introduced by the EPBD) based on **kWh/m2** ratio do not give the information on the **total building** energy consumption.

# Information and Communication Campaigns (1)

- Information campaigns have been a common type of policies to change end-user behaviour based on different societal goals such as: security of energy supply, local pollution, climate change.
- Information campaigns have taken several different forms from general advertisement campaigns (e.g. TV ads) to specific and tailored information provided to specific groups of end-users.
- The meta-analysis carried out by Delmas et al. show that information campaigns are effective, and participants reduced their energy use by an average of **7.4%**.
- When individuals are informed about energy use and given advice on lowering their consumption, they reduced their energy use by **13.5%**. When providing individuals with comparisons with their peers' energy use; this reduced consumption by **11.5%**. Strategies that provided information on **money savings** or provided monetary incentives resulted in an increase in energy usage by the participants.
- The researchers also noted that rates of energy usage slowly increased under longer studies. This suggests that information campaigns may not have a sustained effect.
- The authors of this study concluded that non-monetary, information-based strategies can be effective at reducing overall energy usage in controlled experimental studies.

# Information and Communication Campaigns (2)

- Literature distinguishes three classic approaches:
  - the price-based approach: save money!
  - the environmental approach:  save the planet!
  - the social approach: be a good citizen!

- The **social norms** approach integrates the social norms (refer to the perception of what is commonly done in a situation) as the basis for awareness on energy behaviour. In fact people are social beings and respond to group norms (i.e. the knowledge of the energy consumption of our neighbour influences ours). Social norms do have a huge power to influence pro-environmental behaviour. They not only spur, but also guide action in direct and meaningful ways.

- In addition, researchers and practitioners recommend that people need to be **inspired, to be engaged**, to have fun when receiving the message. The message needs to be carefully selected and kept as simple as possible, key words: entertain, engage, embed and educate! Once the basic awareness is there, the second step would be to provide targeted information on potential energy saving measures. It is essential to understand and study the audience targeted.

# Energy Consumption Feedback (1)

- Among the actions to induce energy savings in recent years through consumer behaviour (both individual psychological and social norm) researchers, utilities and policy makers have focused their attention on **energy feedback**. The use of this mechanism has also been enhanced by the diffusion of smart meters and the internet.

- Energy Feedback is a way to turn a resource, energy, into a visible one, creating the possibility of shifting energy consumers from a passive state into an active one.  This change of paradigm makes it possible to achieve energy savings thanks to the actions stimulated from the collected and processed energy consumption information and the consequent action from the consumer, when the consumer is properly engaged and has some degree of freedom on choices in relation to energy consumption.

- There are two types of Feedback: Indirect and Direct.

# Energy Consumption Feedback (2)

The reviewed literature finds that feedback can reduce the households' energy consumption up to realistic 5% to 10% and that it works best when it is:

- tailored to the end-user;
- presented clearly and engagingly;
- accompanied by advice for reducing energy consumptions;
- delivered regularly and with high frequency;
- made through enhanced billing versus standard billing;
- in the presence of In Home Devices, Web Based, interactive and digital;
- capable of providing information by appliance (even if cases are still rare);
- associated with a well-defined and challenging goal (social norms).
- direct feedback, especially when it comes to electricity consumption

# Energy Consumption Feedback (3)

However there are relevant uncertainties and significant gaps still remain in the effectiveness and cost-benefit of feedback. In particular:

- the effect of feedback on consumers in different social and demographic groups;
- the effect of feedback on appliance purchasing decisions;
- whether feedback continues to work over time or whether it needs to be renewed/reshaped to keep householders engaged and maintain any conservation effects.
- the ability for feedback to facilitate the sharing of energy information between households, friends or neighbours is almost entirely unexplored;
- It is important that the engagement of the final energy consumers is constant in order to minimize the novelty aspect of a new way of energy feedback fading away after some time. Two-way communication from the energy provider and final energy consumers is recommended.
- Gamification and social norms tools such as the comparison with similar energy consumers or the sense of gratification when the consumer's energy performance improves and is communicated towards the final consumer may offer a good solution for the continuous engagement of consumers.

# Taxation (1)

- **Energy or carbon taxation** is a very powerful instrument, often introduced more to raise revenue rather than discourage consumption  which is also effective in limiting the **rebound effect**.
- Theoretically it is based on the fact that consumers tend to overweight losses compared to gains and therefore tend to engage in risk-averse behaviour with respect to gains and risk-acceptance behaviour with respect to losses
- High energy prices tend to reduce the energy consumption particularly in less affluent households and where price is more elastic.
- The taxation level should be rather high in order to trigger behavioural changes or investment in efficiency. However it is quite complex to define an optimum level of taxation and to avoid unintended effects as fuel poverty
- A carbon/energy tax can have a double positive results to reduce carbon emissions and to foster the adoption of renewable and energy efficiency energy technologies by recycling the revenues by government back to the economy in investment in energy efficiency policies and clean energy technologies.
- The introduction of such tax can be neutral or even positive to the economy.  It is important in the recycling of the carbon tax revenue in the economy takes care to avoid the rebound effect.
- In the long term a carbon/energy tax could gradually replace the tax on labour, reducing the labour cost thus helping creating additional jobs in the economy.

# Taxation (2)

- Tax could also be used to **penalise bad behaviour** and **favour good behaviour**.
- Taxes are already used in some jurisdictions to promote energy efficiency in cars by having the annual road tax (or a specific purchase tax) based on the CO2 emissions. In addition, vehicle with very low emission could be incentivised, by lowering the car purchase tax and at the same penalise vehicles with high emissions: this measure would promote the efficiency of the vehicle.
- A carbon tax on the fuel as described above or a road tax/car insurance based on the kilometres driven would contribute to energy savings (especially in the case valid alternative would be available (public transport, cycling, etc.).
- Similarly the building/property tax (at the time of purchase and the annual property tax) could be based partly or totally on the CO2 emissions of the buildings (estimated as in the Energy Certificate) or based on real emissions due to energy consumption (metered data).

# Personal Carbon Allowances (1)

- Personal Carbon Allowance is an interesting innovative policy instrument to reduce CO2 emissions and energy consumption.
- This policy has not yet been adopted in any jurisdiction and has encountered several objections.
- It may include only CO2 emissions from energy usage (including if needed the transport sector and the aviation sector) or it may include all the CO2 emission including waste and food consumption.
- The allowances could be distributed in equal measure to each citizen or based on historic emissions (free allocation, but a share could also be auctioned).
- The allowances could be traded in such a way to allow citizens consuming more to pay more energy virtuous citizens not using all their allowances.
- As with the carbon tax, personal allowances will avoid or minimise the rebound effect and will add a carbon price to every energy purchase.

# Personal Carbon Allowances (2)

- In a similar manner, personal carbon allowances will also foster renewable energies (energy consumption without carbon!) both in the grid and in buildings (e.g. solar thermal).
- In addition, the personal carbon allowances would make the carbon price more explicit to consumers, allowing them to know from the market value the value of each allowance (e.g. 1 kg of CO2).
- Governments could announce long term plans to reduce each year the allocated allowances in order to meet challenging carbon targets (e.g. -80% by 2050).
- Although the accounting technology for the personal carbon allowances is available (via smart cards, smart phones, internet, etc.) the system could be quite challenging in its set up and information and training of end-users.
- Although in principle personal carbon allowances are very different from a carbon tax (setting of the quantity of emission reduction and by leaving the price to the market vs. fixing the price and leaving the quantity to the market), if the people will not be well informed and engaged, it could appear to consumers as a carbon tax.

# Building Carbon Allowances

- The **Carbon Allowances** could also be applied buildings. The allowance can be expressed in CO2 or kWh per building per year (based on the size of the building or on the person living in the buildings or be a fix limit for all buildings). This would be a much less sophisticated systems as buildings have usually less energy sources (e.g. gas and electricity), which are regularly metered.

- The scheme would allocate the emission allowances to each individual building (with a gradual reduction over the years), and thus stimulate investments in EE and renewable energies and ES resulting by behaviour actions by buildings occupant or landlords (the allowance could be split between landlord and tenant to take into account the split incentive barrier). For example tenants may be only responsible for electricity due to appliances (assuming the tenant is selecting and owning the appliances, while landlord being responsible for heating).

- For the commercial sector buildings, some policies similar to this already exist, for example the UK CRC or the Tokyo Metropolitan Carbon and Trade Scheme, even though the UK scheme is working more as an energy tax.

- There could be a strong synergy between the innovative policies described such as property tax based on carbon emissions, building carbon allowances and feedback systems, all based on the metered energy consumption. Another possibility is to have a bonus/malus system on the property tax with the baseline set as example (valid in the EU) on the building Energy Performance Certificate.

# Progressive Standards and Codes

- **Minimum efficiency standards** for equipment and **building codes** are very effective policy instruments and have been adopted by a large number of countries. However both these two policy instruments only set efficiency requirements, but allow consumption to increase with size, as already explained in the introduction. Both these two policy instruments could be **made progressive**, i.e. the larger the appliance or the building the higher must be the efficiency to compensate for the size.

- It could also introduce a **maximum consumption limit** for buildings above a certain size. This policy will be progressive and most probably also socially acceptable and equitable as richer people tend to have larger homes and for them investments in improving energy efficiency and introducing renewable could be more easily implemented. Similar examples could be created for appliances such as TVs, refrigerators.

- This policy could be combined with property taxation based on CO2 emissions, incentives for low consuming buildings and other policy instruments.

# Energy Saving Feed-in Tariff (1)

- The feed-in tariff (FiT) for energy savings can be considered a **performance-based subsidy**, whereby action undertaken by end-users – both in terms of investment in energy efficiency technology and in terms of energy reduction resulting from behaviour change– is financially rewarded based on the energy savings delivered.

- Behavioural change is rarely eligible for traditional direct financial support (technology based incentives).

- Unlike *energy supplier obligations* – whereby energy suppliers have to deliver energy savings at their consumers' premises based on new technologies (and measured through deemed savings), the FiT can directly support action by the end-user based on the amount of energy saved, through technology and behaviour type actions.

# Energy Saving Feed-in Tariff (2)

- Unlike investment *grants*, which are rewarding consumers based on the size of their investment, a FIT rewards end-users based on the operational performance of their investment in terms of energy savings.

- The FiT could work with an *energy tax or high energy prices* by using the additional public money (e.g. money raised through the tax) to 'reward' to energy saved.

# Conclusions (1)

- The EU energy saving target for 2020 and 2030 will require a change in the energy consumer behaviour. This is essential also to reach the long term de-carbonisation goals.

- So far most of the "energy efficiency" policies have promoted the technical efficiency through technical standards or incentive for investments in energy efficiency appliances and energy consuming equipment.

- A number of policies help in triggering a behavioural change and in inducing a real reduction of energy consumption at personal level and/or at building level.

# Conclusions (2)

- In addition to more traditional policies to promote energy savings and behaviour change such as energy taxation and information campaigns there are innovative policies and programmes.

- These includes: Energy savings feed-in tariff, personal carbon allowances, energy consumption feedback progressive standards and building codes.

- Packages of policies are needed as there is no single policy that will deliver the savings.

- Policy makers should consider the innovative policies described in the previous slides and pilot test them. In general policy makers pay more attention to policy that foster a genuine a long lasting reduction in energy consumption.


# Thank you for your attention!

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