We have the facts, but . . . what is the story?

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Abstract

Energy efficiency is a bargain for most actors. They can reduce their energy use and at the same time increase the quality of their service. This is a fact. The cost to do so is normally a small fraction of the price of energy. It would amount to huge savings for them and for the society as whole. The tragedy, however, is that it does not happen as fast as the advantages would merit.

This fact has been well documented by prestigious parties, both in the private sector, e.g. the consultancy company McKinsey, and by international organisations such as the EU and in particular by the IEA/OECD. The latter has, however, also verified that the lion's share of the profitable potential will still remain unharvested for decades to come.

It seems as if mere facts about profitability, environmental advantages, energy security, productivity etc. are not sufficient as arguments to convince the actors responsible for operations and maintenance in industry, and far less so individuals, to act and realise the potential for efficiency improvements that they have.

We, who argue the need for energy efficiency, may have to reconsider our approach. We may have to "qualify the facts". The facts have to be put into a more relevant context to fit how people think and react. The factual story must appeal to people and result in narratives that encourage the necessary mobilisation of the efficiency market actors. If simple facts do not support their vision of reality they will not act. The facts have to be fitted into a suitable/understandable context. We have to tell a better story or tell the story better!

Introduction

This paper will begin with recalling the facts that we are normally serving the actors and expect them to act upon. These facts are however only part of a bigger context of how the energy system works and why the energy use provides services to the users and their strategic objectives.

Even if these facts are perfectly communicated to the users they may find themselves prevented to act properly. The reasons for these cognitive biases are several:

- Individual perception of the reality (thinking fast and slow)
- Social circumstances that form the interpretation of the reality (beliefs and habits)
- Physical constraints and availability (shared (mental) models)

The facts have to be adapted into something that makes sense in the users own understanding.

The facts

A well-known and often repeated mantra is that energy efficiency is the cheapest, safest and cleanest resource. This is often used by decision-makers from left to right, but nevertheless it seems difficult (for them) to act in accordance with this knowledge and these statements.

AFFORDABILITY

The IEA has very consistently delivered the message about energy efficiency as the superior alternative, in particular by issuing their annual energy efficiency market reports. Each year with a blurb that underlines the specific characteristics of en-

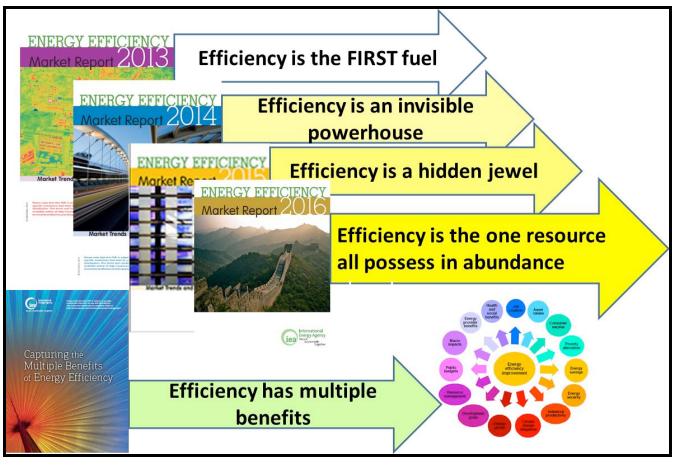


Figure 1. The Annual efficiency market reports from the IEA (IEA 2013, IEA 2014-1, IEA 2014-2, IEA 2015, IEA 2016).

ergy efficiency, see Figure 1. In this process they have managed to get acceptance for energy efficiency as the *first* fuel since it is cheaper and abundant.

This is remarkable since the energy efficiency community has for a long time tried to establish energy efficiency as the fifth fuel being comparable to coal, oil, gas and electricity.[1] The success of these advocates have however been limited but the "upgrading" from fifth to FIRST by the IEA seems to have caught the ear of the decision-makers as can be seen in the approach in the EU and the member states. This could be a sign that it is not the fact but the story, and by whom the story is told, that counts. When advocated by NGOs there have been limited response but when told by a government sponsored organisation as OECD/IEA the notion is catching on.

The European Union has in its preludes to the Energy Union repeatedly made a point that Energy Efficiency should be the first priority "Efficiency first: a new paradigm for the European energy system"[2] and even Germany has in its energy efficiency plan done the same, even by making use of the English expression, "Gabriel: Efficiency First - diskutieren Sie mit uns das Grünbuch Energieeffizienz".[3]

HOW CHEAP IS CHEAP?

The basic facts have however changed very little over time. What the IEA has managed is to convey them in a more striking manner to audiences that pay more attention when the message comes from a credible organisation working on behalf of governments.

The IEA has managed to improve the visibility and the illustrations of the advantages of efficiency a lot. The metrics and the consequences of efficiency improvements is shown in ways that is relevant to many more audiences and the illustrations have been much more elaborated and convincing.

In particular the affordability has been shown in several comparisons and in striking graphics that can be more easily understood than only verbal statements. Affordability has been argued for two reasons. One is that many of the measures to increase energy efficiency are far cheaper than the supply alternative (Figure 2) and in consequence much cheaper than the price of energy supplied via the grid (Figure 3).

When the efficiency option is ranked and compared to other means of changing the energy system and shown in "supply curves" it is often that the cheapest options have negative costs. This happens when the cost for saved energy is deducted from the investments. In this format it is also called "the free lunch that you are paid to eat" (Weizsäcker, Lovins and Lovins 1997, page 38).

Still there is a widespread perception among traditional economists that energy efficiency eventually will be embraced by customers and users when time is right and when prices are motivating enough.[4] At a closer look there is little justification for such a view. In most markets and market segments the difference in price between the relevant measures for efficiency improvements and what is charged by suppliers of energy through grids and otherwise is huge.

This has been documented by the IEA in general way for specific measures and by RAP (The regulatory Assistance Project) in a more specific way by comparison of "portfolios" of measures within the framework of EEOs (Energy Efficiency Obligations) on different markets. In both cases it shows that the cost of efficiency measures is much lower than a continued supply of energy to provide the same "energy service" (light, climate or motive power), Rosenow J. and Bayer E. (2016).

It indicates that there is a significant price difference but also that this difference is not a sufficient driver. This in turn could be explained by the difficulty to calculate the corresponding cost (and thereby the advantage) for the efficiency measure. The price could be read from the supplier's bill but the (lower) cost for the alternative solution to save energy has to be calculated by the user which is difficult and is therefore a huge barrier to action.

Or put in other words, the facts are there, but not easy to detect, and are therefore not sufficient as a driver.

IS CHEAP NOT CHEAP ENOUGH?

Industry often argues that energy efficiency is just one quality of many that should be taken into consideration when making decisions about changing manufacturing. When all qualities are taken together the efficiency opportunities will automatically follow and be fully used. Energy efficiency measures will, however, have to compete with other investment opportunities and will lose to those, which are more profitable.

This could no doubt be the case but given the difference between price and cost for measures as mentioned above and for which the profitability is very high it would be more logical to argue that systematic realisation of these measures the profit of those would generate more cheap capital to invest.

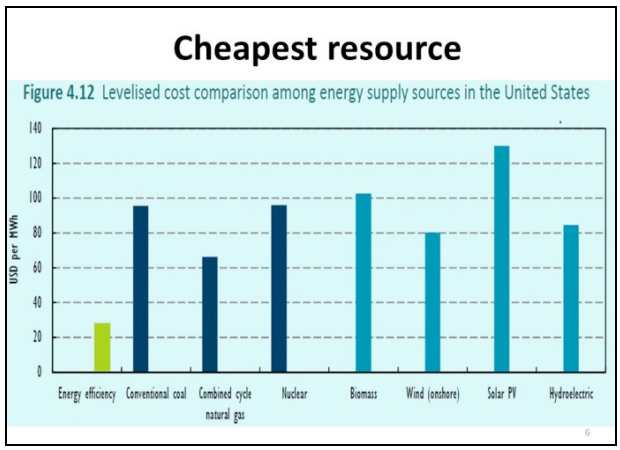
As the IEA has shown there are further many benefits connected to energy efficiency that should be recognised and pos-

1. http://www.economist.com/news/special-report/21639016-biggest-innovation-energy-go-without-invisible-fuel

2. https://europeanclimate.org/wp-content/uploads/2016/06/ECF_Report_v9-screen-spreads.pdf

3. http://www.deutschland-machts-effizient.de/KAENEF/Redaktion/DE/Meldungen/2016/2016-08-12-gabriel-efficiency-first-diskutieren-sie-mit-uns-das-gruenbuch-energieeffizienz.html

4. As captured in a statement by Charles Komanoff: "It's a law of nature, I'd say, or at least of Economics 101: inexpensive anything will never be conserved." (http://grist.org/article/2010-12-15-if-efficiency-hasnt-cut-energy-use-then-what/)



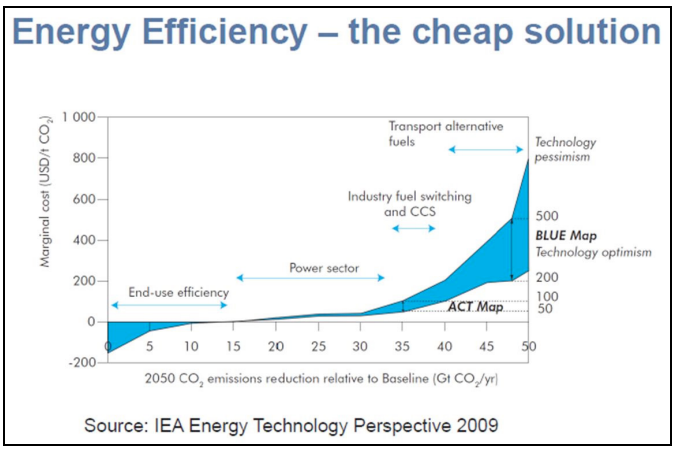
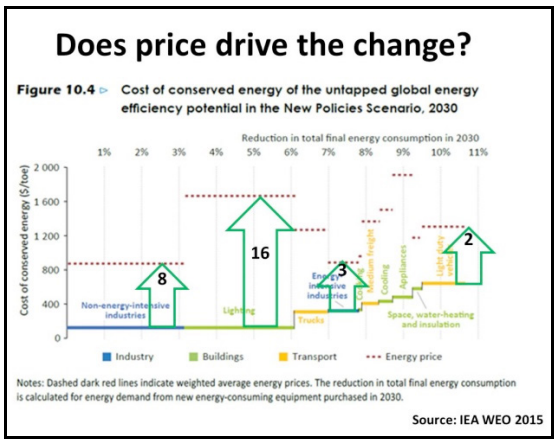


Figure 2. Energy Efficiency is the cheaper resource compared to any sort of supply (IEA 2015 Energy Efficiency Market Report) or compared to other means of GHG-abatement (IEA ETP 2009) as a "supply curve".



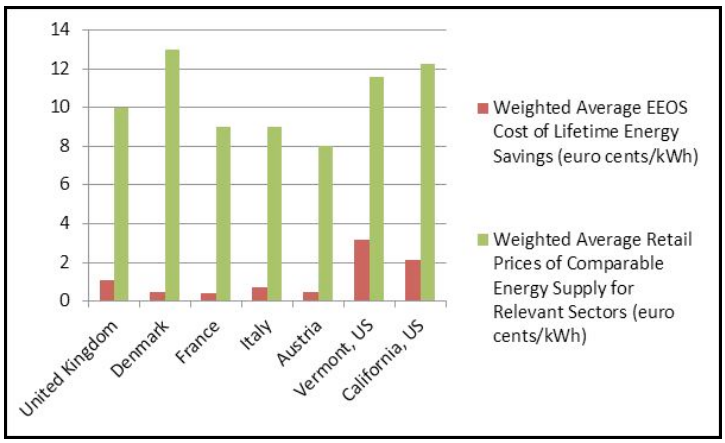


Figure 3. Energy Efficiency is the cheaper resource also in comparison to price on most market segments as shows the IEA reports and when Energy Efficiency Obligations (EEO) are constructed (Rosenow J. and Bayer E. (2016)).

sibly also made part of the calculation. Many of them are, however, both difficult to put into quantities and/or be attributed to the actor who harvests the benefit. If so done it would further emphasise the negative costs of efficiency and boost the potential.[5] The IEA provides examples on Health and Social benefits and on industial productivity (IEA 2014–2):

- "… by making homes warmer, drier and healthier, energy efficiency measures can dramatically improve health and well-being. When monetised, for example through the cost of medical care or innovative metrics such as the value of lost work time or child care costs caused by illness, these benefits can boost returns to as much as four dollars for every one dollar invested"
- "… the value of productivity and operational benefits to industrial companies were integrated into their traditional calculations, the payback period for energy efficiency measures dropped from 4.2 to 1.9 years."

Energy efficiency is the cheapest resource by far.

In spite of the obvious economic advantages the major part of the potential for energy efficiency remains unharvested even decades ahead, 2035 (IEA 2015 World Energy Outlook Special Report, IEA 2015 Energy Efficiency Market Report). Still 20 years from today the lion's share of the potential will not be realised, as shown in Figure 5. We have to face the fact that we put ourselves in the shadow and do not make full use of our resources.

The bigger story

So we have a case where resources remains untapped for decades ahead even if its quality in terms of economy in many aspects is demonstrated by serious and trustworthy analysts and institutions. We must find ways to translate these facts to a more convincing story and to comprise the whole truth and not only parts of it.

We are facing a situation similar to that of Lewis Carrols character Alice who travelled in Wonderland and through a looking-glass. There she discovered that things as she knew them could be completely distorted in the eyes and ears of them she met there. But also that perfectly reasonable questions could need to be rephrased in the communication if she wanted to find her way. Maybe we are having a similar task?

5. This type of study has been presented in "Ancillary Savings and Production Benefits in the Evaluation of Industrial Energy Efficiency Measures". Lung et al. (http://aceee.org/files/proceedings/2005/data/papers/SS05_Panel06_Paper10.pdf)

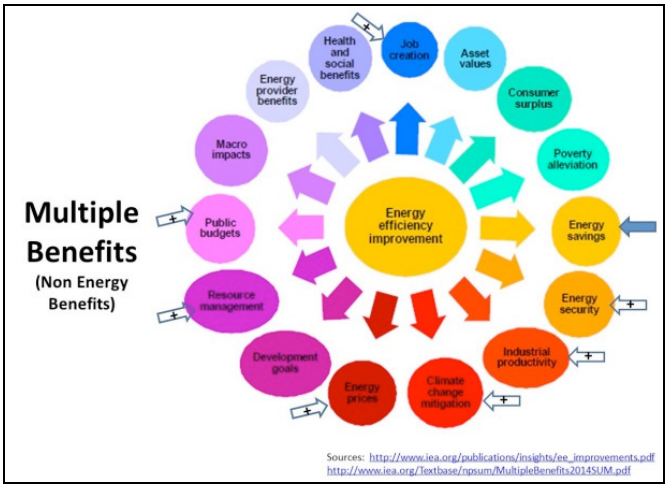


Figure 4. Recognitions of multiple benefits means that several aspects (having a value even if hard to quantify), should be taken into account. (IEA 2014–2).

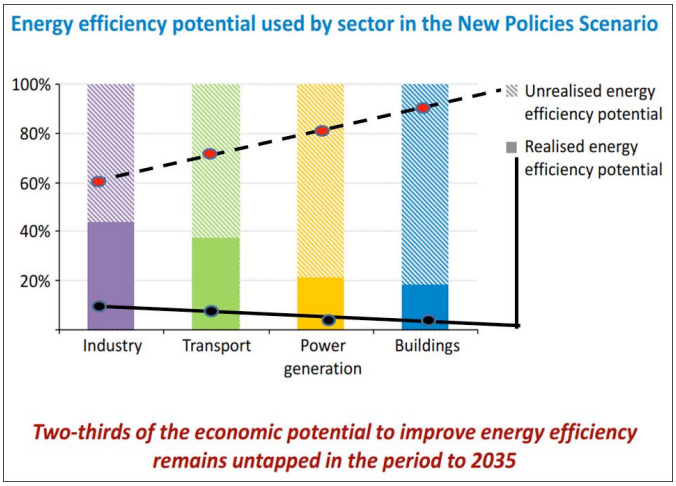


Figure 5. The vast potentials for energy efficiency remain unexploited even decades ahead (IEA WEO 2015).

> Alice (in wonderland) to the Cheshire Cat: 'Would you tell me, please, which way I ought to go from here?'
>
> 'That depends a good deal on where you want to get to,' said the Cat.
>
> 'I don't much care where–' said Alice.
>
> 'Then it doesn't matter which way you go,' said the Cat.
>
> '–so long as I get SOMEWHERE,' Alice added as an explanation.
>
> 'Oh, you're sure to do that,' said the Cat, 'if you only walk long enough.'

One of the problems we may have is that the facts we are telling are selective, i.e. only tell a part of the story and leave our audience blind for issues that are important for them. We could be in the same situation as Alice. We want to go somewhere (else) but we don't heed the cat's advice, to first determine where we want to go.

The textbook explanation, usually provided by neo-classical economists, is that the financially favourable opportunities will eventually be realised ("if we only walk long enough"). Many of us who advocate the bliss of energy efficiency are not economists ourselves but engineers so we like the idea of the human mind as a simple machine. Just fix the part of the machine that is not working.

The defenders of neo-classical economic theory say that there is no "market failure" for energy efficiency. If energy efficiency improvements is not in bigger demand on the market, it is because the customers do not have enough preferences for it but prefer using energy i.e. wasting, (Nilsson 2015).

THE MACHINE IS BIGGER THAN ITS PARTS

Many who basically agree on the need to reshape the energy systems towards sustainability give priority to activities to investments in renewable fuels but still disregard their much better (cheaper and more reliable) options on the demand side. There is thus a risk that we overinvest in supply There should be a merit order beginning with energy efficiency first and followed by a more balanced investment in renewables in a second step, (IEA DSM University 2016-1).

So one part of the story could be that it is necessary to put the proposal for energy efficiency improvements into the full context of what role it should play in the energy system as a whole. Another could be to put into the context of the company's economic reality.

An often used explanation for the lack of investments in energy efficiency in companies is that it might be profitable but the company has several competing investments that they are considering as *more* profitable and therefore more attractive. It could be development of capacity or of products with new features. The IEA has however made a remark on the dysfunctions of the financial market and its inabilities to recognise the value of energy efficiency:

> Energy efficiency currently lacks the attractiveness of investment in clean energy supply, such as renewables, reflecting different policy frameworks and a set of specific barriers, including small transaction sizes and verification and measurement issues. In contrast to traditional energy-supply investment, energy efficiency investments offer expectations of future cost savings rather than an asset generating a specific cash flow. (IEA WEIO 2014)

Investments in energy efficiency however have to be put in a wider context than saving money alone. Such investment often have an impact also on risk and on the value proposition which taken together has an impact on a company's strategic objectives, (IEA DSM University 2016-2, Cooremans 2011).

The full story, that might create more interest in energy efficiency, should at least be told with these two extra components in mind.

1. How energy efficiency impacts supply and thereby energy security/independence/robustness (for a company/country).
2. What energy efficiency does to the strategic objectives for the business.

The extended story

The more crucial issue for making a decision based on facts is how the facts are interpreted by the receiver of the information (= facts). Are they (1) understood, are they (2) in line with the receivers perception of what is right and possible and are they at all (3) possible to act upon with the connections and the means that the receiver has?

> 'But I don't want to go among mad people,' Alice remarked.
> 'Oh, you can't help that,' said the Cat: 'we're all mad here. I'm mad. You're mad.'
> 'How do you know I'm mad?' said Alice.
> 'You must be,' said the Cat, 'or you wouldn't have come here.'

Most of our common perception of how (economic) decisions are made is based on the idea that all people are totally focused on, and acting to, maximize the "utility" of all their actions. Thaler and Sunstein call such people "homo economicus", but also note that they seldom exist in reality but rather dwell in textbooks (Nudge 2008). They contrast this person with what they call "Humans" a category, which is not perfect but flawed in their behaviour – in thinking and in acting. This contrast is the essence of behavioural economics. This school of economics focuses on, and tries to explain, how and why decisions are not (always) rational and optimal but rather results of cognitive processes where we are primarily relying on experience and habits.

The findings from Behavioural Economics show more and more clearly that Homo Economicus is a fiction. The World Bank has published a report called Mind, Society and behaviour in which they state:

> Economics has …. come full circle. After a respite of about 40 years, an economics based on a more realistic understanding of human beings is being reinvented. But this time, it builds on a large body of empirical evidence—microlevel evidence from across the behavioral and social sciences. The mind, unlike a computer, is psychological, not logical; malleable, not fixed. It is surely rational to treat identical problems identically, but often people do not; their choices change when the default option or the order of choices changes. People draw on mental models that depend on the situation and the culture to interpret experiences and make decisions. This Report shows that a more interdisciplinary perspective on human behavior can improve the predictive power of economics … (World Bank. 2015, page 5)

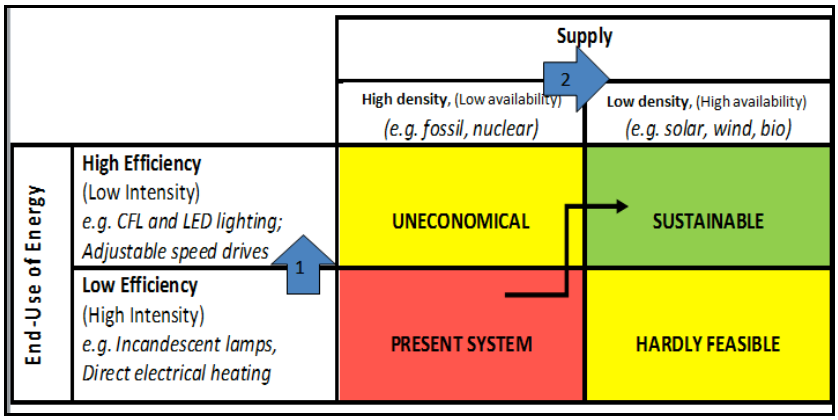


Figure 6. The twin approach to create a sustainable energy system.

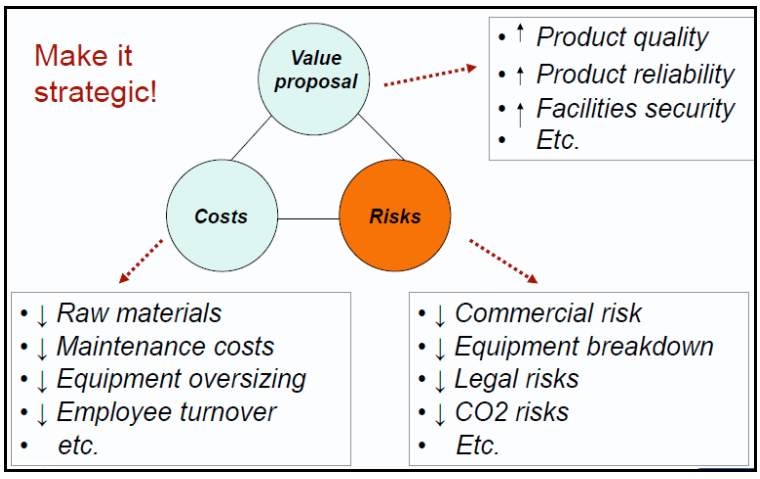


Figure 7. The components of a strategic approach to energy efficiency, IEA DSM-University 2016-2.

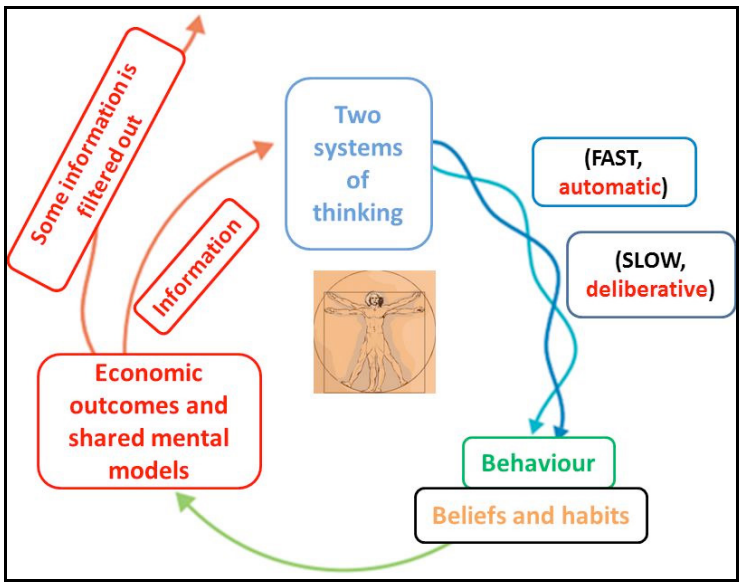


Figure 8. Behavioural economics recognises that the process for making decisions is not consistent (Based on World Bank 2015).

Table 1. The three steps (with cognitive limitations) towards a decision.

The receivers steps towards a decision	The World Bank model interprets and describes how our decision process depends on:
1.Understanding of facts	The **two systems of thinking** we all have where one part is **fast and automatic** and the other is **slow and deliberative**, Kahneman 2011.
2. Perception of scope	Which guides our behaviour which is also dependent on **beliefs and habits** where we tend to trust some sources/authorities and have less trust in others, Kahan and Braman 2006, Kahan et al. 2007.
3. Ability to act	That finally results in **economic outcome** that depends on **shared mental models** from which some **information is filtered away** and some is accepted, used and results in input for new decisions. In this last stage it might be that some things that I would like to do is made impossible because the option is not available on the local market

As can be seen there are many hurdles on the way to the perfect and optimal decision. Most of them are mental and could of course in due time be overcome by use of information, facts and persuasion but some are harder to come around. How can we, by embracing these findings, improve the story of energy efficiency to be accepted and realised?

The stories we could develop

Homo Sapiens is no doubt a very rational creature when it comes to economising resources such as time and personal efforts even if not in terms of economical maximisation. The fact that we are applying heuristics and learn to recognise patterns to make quick decisions using the fast system 1 instead of engaging the slow system 2 is indeed a way to save time.

> Alice laughed. 'There's no use trying,' she said: 'one can't believe impossible things.'
>
> 'I daresay you haven't had much practice,' said the Queen. 'When I was your age, I always did it for half-an-hour a day. Why, sometimes I've believed as many as six impossible things before breakfast.'

Behavioural economics is useful primarily since it gives us a tool, not only to understand how decisions are made, but since it gives us an idea about how decisions can be influenced. The most commonly known is the use of "nudging" to suggest choices that may be more beneficial but still allows people to make other choices if that suits them better.

But stopping with nudging would be too easy and misleading. It could give the impression that there is ONE simple solution and that we can find and convey it by use of magical tricks. As the World Bank model shows there are many ways that the decision process can derail. It could be more useful to look closer to each of these 3 steps and try to address the issues that could lead us away from promoting energy efficiency to full extent.

1. THE TWO SYSTEMS OF THINKING

Basically we could assume that if people could apply the slow and deliberative thinking it would automatically lead to more use of energy efficiency since that would be the logic of:

1. the fact that energy efficiency is cheaper and
2. there are numerous multiple benefits to take into account.

It however takes time to think slow and it is not only the lack of time that prevents the careful and deliberative thinking but the

general circumstances for the actor that has an impact on the mindset. It has been shown that people who are under physical or mental pressure (being hungry or struggling with sudden debts) narrows their chances to "think clearly" – The bandwidth is narrowing (Mullainathan and Shafir, 2013).

So telling a story with all the facts and details may not be the only (and the best) way to reach out and get the positive response. But this approach would be based on an idea that we could reform people and put them on the right track. First we may have to consider what made them come astray?

Overconfidence in limited information (The illusion of validity and WYSIATI)

There is a risk of illusion of validity from the data we have. The confidence one has in the ability to predict is based on the *degree* of representativeness without considering factors that may limit predictability. Kahneman coins the phenomenon of jumping to conclusions based on limited information WYSIATI – What You See Is All There Is.

WYSIATI is not only an issue of limited validity but worse! We are able to create a story that gives us confidence that we know all we need to know based on the little information we have, i.e. what we see is enough. "It is the consistency of the information that matters for a good story, not its completeness. Indeed, you will often find that knowing little makes it easier to fit everything into a coherent pattern. … WYSIATI facilitates the achievement of coherence and of the cognitive ease that causes us to accept a statement as true" (Kahneman 2011 p. 87)

Uncertainty

Thinking fast has its pitfalls and some of it has to do with that we are genuinely uncertain about the situation. According to Kahneman this depends on "substitution". When we have difficulties to understand a question we substitute it with one that is easier to handle. Four often used ways to create such a shortcut are characterised by the following biases, (Angner 2016):

a. **Anchoring and adjustment**, which means that the initial estimate becomes the reference (anchor) to which adjustments (plus or minus) are made to form the value for the decision. The problem is that the anchor could be totally irrelevant and easily tricked.

b. **Representativeness,** when an estimate is based on the result of a process that is assumed to be trustworthy but when the premises for this process are not sufficiently known – "it seems likely".

c. **Availability,** when an estimate comes to mind and is assumed to be more trustworthy the easier it comes to mind**.**

d. **Affect,** when an estimate is deemed more probable if the consequences give a good feeling.

Creating trust and desire: Energy advice, competent energy service companies from certified companies operating under known standards and more examples and data from these, will be useful as a way to reduce uncertainty for the categories a–c. For category d it will be needed to load the examples with positive affect e.g. by showing the full set of multiple benefits (and costs) to provide more realistic and good feelings.

In any of these cases it will be necessary to address the type(s) of bias that people may be guided by directly.

Certainty

Some other situations are still tricky even if we are certain about what we are facing. It has to do with our mental mechanisms

a. **The Endowment effect** is present in cases when people often demand much more to give up an object than they would be willing to pay to acquire it. This is basically what happens when we try to persuade people to change their well-known installation and equipment with something that they don't know how (and if) it works. How will the beautiful inherited lamp look like if it is equipped with 470 lumen LEDs instead of 25 W incandescent bulbs?

b. **Loss aversion** describes that we are more afraid of losing than we are interested in winning even if is the same value at stake.

The endowment effect calls for "creating trust and desire" as mentioned above. Loss aversion is handled with framing in terms of loss rather than only "win". The expression "win-win" is therefore a bit dubious.

2 AND 3. BELIEFS AND HABITS AND SHARED (MENTAL) MODELS

Our decisions get even faster once we have recognised a pattern and turned the reactions to it into habits and maybe even cemented the habit by attaching it to a belief-system of some sort. Being social we want to belong and one way of doing it is to stay with a (our) crowd.

Beliefs

The "Cultural Cognition Thesis" describes how peoples' beliefs about risk are shaped by their core values. People with a more egalitarian or more communitarian worldview are more inclined to believe that global warming is a risk that we have to deal with than people with a more hierarchic or more individualistic worldview (Kahan et al, 2007). One conclusion is that one should "focus less on facts and more on social meaning" to get the support for sound policies (Kahan and Braman, 2006).

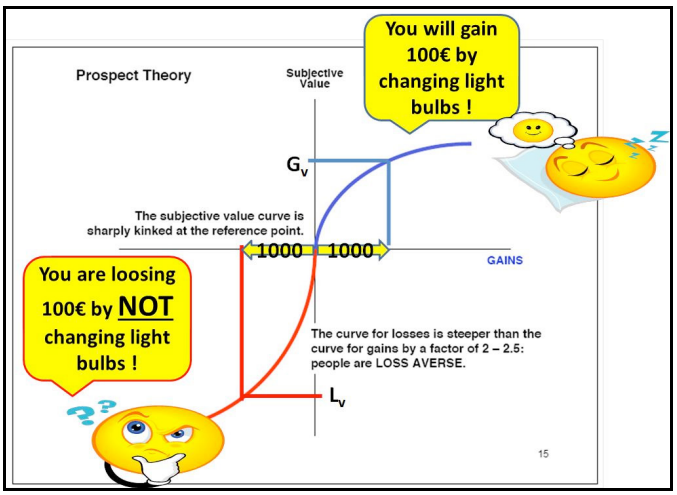


Figure 9. Loss aversion means that the subjective value of losing (Lv)is higher than the value of gaining (Gv).

This has also been called "solution aversion" in a study that tried to find out to what extent people were prepared to accept the facts related to global warming and found that those who held values that opposed the solutions that were perceived to put restrictions on market freedom also rejected the facts. *… many people (of course not all) who purport to be sceptical about climate science are motivated by their hostility to costly regulation.*[6] Their belief in that society should "keep the hands away from the market" is so strong that when solutions are suggested that suggests government involvement they not only reject the solution but also the facts.

Habits

Studies aimed at behavioural changes find that many attempts to make changes based on information and/or economical incentives seldom succeed unless they are made part of a battery of supporting activities.

> … strong habits are associated with simple, shallow decision rules. Essentially, people with strong habits possess motivational and informational biases that reduce the likelihood that they will receive and evaluate favourably new, counter-habitual information. These biases reduce the impact of informational campaigns and help maintain existing behaviour patterns. (Verplanken and Wood, 2006)

There have been many campaigns trying to inform people about energy use and motivate saving by providing and focusing on the positive financial outcome. A closer look at these shows less impressive results and occasionally even that they can be counterproductive leading to growing energy use! Something called the "licensing effect" meaning that when the concerned found that the monetary savings not were very dramatic they instead started to excuse their consumption (Delmas et al. 2013).

So there is good evidence that even with the best ambitions to be economically rational we will never be able to gather, compile and handle all the information we need to be a Homo Economicus. We are just by being human and by default ourselves not very fit to act in the market. We are a market imperfection ourselves!

SHARED MODELS

In the PV market it has been shown that the people who have PV on their roof are the people whose neighbours have PV on the roof. Generally it is easier to understand and accept a change when there is a known object close at hand to study and copy. The trend to establish industrial networks locally is from this point of view interesting and important.

Success breeds success: For tackling of beliefs and habits and for establishing of models that can be copied we need to move closer to the user in many ways. There is a need for new business models that provides related services to the customers. An example could be the British case where loft insulation was made easier when the customers also got help to clean the attic.

UBR-attitude (Unique Buying Reason) is important to address issues that are important for the customer, many of which are "multiple benefits" even if the customer is not at all interested in energy efficiency except that the saved energy could help pay for the change, Nilsson and Ruhbaum (2014), Nilsson (2016).

Conclusion

What could we hope for? Would it be to change people's minds to embrace (our) facts and act accordingly or should we just accept that people are following their instincts whether we think they are right or not? Or should we "distillate" facts and deliver them in a format that is in accordance with how people think? Should (and could) we tell them a better story about energy efficiency than only serve them cold facts on a plate and hope for the best?

It is necessary to stick to our tradition of gathering and telling about facts in the most traditional terms of cost and technical performance. But it is also necessary to put these facts into contexts that are of importance for the receiver, which has two main features:

a. The physical context by showing what energy efficiency means for the energy system and for the activity of the user.

b. The psychological context by understanding how the receiver think, where and from whom they take impressions, what resources they have in their close neighbourhood and that could help or prevent a change.

In short we must "go with the grain" and make sure that our facts are made part of the reality that people are facing. The story must make sense in the eyes and ears of the receiver.

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