Response to the 2013 public consultation
"Green Paper on a 2030 framework for climate and energy policies"

"Towards a multiple objectives and effective policy"

Dirk Van Orshoven, citizen

03 July 2013

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Preliminary notes:

- Frequently used abbreviations in this text:
    - MS: Member State
    - EE: energy efficiency
    - RE: renewable energy
    - GHG: greenhouse gas
    - CCS: carbon capture and sequestration
    - ED: ecodesign directive; IM: implementing measure
    - EPBD: energy performance of buildings directive
- In this text, "conventional energy" refers to all fossil and fissile primary energy sources.

1. Preliminary note

This text is a quick brainstorming the day before the deadline of the consultation. To a large extent it is an (unoptimised) compilation of earlier text fragments. It is written from the point of view of a concerned citizen, who has some technical background in energy matters, but who has no deep knowledge of all diverse aspects of the existing EU's energy & climate policies and their motivations and backgrounds.

2. Targets: multiple challenges – multiple objectives

The intrinsic limits of today's energy sources and the problems related to their use will probably require a full transformation of the present energy system within less than a century. Several issues need to be solved at the same time.

Since the 1970s, energy issues (and once in a while outright crises) have been a constant worry in our society. The multitude of problematic aspects related to the conventional energy supply and its consumption can broadly be grouped into 3 main categories:

- depletion of the reserves (commonly estimated to last –much– less than a century for most conventional energy sources[1])
- environmental issues:
    - fossil fuels are the major source of GHG emissions (CO_2, CH_4, etc.)
    - contamination: air pollution (particulate matter, NO_x, smog, volatile organic compounds, CO, acid rain, etc.), oil spills, the issue of radioactivity[2], etc.

[1] Nobody can exactly predict the future. But the eternal discussions whether crude oil, natural gas, etc. will last another ...40...60...80... years are to some extent pointless in a longer term perspective: these futile disputes must not detract from the fact that those energy sources that at present drive our society and our economy will not be available anymore in any significant amount in a not too distant future.

[2] Nuclear fission of U-235 is said to be able to supply electricity at its present rate only for another 50 years or so. However, radioactive waste will need to be stored for many millennia to come. This may constitute an extra incentive not to fully exploit the available fission fuels, so that future generations are not burdened with the waste of a short-lived intermediate energy solution.

- massive imports into the EU: risks of supply disruptions, negative impact on trade balance, volatile prices, loss of political independency, etc.

Each of these 3 issues already warrants by itself serious attention in order to thoroughly solve each problem. All 3 combined call for even more pervasive action.

Since they need to be tackled simultaneously, a single, overall, integrated policy is needed. Independent, disparate action plans for each of the issues separately will likely not be able to do the overall job. In other words: fighting is needed on several different fronts simultaneously, in parallel, but all these fights should be part of a coherent, optimised, overall strategy.

The impression is that in many policy documents the depletion of conventional energy sources is given far less attention than other aspects such as security of supply or climate change. However, any overall long-term energy policy needs to deal as much as possible with all main problems together.

There is a need for a mature, stable and effective long-term policy course that answers to all of the combined challenges in a coherent manner. Single or minor issues should not steer policy in a different direction at certain points in time.

Recently, there has sometimes been a tendency to focus primarily, or even solely, on reducing CO_2-emissions and enshrining this as a single policy target. It seems clear that such one-sided goal would result in a narrow reaction from the markets. Although it might result in the least-cost solution in the short term (e.g. application of CCS and nuclear only), it will unlikely be able to deliver a lasting, combined answer to the range of energy and climate issues that need to be solved. <u>As already indicated in the green paper, it appears absolutely essential to go beyond the few headline targets and to adopt a sophisticated and long-term strategy that has multiple objectives, corresponding to all the fundamental problems of the present energy system.</u>

In this sense, it is deplorable that the 2050 objective focuses so strongly on a reduction of the GHG-emissions by 80 to 95%. Always communicating on the highest level a more comprehensive set of energy and climate policy goals could help towards a more balanced public debate.

3. Wider context

3.1 Long term perspective: 2050 and beyond

Between now and 2050 a significant reduction of CO_2-emissions by at least 80 is maybe still possible through a combination of wide-spread application of present nuclear fission technology (based on Uranium-235) and systematic CCS. It could thus also appear a valid strategy for intermediate 2030 targets.

However, beyond the 2050 time horizon, the depletion of conventional fossil and fissile fuels is expected to rapidly become ever more acute. The possible use of the U-238/Plutonium cycle may significantly increase the nuclear resources by themselves, but compared to the total worldwide energy needs (considering the growing average material welfare and the increasing world population), it does not meaningfully delay the fundamental need to completely overhaul the energy system, including a full conversion to new energy sources.

It is thus clear that a strategy that would focus exclusively on the years 2030 and 2050 without longer term perspective could potentially be unbalanced and misguided. If a policy would focus too strongly on medium term solutions that however will intrinsically collapse in the longer term, it might even turn out disastrous in the long run.

It seems therefore self-evident that attention and investment should first and foremost concentrate on fundamental solutions that offer a perspective for many millennia to come. Energy efficiency, renewable energy sources and maybe nuclear fusion are valid strategies almost for eternity, and thus merit primary attention.

Nuclear fission and CCS most likely will have the potential to significantly mitigate GHG-emissions for the first few decades, and may thus constitute unavoidable intermediate technologies, given that it will probably not be possible to deploy the long term fundamental solutions so rapidly to solve all energy issues a full 100% in the first few years already. But it is obvious that the maximum lifespan of these transitional solutions is intrinsically limited; they will more or less get extinct together with the conventional reserves. And as CCS may consume itself some extra energy, its application may actually accelerate the depletion of fossil fuels.

In an overall long term energy policy, it seems therefore important to thoroughly deal with the fundamental solutions in the first place, and always correctly reflect the intrinsically secondary and provisional role of the transitional measures in all plans, communications and actions so that all sectors of society always keep the individual actions in the right perspective. The passing measures should not take the overhand and thus detract from the fundamental long term solutions.

It is possible to check the long term robustness of any new European energy &climate strategy by means of a simple question: is it not only 2050- but also 2100-proof?

3.2 World wide perspective

Today, the world population is still less than 7 billion and some 80% lives in non-industrialised regions with average living conditions and per capita energy consumption much below those in the OECD countries. Over the next 50 to 100 years, world population is expected to continue to grow, with some projections exceeding 10 billion. In a future, more developed and equitable world, every world citizen will logically have the right to a similar amount of energy consumption[3].

An important question with respect to any long-term European energy policy therefore seems to be: is the model that is developed for the European future, compatible with similar or complementary strategies in the rest of the world that achieve the same objectives and benefits for local people? Is the European strategy part of a viable, worldwide, overall concept of solution? Can the per capita consumption that is envisaged for Europe by 2030, 2050 and beyond also be produced in a sustainable manner for the rest of the world population, which in all likelihood will have grown significantly by then?

For instance, if the EU would absorb an excessive amount of the world sustainable energy resources such as biomass produced elsewhere, no proportional quantities may remain available for the remainder of the world population. Today, Europe already imports biofuels and wood chips or pellets[4] from around the world to substitute some of its fossil fuel use. Is the biomass production in these producer countries sufficient to supply bio-energy at the same rate to the rest of the world? If projections for a future European energy supply would disproportionately rely on import[5] of scarce RE resources from elsewhere, such model would not be extendable to the rest of the world and thus not constitute a robust global answer to the fundamental challenges of the GHG-emissions and the depletion of the conventional resources.

It will be possible to check the worldwide compatibility of any new European energy & climate strategy by means of a simple question: is the EU-roadmap world-population-proof?

[3] Sometimes, it is argued that the relatively colder climate of (central and northern) Europe, compared to the majority of the world population in more tropical countries, would morally warrant a higher per capita energy consumption in Europe than the world average. However, given today's building technology, the heating needs in new construction can be reduced to negligible amounts. So, in the long run (50 to 100 years), as it slowly gets replaced year by year, nearly the entire building stock can be converted to nearly zero energy buildings. In the intermediate period also substantial savings are possible by retrofitting the existing building stock.

[4] See for instance "Renewables 2013. Global status report" Table R3 p99: EU represents more than 97% of global imports. http://www.ren21.net/Portals/0/documents/Resources/GSR/2013/GSR2013_lowres.pdf

[5] Also, excessive imports would perpetuate Europe's present vulnerability to supply disruptions and would constitute a permanent drain on the balance of payments.

4. Instruments

4.1 EU powers

Internally

Today, the EU has only limited authority to act in the field of climate and energy policy. And any common approach now needs to be implemented to a very large extent by the member states. This results -among other things- in many unnecessary, nearly random divergences between the different MS, hampering the effectiveness of the policies, undercutting economies of scale, etc.

It strongly appears that this is far from optimal. It would seem that the citizens of Europe would be much better served if more authority would be transferred from the MS (or lower) level to the EU-instances, not only in terms of policy making itself, but also with respect to its execution and implementation. C**limate & energy policy aspects could as much as possible be conveyed to the EU-level (and for some aspects to world wide agreements). Only those aspects where acting by a lower level public authority has a clear benefit would remain on that level.**

In this manner, the combined (EU, national, regional and local) authorities can provide a maximum service to the citizens, delivering their work in the most effective and cost-efficient manner.

Externally

In order to optimally defend the interests of the European citizens on the international scene, and in order to achieving maximal progress on those policy objectives for which the solution is intrinsically global (not least of which the climate change threat), it seems also necessary for Europe to be represented in all external contacts (both bilateral and multilateral) by a single, common representative who acts on behalf of all the MS, in the same way as this is already done in the field of trade. It will strengthen Europe's position (e.g. at the climate change negociations), and in addition it will also save a lot of money, as 28 national ministers and delegations will no longer need to travel outside the EU.

Application

An increase of the authority of the EU in the climate and energy policy fields, both internally and externally could start immediately on an informal basis. At the occasion of a revision (for other reasons, e.g. monetary and economic) of the TFEU (Lisbon treaty) this could also be included in the revision, and thus be formalised. It is self-evident that new EU responsibilities will need to be backed up with sufficient extra staff and budget. The cost savings that can be achieved in all the national ministries will doubtlessly more than compensate the extra cost at EU-level. So, in addition to the much greater effectiveness of the energy policy, empowering the EU instances will also result in a leaner and cheaper overall public authority.

4.2 Energy efficiency: lagging behind ==> mandatory target

Although EE has still a great unexploited potential that is cost-effective at today's conventional energy costs (unlike CCS and most RE, which require extra financial expenses), it is still treated in a stepmotherly manner. In the 20/20/20 objectives it is only an indicative target. What is the justification for treating the economically most interesting instrument as second rank?

For the 2030 policy it would seem logic that fully achieving EE becomes the most important and first instrument and target. Not making this cost-efficient opportunity binding appears the worst possible service that the public institutions can render to the European citizens.

The Green paper (§3.1 p8) raises the question whether the energy savings target should be expressed in absolute or relative terms. This appears a false dilemma: logically all 3 of the following indicators are achieved simultaneously:

- primary energy consumption per caput
- primary energy consumption per unit GDP
- primary energy consumption per caput, exclusive of industrial energy consumption

The first criterion ensures that energy consumption reduces in absolute terms despite any economic growth. It is an indicator for technological progress and responsible lifestyles.

The second criterion guarantees that even in times of economic stagnation or recession such progress continues. With the first target, low economic activity would blur any lack of intrinsic progress.

The third criterion will reveal the effect of migrations of industrial production in the ever more open world markets, because of labour costs, energy costs, environmental cost, etc. It will indicate real progress in all other sectors of the society and the economy.

4.3 Sufficient staff to implement EU EE-obligations

An extensive study[6] by the "coolproducts" campaign has shown that the staffing resources (both internally within the administration and external consulting) in the EU are lagging far behind those in other major economies like the USA, China and (in relative terms) Australia.

The study estimates that the annual costs (of both internal staff, evaluated at about 12 full time equivalent, and external studies) is little more than 6M euro per year. Since its acceptance in 2005, the ecodesign directive has thus cost about 50 Meuro.

[6] "International comparisons of product policy", EEB, Feb. 2013. http://www.coolproducts.eu/resources/documents/Comparison-Report/International-Equipment-Efficiency-Comparison-Report_FINAL.pdf

Summary: http://www.coolproducts.eu/resources/documents/Comparison-Report/Comparison-Report-Summary_FINAL.pdf

Another study by Ecofys[7], estimates that net annual savings in 2020 as a result of the ecodesign implementation measures will be 90 billion euro (120 Geuro energy savings minus 25%, i.e. 30 Geuro investment costs).

Even considering that there is a great margin of uncertainty on each of the figures, the benefit/cost ratio for society is staggering: 90 Geuro annual net savings compared to 50 Meuro cumulative policy implementation investments. **That is a benefit/cost factor of more than 1000!** In this perspective, it seems not at all understandable that the European society does not allocate much more resources to a full and timely implementation of the ecodesign potential. **There seems an absolute and urgent need to greatly multiply the internal and external manpower that is devoted to the ED-implementating measures.** Which private business case with the same return would remain untapped?

Apart from the purely financial benefits, there are still many other advantages in terms of the environment, job creation, innovation & global competitiveness, etc. If it would not be possible to increase the personnel working on the ED implementation within the EC, could an external agency fill this deep gap? This idea is further explored in Annex 1.

4.4 Equal financial treatment of energy efficiency and renewable energy

EE and RE constitute 2 parallel tracks that both reduce the conventional energy consumption, thus both contributing to solving the problems of resource depletion and environmental pollution (including global warming) and the different issues related to the massive energy imports.

Since they both deliver exactly the same benefits by means of reducing the conventional energy consumption, an overall societal optimum can be achieved if they are both evaluated at the same financial conditions. In other words, the same financial premium that is given to RE is worth giving to EE. The previous paragraph mentioned the great benefits of EE that are already present at today's market energy prices. It goes without saying that at still much higher energy costs, the EE-benefits are still much higher.

It thus seems absolutely rational that EE-policy catches up with RE and that any EE-measure gets implemented that on a life cycle basis is not more expensive than the priciest large-scale form of RE (e.g. off-shore wind electricity production). Treating EE on the same financial footing as RE will probably make it possible to set and effectively achieve much more ambitious energy and climate policy goals. **It is the strong impression that an equal financial treatment of EE and RE will result in an overall optimal mix of RE and EE to the benefit of the environment, of the economy, of the society as a whole and ultimately of all the citizens individually.**

[7] "Economic benefits of the EU Ecodesign Directive" April 2012. http://www.coolproducts.eu/resources/documents/Economic-benefits-Ecodesign.pdf

This reasoning is further elaborated in a brainstorming in Annex 2. It dates from a year ago and is in some of its practical detail (links, day-to-day state of policy development, etc.) no longer up-to-date, but time was lacking now for a full review. Apart from those practical points, the basic reasoning seems however still fully pertinent.

As expounded in the brainstorming, **a substantial and systematic energy tax on all forms of conventional primary energy** appears a practical approach and crucial element (complementary to existing instruments such as the ED, EPBD and EED) in order to achieve such overall optimisation between RE and EE on societal level.

5. Some miscellaneous considerations

Several of the energy and climate issues are of a global nature (resource depletion, climate change, etc.) and thus need global solutions. The relative importance of the EU in world-wide conventional energy consumption is already small, and will further reduce as the world population grows (but not the EU population) and poorer countries slowly get wealthier. It is thus sometimes argued that the efforts that Europe does are pointless since the worldwide evolution will be determined by evolutions elsewhere in the world (China, India, etc.). However, it is self-evident that our way of living constitutes a benchmark for these countries: they aspire to the same levels of comfort, and thus feel entitled to the same level of primary energy consumption per caput. It is thus quintessential that Europe shows in practice that it is possible to develop a fully sustainable energy system. It will then serve as a role model and other countries will probably more or less automatically copy the example in the course of time.

Now, the policy targets are defined on the long run (2010, 2020, ...). A more constant and stable evaluation could be based on a moving average, e.g. as the consumption over the preceding 5 years. Some advantages of such approach are:

- yearly weather variations are smoothed out, so that no corrections will be required
- variations throughout economic cycles are also levelled out, so that –again– specific corrections will be superfluous
- if the policy fails during 1 year for whatever reason (less impact than anticipated, unexpected events, etc.) it doesn't immediately lead to missing the binding target, in as far as some advance has been built up in the preceding years
- it leaves some time to make a policy operational in the first few years
- etc.

E.g. if an annual reduction of 2% of the energy consumption would be the objective, the binding 5 year average would have to be 6% for the 1st to 5th year, 8% for the 2nd to 6th year, 10% for the 3rd to 7th year, etc.

Now there is only 1 RES-directive, but there are several directives related to EE (EPBD, ED, ELD and EED). It would appear to make sense to integrate all these EE-directives into 1 single directive, so that an overall streamlining can be achieved, filling any lacunas (energy consumptions not yet covered) that may still exist.

It is unclear to what extent each of the RE-technologies will be cost competitive by themselves by 2020. For all those that are not, a continued financial support for their deployment seems justified. Otherwise these markets will completely collapse and the corresponding supply industry will be wiped out. For those technologies that still need financial support, fixed volume (in absolute terms) of new annual additions may constitute a stable long term framework for continued investments in development and production facilities. Combined with a growing replacement market, this will still constitute an expanding overall market. Also, the financial support may be in the form of a fixed, total feed-in-tariff, independent of the wholesale electricity market price. In this manner the risks associated with the fluctuations of the conventional energy prices can be removed, giving investors in RE more certainty.

RE is now primarily achieved by means of electricity generation. Generally speaking, the cost of its financial support is recovered through higher electricity prices for (some) consumers. This increases the cost of electricity compared to conventional fuels and may thus slow or even halt the switch-over from fuels to electric energy usage (e.g. by means of heat pumps). But in many future energy scenarios, a (strongly) increased share of electricity is generally envisaged, also in order to allow for large scale decarbonisation. In order to eliminate this apparent contradiction, it may be warranted to recover any financial support given to any form of RE (e.g. also subsidies for pellet boilers) from all energy consumption (thus also fuels) in order to maintain a level playing field.

6. Annex 1: E³A: a European Energy Efficiency Agency

Given the present choking constraint of lack of personnel for implementing the ED, the question arises whether it would be possible to also externalize the actual ED-IM-work. Could the task of developing IMs be fully transferred to an external (executive) agency (new or existing, e.g. JRC or EACI, etc)? Apparently, there have already been established different instances of such kind, cf. http://europa.eu/agencies/index_en.htm. The situation would then become similar to the one in the USA, where the national laboratory Lawrence Berkeley (LBL) in California seems to be executing the bulk of the "ED"-work for the Department of Energy (DoE) in Washington. The number of EE-staff at DG ENER could remain constant and then again have its hands free to refocus on monitoring the implementation of the different EE-related directives, and to develop new legislative initiatives in order to further enhance the effectiveness and efficiency of EU EE-policy.

Would the legal rules of the EU allow for such transfer –e.g. by means of a directive– of the full IM-making process to such "external" (outside EC, but still EU) instance? The EC would then only need to formally approve and publish the definitive IM-texts once they are absolutely final at the very end of the full development procedure. Or could even the authority of formal, final approval be transferred?

It goes without saying that such "European EE-agency" (further referred to as E³A) could fulfil many other ED-relevant tasks, such as market surveillance and enforcement, managing a central database with all regulated products on the market and its corresponding interface(s) (for vehicles such comprehensive public DB already exists: www.cleanvehicle.eu), general information provision and helpdesk, etc.

Besides, one could consider many other activities that such agency could develop in order to advance EE, whenever that cannot be done more efficiently on national level:

- giving support to the MS on EE-policy, e.g. by beefing up CAs with substantial, evidence based best practice studies
- maybe support and collaborate with EnR (www.enr-network.org)
- closely guiding the development of high quality CEN-standards concerning all EE-related aspects
- providing pertinent EE-information to citizens and businesses
- liaise with EU RDD and dissemination programs to accelerate the development and market introduction of new cost-effective EE-technology by targeted focus
- etc.

In short, the mission of such an agency could consist of being an EE power house contributing to a very dynamic and fast development of EE throughout Europe, lifting EE to the same level of frantic evolution as RE. Its initial time horizon could be 2050, in order to contribute as much as possible to the 2050 policy objectives, wherever EE is not more expensive than further expanding RE. Such strong agency would also allow to keep up pace with the USA who seems to dispose of much more powerful EE-policy implementing means.

It is self-evident that such E³A will require substantial funding to realize such ambitious objective: a large staff will be needed, as well as sufficient budget to finance external activities (CAs, mandates for standardisation, ...). However, given the gigantic cost-effectiveness of EE, certainly in comparison with RE, this would be investments very well spent. Overcoming the retarded development of EE would be of great benefit to society and all its citizens, since it liberates economic wealth that is now locked up by the suboptimal energy consuming devices and buildings, which at present still abound. Viewed in this perspective, the contributions to the energy and environmental objectives come as a free extra.

The personnel requirements of such an E³A might vary over the course of time. Initially, a lot of work would need to be done in order to catch up any backlog and to regulate as quickly as possible all products where it makes sense to impose EE-measures. It is unclear whether later on the continuous updating of the requirements and standards, following technological developments, would still be as labour intensive. The number of staff could then evolve accordingly. But maybe in the mean time new EE opportunities and challenges will have emerged, warranting to maintain the same (redirected) manpower.

When considering the economic benefits of EE and its very significant potential contribution to solving energy, environmental and global warming problems, it appears like a mine of pure gold. It would thus seem such a shame to leave this treasure underutilised and wasted for the mere reason of allocating insufficient manpower.

7. Annex 2: Energy efficiency: as worthwhile as renewable energy

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Energy efficiency: as worthwhile as renewable energy

Brainstorming

version: 25 March 2012

(small correction of some language and formatting errors: 2 July 2013)

Dirk Van Orshoven

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Preliminary notes:

- Frequently used abbreviations in this text:
    - EE: energy efficiency
    - RE: renewable energy
    - GHG: greenhouse gas
    - EPBD: energy performance of buildings directive
    - ETD: energy taxation directive
- In this text, "conventional energy" refers to all fossil and fissile primary energy sources.
- This text came about as a quick compilation of a set of disparate mails and partial brainstorming notes on different aspects, written at different times, which explains the often repetitive formulation of this text.

7.1 Introduction

For many years already, EU policy on the climate and energy issues has been very active and at the forefront of worldwide developments. It is very positive to see that Europe continues to be dynamic and proactive in these areas, e.g. presently with the work on the "2050 roadmaps". This is of course an absolute necessity, given the formidable challenges that not only today's EU but also mankind as a whole face with respect to the global energy system.

The intrinsic limits of today's energy sources and the problems related to their use will probably require a full transformation of the present energy system within less than a century. The issues related to depletion and environment and to the strongly inhomogeneous geographical distribution of the conventional energy resources are discussed in a little more detail in Annex A.

The complete overhaul of the energy system constitutes an enormous endeavour for our society that will require a persistent and focused process of change. But if achieved successfully, it will lift the fundamental threat that today looms above our comfortable industrialized civilisation, i.e. that our economy will run out of power together with the depletion of the energy sources that at present supply nearly all of our energy consumption.

Over the last decade or 2, RE has gained increasingly serious policy attention, resulting in an enormous development of the RE industry and a massive deployment of RE installations on the ground. In recent years, a stable medium term market perspective until 2020 has been put into place, and a policy discussion is already underway now on how to continue to achieve steady development rates beyond 2020, up to 2030 and 2050.

EE too has been given ever more attention, e.g. with the EPBD, the ecodesign directive, the present proposal for an EE directive (combining the energy services and cogeneration directives), different action plans, etc. However, it is the feeling that EE never has spoken as much to the imagination of the public at large and of the politicians as RE has. As a result, also in energy policies, both national and Europe-wide, EE appears to have been lagging behind compared to RE. EE does as yet not seem to be pursued with the same vigour and to the same extent as RE. The efforts and finances dedicated to RE are not yet matched by those committed to EE. This is illustrated with a few examples in Annex B.

This brainstorming document formulates some considerations why it seems to make much sense to pay as much societal and policy attention to EE as to RE. If in a first instance the arrears of EE could be made up, and if after that EE-efforts can keep abreast with RE-commitments, this major 2nd avenue (EE) towards solving the fundamental energy issues can be fully exploited. Treating EE and RE in an equal manner might make a significant contribution to solving the different energy problems and might result in an overall optimal solution for the society. It also may have far-reaching practical consequences stimulating strong innovation throughout all sectors of the economy.

As a private, semi-technical European citizen, I hope that these brainstorming considerations may contribute to the further elaboration and optimisation of coherent long term goals and strategies of an energy policy that fully and simultaneously answers to all challenges posed by the energy issue.

7.2 EE compared to RE

As a society, we have decided in Europe to cover an increasing part of our energy consumption with RE, even if that is at the present time still (much) more expensive than today's price of conventional energy. For instance, in Flanders[8], Belgium, at present the following extra[9] premiums are minimally guaranteed for the production of green electric power[10]: 60 euro/MWh for a few kinds of biomass, 90 euro/MWh for on-land wind, for most forms of biomass and for most other forms of renewable electricity, and 120 euro/MWh for off-shore wind (and even more, much more, for photovoltaics). It is said that this premium does not yet include the cost for the DC connection between the off-shore wind farms and the on-shore grid. These figures compare to a wholesale market price for electricity that reportedly varies between roughly 40 and 55 euro/MWh in Belgium (depending on the time of the day and of the year).

EE is a parallel, complementary manner to reduce the consumption of conventional fuels. Any EE-measure that is cheaper than the most expensive form of RE is thus as good or better an investment that contributes as much to reducing each of the different negative effects of conventional fuels. Any EE-investment that is not more expensive than the costliest RE technology presently applied on a large scale, thus equally deserves being implemented. Not doing so is a suboptimal use of our financial investments and an incomplete exploitation of the techno-economic potential to reduce the conventional energy consumption at a given cost.

In order to achieve an overall societal optimum, it seems thus warranted to systematically apply EE to a greater extent than the private economic optimum at today's energy prices. It appears justified to always implement EE-technologies up to the equivalent cost of the most expensive large scale form of RE. To a certain extent, applying already now such more advanced EE-standards already factors into account the highly probable future energy price rises as both the (more expensive) RE fraction will grow in the entire energy supply and as also the world market prices of conventional energy sources will most likely keep rising in the future. Not yet fully taking into account today these much higher future energy prices would have as a consequence that Europe's average stock of energy related products will always lag behind the instantaneous economic equilibrium.

In Europe, the remaining capacity for new hydropower, (home-grown) biomass and on-land wind energy is said to be limited compared to Europe's present total energy consumption. However, the technical potential of off-shore wind energy in the North Sea and other coastal

[8] Source: "Energy decree", Art.7.1.6 (in Dutch), in its version valid as of 26 Aug. 2011, as consulted in March 2012 on www.codex.vlaanderen.be.

[9] On top of the wholesale electricity market prices.

[10] Is there somewhere a Europe-wide public overview and synthesis kept up-to-date with the equivalent total support per unit of RE produced of all the different sorts of public support (green certificates, reverse metering, tax deductions, subventions, cheap loans, etc.) for the different kinds of RE?

seas is said to be very large and would be more than capable of supplying on a yearly basis all Europe's energy needs (?), abstraction made of its non-continuous nature and thus its need for electric storage capacity. Moreover, expectation seems to be that the cost of off-shore wind will not drop significantly anymore, especially since ever deeper waters ever further ashore will need to be used. Until further notice, the price of photovoltaics is still much higher than that of off-shore wind. And it is at present still unclear whether or when PV might undercut the cost of off-shore wind, and thus become a serious economic competitor and a new reference. In conclusion, it appears that for the time being the present day cost of off-shore wind might be a good first indicator of the marginal, most expensive cost of future electricity production on a large scale. Taking into account the conversion losses in the electricity generation process, an equivalent cost of conventional fuels can be calculated[11]. These levels seem to correspond to a significantly higher energy cost than the present energy prices.

In summary, it appears fully justified to give at all times equal treatment to EE, as compared to RE. Thus, any EE-measure that is not more expensive than the priciest form of RE applied on a large scale equally deserves to be implemented, so that the best possible overall solution for the society at large is achieved. EE-measures should be rewarded up to the same levels as RE-investments.

In view of the common good, it would thus seem highly desirable that such rule would be applied systematically throughout the entire energy policy. An important and logical first step would be a formal and committed endorsement of this fundamental principle at the highest level, i.e. by the heads of states, as one of the basic pillars of the energy policy. Next, it would need to be rigorously integrated in the different regulations and directives whenever these are revised, or new ones are established. And finally, it should be applied methodically throughout all practical actions.

The asymmetric attitude towards the production side on the one hand and the demand side on the other hand is a more general and long-standing issue in the field of energy, also with respect to conventional energy sources. On the production side, investment decisions are generally based on long-term life cycle cost analyses, and public authorities are asked to provide a stable framework that guarantees a return on investment. On the demand side, EE-

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[11] If it would be verified that premiums for off-shore wind in Flanders are representative of the real cost and of the Europe-wide average, then any EE-measure that pays for itself at an extra electricity cost of some 120 euro/MWh (i.e. ~ 33 euro/GJ_electricity) would be money equally well spent. Taking into account that on the average in Europe thermal power plants need some 2.5 to 3 units of conventional fuel input to produce 1 unit of electricity, the equivalent extra cost of about 11 to 13 euro/GJ (gross calorific value) would seem a reasonable reference for fuel savings.

It should be noted that such an extra cost is no more than the fluctuation of heating oil in a single year in periods with extreme world market price variations, such as in the second half of 2008.

The electricity production premiums for green power do not yet include all the extra investment costs for new (off-shore and other) grid connections, reinforcements of the existing grid, back-up power and other extra costs that will arise as the RE-share grows (electric energy storage, etc.). Since the long-term average cost of conventional fuels can be expected to continue to rise steadily (albeit with high momentaneous volatility), in a first instance an approximate hypothesis could be made that this rise will more or less be able to cover the extra indirect costs of a growing RE-share. As the energy system evolves in the future, monitoring will provide insight to what extent this assumption needs to be adjusted, raising or lowering the extra cost that EE is worth paying for.

investment decisions are often not considered at all or not based on well-founded economic considerations[12] (e.g. often in households), or they are decided on the basis of short term linear pay-back time considerations of 3, maximum 5 years (e.g. in many businesses). On the demand side policy by public authorities has generally been much less active and effective than on the supply side. However, for the overall societal interest, it would be better to avoid those separate (even schizophrenic) analyses, and always make balanced policy decisions based on an overall integrated optimization.

It would be interesting to have an estimate of the quantitative impact on the overall primary energy consumption of the EU when EE would be given the same financial treatment as RE. How large could the reduction be? And which dynamics might potentially ensue in terms of further commercial, industrial and technological development of all energy-related products and processes? It would most probably give an enormous boost to the manufacturing industry in terms of innovation and turnover. Expenses now going to purchasing imported energy would shift towards EE devices, thus nourishing the industry.

In the following paragraphs, as an example, the practical implication on a couple directives is briefly explored. Systematically applying the principle of equal treatment of EE and RE throughout the entire energy policy of the EU and the Member States will require a lot of hard work and persistent focus.

7.3 Implication for some EU directives

7.3.1 The ecodesign directive[13]

Art. 15, 5 (c) stipulates that the product requirements must be set in accordance with the principle of "least life cycle cost" from the point of view of the private consumer. As is clear from above reasoning, this doesn't appear to correspond at all to the overall societal optimum (and thus ultimately, again the private optimum of the citizens, since in the end they pay for the collective costs of more expensive alternatives). It therefore seems in the overall long term interest of everybody to modify this clause and to allow requirements to be determined up to a cost equivalent to the marginal cost of large scale RE production. This principle could be enshrined in the legal text of an updated ecodesign directive, independently of whether or not the consumer energy prices are effectively raised by taxes in the short term (see §7.3.3).

[12] And thus often not achieving the full economic potential.

[13] 2009/125/EC

What would be the quantitative impact of stricter requirements corresponding to such equivalent cost?

- In a first instance, the sales of the more EE products[14] that are already on the market now will in all probability grow significantly which will allow for mass production, most likely in turn resulting in cost reductions.
- But also existing technologies that are now not put into production may become competitive and thus get implemented[15].
- Finally, the search for new EE technologies can be expected to receive a tremendous boost leading to even further progress.

Treating EE financially in the same manner as RE will thus in all likelihood lead to a wave of frantic innovation.

7.3.2 Energy performance of buildings directive[16]

The recast of the EPBD states in art. 9 that all new construction should be "nearly zero energy buildings" (NZEB) as of the beginning of 2021 at the latest. However, in art.5, it is written that the private economic optimum of the EPB-requirements should be determined, and in art.4 §1 it says that Member States are not obliged to impose more stringent standards than the private optimum. Economic studies for the Belgian situation have shown until now that the private optimum is still far away (probably by a factor of roughly 2) from the NZEB objective. This is for instance evident for an outstanding thermal insulation of the envelope, equivalent to that of passive houses (U= ~0.1 W/m^2K).

[14] In order to help consumers make informed decisions, it would seem very productive, as accompanying action to the ecodesign directive, to set up informative websites for all the products for which there are implementing measures, starting with consumer products (refrigerators, washing machines, dishwashers, TVs, etc.), as has already been done for lamps, see http://ec.europa.eu/energy/lumen/index.htm. Doing this centrally, and then translating it into all European languages, is probably the best guarantee for completeness, quality and cost-effectiveness. It may avoid that the same effort needs to be done over and over again in a fragmented manner in each country separately.

A further step would be to establish databases of all products on the market that fall under a given implementing measure. These databases could then be consulted through a webpage interface in the national language, showing only the products available in that country. In this manner consumers can easily see the best performing products in their country, and thus be guided faster towards more EE choices. Could JRC do such a job?

For building products, such databases could also constitute a tremendous support for the EPBD-implementation, as correct product data as input for the EPB-calculations is difficult to control by building authorities.

[15] This is illustrated in a Dutch report with respect to the EPB. A study on the impact of the regulation some 5 years after its implementation in the Netherlands wrote in the final conclusions: "Producers are permanently working on the development of better and more EE products. This [development work] is actuated by the EPB-regulation, but [this development work] is independent of the moment of tightening of the requirements. It is only on the moment that the requirements are tightened that the products are [effectively] put on the market" (Ecofys, Dec. 2001, "Secondary effects of the EPB-regulation", p.33, in Dutch).

If this observation is correct and if it can be generalised, it means that the presence of the regulation permanently incites manufacturers to develop new, more efficient products. But it is only when the requirements are tightened that these new products are put into production and commercialized (presumably, because only the guarantee of a sufficiently high sales volume justifies the investment in the new production line).

[16] 2010/31/EU

In line with the above reasoning on the cost effectiveness of many EE measures compared to RE, it would appear appropriate to revise art. 4 and 5 of the EPBD with the aim of reaching an overall societal optimum. Given the impact in the very long term (buildings in Europe on the average typically last 50 to 100 years; no other energy investment has such a great inertia), it seems all the more important that investment and design decisions are based on considerations beyond the private economic optimum at today's energy prices. Instead, they would better at least be in equilibrium with the expected long term energy costs. This is especially true for the thermal insulation and the air tightness of the envelope which after construction usually cannot easily be improved anymore to a very high standard[17]. (In contrast to some technical installations, core parts of which are often replaced every 20-30 years anyway, and can then to a certain extent be upgraded to the instantaneous techno-economic optimum.)

Another problem with the long lifetime of buildings is that in classical economic analyses any costs more than 30 years into the future have little or no impact on the present worth life cycle costs. Nevertheless, very few building owners are ready to pull down their property after only 30 years, and reconstruct all over again in order to achieve up-to-date energy standards. This shortcoming calls for even tougher public authority requirements that take into account the long term general interest, going beyond classical economic evaluation.

7.3.3 Revision proposals for the energy taxation directive[18]

In order for the long term overall (collective, and thus ultimately also private) optimum and the short time individual optimum to better coincide, the most evident and systematic way appears to be to raise today's energy prices by means of taxes to a level equivalent to that of the most expensive form[19] of large scale RE. In this manner a correct price signal for balanced long term energy decisions will be set throughout the entire society. Right pricing seems an absolutely necessary element for the market to function in an overall optimal manner. All energy actors will then have the appropriate drive[20] to save energy.

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[17] And if e.g. post-insulation is applied in existing buildings (e.g. cladding with external insulation), it is a lost opportunity not to go directly for the full practical potential, but to install layers of only mediocre thickness. Adding a 2nd layer later on would be practically and economically much less interesting, and is never done to my knowledge. Thus, for such energetic renovations too, requirements based on the equivalent cost of RE appear absolutely warranted. An appropriate energy tax thus seems a necessity to systematically stimulate so-called deep renovations, which are needed in order to achieve the best overall societal energy situation.

[18] COM(2011) 169/3, 13 April 2011, as published on http://europa.eu/rapid/pressReleasesAction.do?reference=IP/11/468&format=HTML&aged=0&language=en&guiLanguage=en

At the time of the writing of the present note, I am not aware of any communication about the state of progress of the discussions with the Member States or about the present content of the draft.

[19] Logically speaking, it is not the average extra cost of all RE-technologies that is considered, but the highest cost of the ones that widely get implemented, because these most expensive ones will need to get rolled-out less so as to achieve a given reduction of the conventional energy consumption (and of the attendant GHG-emissions). It is thus the marginal cost of RE that constitutes a rational reference for EE-investments.

[20] But as is well-known, many actors often don't act in an entirely economic manner for a variety of reasons. For instance, families will not always fully and correctly evaluate the life cycle financial impact of all their purchases of energy related products or of their housing choices. And businesses (especially non-energy-intensive ones)

In most European countries taxes on common motor fuels are already substantial. The draft ETD revision proposes to systemize this (table A of Annex I). However, the values put forward in the proposal for the energy tax on heating fuels and electricity (Tables C and D of Annex I) appear to be dismal. In order to achieve an integrated, overall-balanced energy policy that best serves the overall societal interest, it seems absolutely justified for these energy taxes to be heightened substantially[21]. In this manner, correct price signals may be given to the market that can result in an overall optimal combination of EE and RE on the level of the society as a whole. Correct taxes today thus seem a necessity for sound long-term economic decisions and for a balanced development of the energy consumption and production sides. As already mentioned before, in the context of rapidly rising energy prices, Europe's average stock of energy related products will otherwise always lag behind the instantaneous economic equilibrium.

In a certain sense, the tax would to some extent be nothing more than a foreshadowing of the likely future energy price rises. If the tax on the consumption side is significant enough, consumers will already take into account in their present day purchases and investment decisions (e.g. in roof insulation, triple glazed windows, condensing boilers, refrigerators, etc.) these higher energy prices, which will inevitably occur during the lifetime of today's decisions. Such tax would thus make our energy consumption more future-proof. It would only accelerate a process that can be expected to occur naturally in the long term as energy prices rise, but we will reap the benefits faster and make our economy more resilient against external shocks.

As said, the taxes on motor fuels are already substantial in many European countries. In the USA most people find it politically unimaginable that this is possible[22]. The fact that it already has become standard practice for motor fuels in much of Europe, illustrates that it should not be impossible for heating fuels and electricity either[23]. It seems a matter of taking our destiny in our own hands.

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will focus on their core activity and tend to only implement EE-measurements with a short pay-back time (e.g. 3 years).

In order to ensure that all energy consumers also effectively act economically and that the new economic private optimum on a life cycle cost basis is thus fully and systematically turned into a reality, complementary policies will thus remain as crucial as ever: actions such as intensified information campaigns (see e.g. footnote 14), adjusted ecodesign requirements (see §7.3.1), adapted EPB-requirements (see §7.3.2), etc. An energy tax will actually be a lever for each of these actions to achieve much more effect.

[21] If the figures in footnote 11 were to be corroborated, the combined energy and CO_2 tax would thus logically be some 120 euro/MWh (i.e. ~ 33 euro/GJ) for electricity and –taking into account a factor of 2.5 to 3 for the conversion of the primary energy into electricity– some 11 to 13 euro/GJ for fuels. In other words, heating fuels should be taxed more or less to the same level as the motor fuels in Table A, and electricity some 2.5 to 3 times more.

[22] Reportedly, the average mileage of the US vehicle fleet would be much less favourable than of the European one. Probably, this is to a greater or lesser extent related to the long-standing difference in motor fuel prices.

[23] Actually, a few European countries appear to already have high taxes for households on electricity and natural gas. From the prices compiled by the EC "Market observatory for Energy" ("Key figures", June 2011, http://ec.europa.eu/energy/observatory/eu_27_info/doc/key_figures.pdf#page=33), one can for instance see that:

- for electricity prices (slide 34), taxes etc. increase the cost from 0.128 to 0.196 euro/kWh (+53%) in Sweden, and from 0.120 to 0.271 euro/kWh (+126%) in Denmark.

As the main purpose of the high taxation level would be to establish a sound energy policy and a priori not to raise the income of the governments, the extra revenues could in large part be returned to the energy consumers. A few practical considerations in this respect are developed in some more detail in annex C. A further convention could for instance be that only the extra income from conventional energy sources is returned to the consumers, whereby the government keeps from the start the tax on RE[24].

Obviously, raising taxes is not a popular measure and even less so if the hikes are very steep. Therefore, it is very important to obtain extensive support for such a measure throughout the entire society. The reasons for such policy choice should be explained extremely well to all energy consumers, namely to achieve a proactive and smooth transition to the future energy price situation and its corresponding equilibrium. It should be emphasized that the extra money generated by the extra taxes will be returned to the consumers for some time, which can help them to make the necessary EE-investments.

Raising energy taxes will not only stimulate energy consumers to opt for EE devices, but it will also motivate them to avoid wasteful behaviour, such as needlessly leaving lights on in empty rooms, heating spaces more than is needed, etc. Such overconsumption only squanders rare energy resources without serving any useful purpose.

There are some other suggestions for improvement of the ETD that can be made from a (mainly physical-technical) perspective of a rational energy policy. These are briefly listed in annex D.

7.4 Summary

EE and RE[25] constitute 2 parallel tracks that both reduce the conventional energy consumption, thus both contributing to solving the problems of resource depletion and environmental pollution (including global warming) and the different issues related to the massive energy imports.

- for gas prices (slide 36), taxes etc. increase the cost from 4.84 to 8.43 eurocent/kWh (+74%) in Sweden and from 4.15 to 8.37 eurocent/kWh (+102%) in Denmark.

On the average these price increases owing to taxes seem to be of the same order as the present extra cost of off-shore wind energy in Flanders (see footnote 11). This illustrates once more that it is politically possible to achieve these tax levels, also in other domains than motor fuels.

[24] All those forms of RE that are less expensive than the costliest form of RE could be taxed too, but to a lesser extent than conventional resources, so as to create a private break-even situation, as is presently done (in a reverse manner) by means of support schemes. When these RE taxes go to the treasury, the public authorities will have a self-interest to promote first and foremost the cheapest forms of RE, which will generate them more revenue and sooner. This may contrast with the present situation in some countries where the electricity consumer pays for the green certificates and political decision makers thus don't directly feel the budgetary impact, sometimes giving –largely unwittingly– in a first instance undue priority to the popular but more expensive RE-technologies.

[25] Abbreviations: see first page.

Owing to an active public policy, RE has been gaining ever more momentum in the EU over the last 20 years or so. It is important that this impetus is maintained in the decades ahead and that a stable, mature RE supply chain is further fostered and developed.

But until now, EE has mostly been lagging behind RE in terms of the costs that our society has been prepared to pay for each of them. For the EE-policy, the basic (explicit or implicit) assumption generally is that the extra initial investment must be paid back to its user by the energy savings generated by the device during its life cycle. In general, this appears to be evaluated at today's conventional energy prices and assuming only a modest price increase rate. For RE, which apart from very few exceptions is not at all competitive with conventional energy at the present conventional prices/increase rates, society is ready to pay significant extra costs (usually more than 100% above today's conventional production costs) in order to expand its production in a steady manner year after year.

This asymmetric attitude towards EE and RE obviously results in a significant underutilisation[26] of the potential of EE to reduce the conventional energy consumption at costs (much) lower than those of RE-investments. As a society as a whole, we thus seem to be behaving very much in a suboptimal way, not fully exploiting all available possibilities to solve the different energy issues.

It thus seems absolutely rational that EE-policy catches up with RE and that any EE-measure gets implemented that on a life cycle basis is not more expensive than the priciest large-scale form of RE (e.g. off-shore wind electricity production). Treating EE on the same footing as RE will probably make it possible to set and effectively achieve much more ambitious energy and climate policy goals. It will most likely allow to strongly reduce the consumption of conventional energy and thus automatically also all its attendant problems. It is the strong impression that an equal financial treatment of EE and RE will result in an overall optimal mix of RE and EE to the benefit of the environment, of the economy, of the society as a whole and ultimately of all the citizens individually.

Not only with respect to RE, but also more in general, it appears that energy policy has always tended to be slanted very much towards the production side, with the attention for the demand side (EE) lagging behind, resulting in a less than optimal overall situation. It seems very much in our interest to redress this situation.

If today the likely continued future rise of the energy cost is not sufficiently factored into account in all the EE-investment decisions, the entire stock of energy-related investments (products, buildings, production processes, etc.) will always tend to lag behind the instantaneous optimum. This problem can be avoided if we start to make EE-decisions as of today on the basis of the expected future cost of the most expensive form of RE.

[26] On top and above the fact that for many different reasons even the private economic optimum is often not yet achieved today.

In order to give a correct market price signal, a generalised energy tax reflecting the marginal cost of large-scale RE seems quintessential. This appears a necessary condition for a fully successful energy policy.

Today, RE and EE in themselves are often defined as (primary) policy goals. However, ultimately we seek to solve more fundamental underlying issues, such as the finiteness of the conventional energy resources and global warming (see annex A for a more extensive discussion). EE and RE are both mere means to achieve those underlying goals and both thus deserve to be treated in an equal manner. In order to avoid unbalanced strategies, it would seem desirable to differentiate in the policy formulations in a more nuanced manner between primary and derived, secondary objectives.

It seems very important to gain wide-scale support for a new basic energy policy option, namely to give equal financial treatment to EE and RE. In order to achieve a smooth and full implementation, the idea should be widely borne in all sectors of society. This seems especially true for the substantial heightening of the energy taxes. Although such generalised energy tax seems an essential element of an overall approach, it might at first sight, on the surface of it, seem rather unpopular, and thus be rejected outright without serious evaluation. In order to obtain broad popular support for it, it seems crucial –in addition to explaining very well the rationality behind it– to return to the energy consumers in one way or another most of the extra revenue that the extra tax would generate.

If as a European society we succeed in further advancing EE to the point of paying as much for it as we presently do for the most expensive forms of RE, major new perspectives will open up to help solving our fundamental energy problems. It will require great and persistent efforts to apply such principle consistently throughout the entire energy policy on all levels, but it will be rewarded with a much improved energy situation.

If as a European society we want to take EE really serious, we have to put our money where our mouth is and pay extra for EE, in the same way as we are already doing for RE. It is not productive to continue to treat RE and EE with 2 different weights and 2 different measures.

7.5 Annexes

7.5.1 Annex A: the energy issues

Since the 1970s, energy issues (and once in a while outright crises) have been a constant worry in our society. The multitude of problematic aspects related to the conventional energy supply and its consumption can broadly be grouped into 3 main categories:

- depletion of the reserves (commonly estimated to last –much– less than a century for most conventional energy sources[27])
- environmental issues:
    - fossil fuels are the major source of GHG emissions (CO_2, CH_4, etc.)
    - pollution: air pollution (particulate matter, NO_x, smog, volatile organic compounds, CO, acid rain, etc.), oil spills, the issue of radioactivity[28], etc.
- massive imports into the EU: risks of supply disruptions, negative impact on trade balance, volatile prices, loss of political independency, etc.

Each of these 3 issues already warrants by itself serious attention in order to thoroughly solve each problem. All 3 combined call for even more pervasive action.

Since they need to be tackled simultaneously, a single, overall, integrated policy is needed. Independent, disparate action plans for each of the issues separately will likely not be able to do the overall job. In "war" terminology: fighting is needed on several different fronts simultaneously, in parallel, but all these fights should be part of a coherent, optimised, overall strategy.

The impression is that in many policy documents the depletion of conventional energy sources is given far less attention than other aspects such as security of supply or global warming. However, an overall long-term energy policy would be able to deal as much as possible with all main problems together.

There is a need for a mature, stable and effective long-term policy course that answers to all of the combined challenges in a coherent manner. Single or minor issues should not steer policy in a different direction at certain points in time.

[27] Nobody can exactly predict the future. But the eternal discussions whether crude oil, natural gas, etc. will last another ...40...60...80... years are to some extent pointless in a longer term perspective: these futile disputes must not detract from the fact that those energy sources that at present drive our society and our economy will not be available anymore in any significant amount in a not too distant future.

[28] Nuclear fission of U-235 is said to be able to supply electricity at its present rate only for another 50 years or so. However, radioactive waste will need to be stored for many millennia to come. This may constitute an extra incentive not to fully exploit the available fission fuels, so that future generations are not burdened with the waste of a short-lived intermediate energy solution.

7.5.2 Annex B: Some examples of the present difference in attitudes in Europe towards RE and EE

The following table tries to compare in an overview manner a few major public opinion and policy elements.

	RE	EE
attention of the public at large, the media and the politicians	generally very high	on the average much lower
attitude of the respective industrial sectors	usually demanding more ambitious obligations and more government intervention	often opposing and delaying government policies to achieve progress
costs	EU-targets are formulated in absolute terms, to be achieved whatever the cost	EU-targets generally do not seem to go beyond the private optimum[29] at present energy prices (see §7.3.1 and 7.3.2)
20-20-20 objectives	• 20% GHG emission reduction is binding • 20% RE fraction is binding	• 20% EE target is only indicative until now[30]
2020 prognoses	on track[31] to achieve the 20% objectives	at present trend, only some10% is estimated to be achieved[32]
beyond 2020	• 2011: RE sector demanded a policy for continued stable growth • EC responded with a public consultation (06/12/2011 to 07/02/2012) to start with	? [33]

It can be seen that EE is generally lagging behind RE in the attention that our society has been devoting to it and in the amount of money that it has been willing to pay for it. In a more or less inadvertent manner, EE appears to have always been slighted compared to RE.

[29] This is often not only true of European directives, but also on a national level. For instance, in the German "EnergieEinsparungsGesetz" ("energy saving law") for buildings there is since the 1970's a "Wirtschaftlichkeitsgebot" ("economic commandment"), i.e. a clause that explicitly states that the requirements should be such that the necessary efforts should pay for themselves by the accrued energy savings.

[30] Will mandatory objectives per Member State be achieved in the new EE-directive which is presently under discussion? (see http://ec.europa.eu/energy/efficiency/eed/eed_en.htm)

[31] See summary of national action plans, p.9: http://www.ecn.nl/docs/library/report/2010/e10069_summary.pdf

[32] See estimates on slides 4 and 5 of http://ec.europa.eu/energy/efficiency/eed/doc/2011_directive/20110622_energy_efficiency_directive_slides_presentation_en.pdf

[33] Are there already any equivalent EE-policy initiatives for the post 2020 period, that give manufacturers in all EE-fields certainty that any expensive developments and production investments in new EE-technology will be rewarded by a guaranteed market in the long term, even if some of these technologies would not be cost-competitive with fossil fuel? (In other words, a situation totally similar to RE.)

7.5.3 Annex C: Some practical considerations on returning the extra revenues from an increased energy tax to the energy consumers

As a general principle, the extra income generated by the extra energy taxes on conventional fuels could be returned to all energy consumers in an equitable manner.

For instance, the total amount paid by households on conventional fuels could be paid back as a lump, equal sum to each individual citizen, independent of age. Those households consuming more than the average will thus be net payers, those families consuming less than the average net receivers. This can be expected to vigorously incite most people to reduce their energy consumption. Moreover, they could be strongly advised[34] to invest the returned sum of money in EE-measures, thus reducing their energy bill and taxes the next year. A more stringent approach would be to only release the sum gradually as a function of proof of EE-investments (e.g. bill of purchase of a triple A refrigerator, invoice for super roof insulation, etc.) until the absolute consumption per person is below a given level, point from when the annual rebate would be paid out without precondition. As the entire population can thus be expected to invest massively in EE, the energy consumption and thus the revenue of the energy taxes will decrease year after year, and so will the sum paid back to everyone. In order to further stimulate people not to linger with their EE-investments, the rebate scheme could from the start on be limited to e.g. 10 years, after which the full revenue would go the government.

Similarly, the total amount of taxes paid by business offices could be returned[35] to them proportional to the conditioned floor area.

A more difficult endeavour on a practical level may be the production industry. As a matter of principle, it is clear that for the society as a whole it is just as warranted to invest in any EE-measure in industry as in any other sector, as long as the equivalent life cycle cost is not more than the marginal cost of extra RE-production. But, obviously, for those (few?) parts of the energy intensive industry that are exposed to intercontinental competition, great care must be taken that these production facilities don't move outside the EU, either by radically closing down existing European plants or, more insidiously, by allocating all new investments elsewhere. Apart from the obvious loss of economic activity for the EU, also the EE-objectives wouldn't be achieved if these plants elsewhere continue to be built according to the old standards.

One option to avoid such emigration of energy intensive production could be for the public authorities to pay for the extra cost of EE-investments beyond the optimum at world market prices and for the extra cost of the taxes through a rebate on the output (e.g. per tonne of steel) under the condition that the plant is refurbished to the new energetic optimum. Implementing this in practice may however pose extremely challenging practical issues (e.g. how to realistically and accurately calculate the costs at both optima).

[34] For the poorest tenth or so of the population, an intensive EE information supply by the public authorities (see also footnote 14) may not be sufficient to make them take fast action. Here, intensive, personalized coaching may be necessary to ensure that proper EE investments are timely made. This counselling could be provided by the public services that in most countries already today accompany these people budgetarily.

[35] But given the fact that energy costs in an office are often extremely small compared to the labour cost (typically on the order of magnitude of 1 to 2%), it might be considered to forsake the complications (and costs) of such rebate scheme for offices and maybe also for many other non-residential buildings.

7.5.4 Annex D: potential enhancements to the ETD

Apart from the fact that it seems absolutely warranted to strongly increase the taxes on heating fuels and electricity, as argued in particular in §7.3.3, there are some other (partly technical) aspects that maybe could be improved. These are briefly listed here.

- The energy tax for electricity appears to be the same as for heating fuels, whereas about 2.5 to 3 units of fuel are needed for 1 unit of electricity[36]. So, it would be more logic that the tax level for electricity would be about 2.5 to 3 times higher than for fuels.
- The previous point could be solved simply by not imposing an end use tax, but rather a tax on the primary energy consumption of conventional fuels (fossil fuels and uranium). This would also stimulate efficiency upstream, e.g. in electric power production, refinery activities, transport and distribution, etc. Any RE production that is cheaper than conventional production inclusive of the new tax, could then be taxed at a rate bridging the difference between the 2 so that it is profitable but without excessive margin. The present green power certificates could then be forsaken.
- Could the CO_2-tax maybe also be moved upstream towards the primary energy consumption? In this manner, the complicating existence of 2 parallel schemes (ETS and CO_2-tax) for 2 different subsectors can maybe be avoided?
- Is it logic that there are so many exemptions, e.g. for households[37]? As explained in the main body of the text, EE in any sector makes perfect societal sense as long as it is cheaper than the priciest RE. For the policy to be as effective as possible, the energy tax should be applied as methodologically as possible. As argued in the main text and annex C, the hardship wrought upon all energy consumers could on the average be neutralized by redistributing the extra revenue in an equitable manner back to the consumers. In this manner the policy will achieve its EE-objective without constituting a major overall financial burden on the energy consumers.
- In the proposed revision of the ETD, it is argued that all fuels should be treated in an equal manner and thus be evaluated on their energy content rather than their volume. This seems a very good move, but it is then a pity that in practice the net calorific value (NCV) is proposed as a basis for the taxation and not the full energy content, i.e. the gross calorific value (GCV). This is a pity both as a matter of principle and for practical reasons. By using NCV, a new incoherence slips into the system. It gives an advantage of roughly 6% to natural gas compared to coal, and some 4% compared to fuel oil, so that the inequality which was due to the use of the volume as taxable base, remains since it is replaced by another inequality. The original objective of treating all energy vectors fairly is thus not entirely achieved.
  There is absolutely no reason to use the NCV (which is only part of the energy content) instead of the GCV (which covers the full energy content).
  Although the NCV is commonly used as a reference for many applications (e.g. for

[36] Since fuel cannot –because of intrinsic thermodynamic limitations (2nd law)– fully be converted into electricity in thermal power plants, a GJ of electricity is not at all equivalent to a GJ of fuel, in the same way (and even more so) as a litre of one type of fuel is not equivalent to a litre of another type, and thus were litres not a very good taxation basis in the 2003 ETD.

[37] Representing some 25% of total energy consumption?

reporting laboratory test boiler efficiencies [38]), I have never ever heard one single good reason for this. It appears to be an arbitrarily entrenched historic anomaly, maybe dating back to the 19th or even 18th century when coal was the only commercial fuel and thermodynamic understanding was still at its infancy. There seems absolutely no justification to perpetuate this aberration into the 21st century[39]. If the new ETD wants to succeed its envisaged coherence, it seems necessary to take the GCV of fuels as the basis for the taxation [40].

[38] Resulting in the conventional, but absurd, larger-than-100%-efficiencies, which doesn't make any thermodynamic sense since its 1st law states that no energy can be created; it can only converted from 1 form into another, e.g. chemical energy (fuel) into heat.

[39] E.g. following the EPBD, European standards now prescribe for instance that when boiler efficiencies are applied in building calculations, the test data should be converted to GCV in the process (see e.g. EN 15603:2008, e.g. §3.3.2, or EN ISO 13602-2).

And in the Feb. 2012 draft of the ecodesign implementing measure for boilers, the newly defined seasonal efficiency is based on the GCV too.

Also, the GCV is used as the basis for billing of natural gas in Flemish households, and I suppose the situation must be the same in other countries. It would be all the more inconsistent, and confusing for the citizen, if then NCV would be used to calculate the energy tax on the same bill.

More in general, there seems no fundamental reason for not converting systematically to GCV for all energy references, e.g. also for efficiencies of electrical power plants, energy statistics, etc.

[40] Doing it later, e.g. at the next revision, will also cause undue administrative burden since the present conversion to energy would need to be corrected in a second round.