Sustainable Technology Development, case hot water

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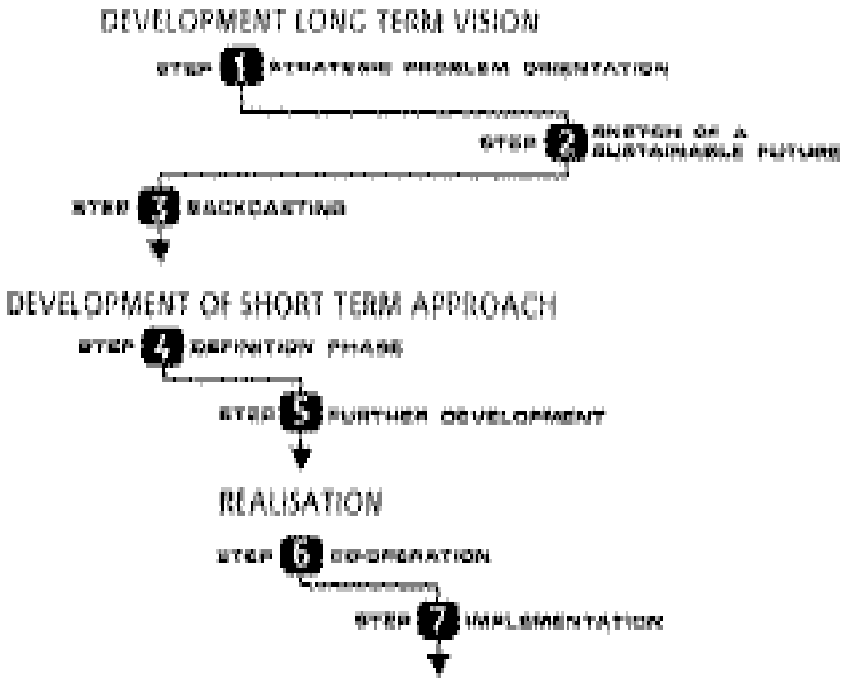
1. SYNOPSIS

The challenge of the Dutch Sustainable Technology Development Programme (STD) can be summarised in two key elements: a long time horizon and system innovation.

2. STD PHILOSOPHY AND METHODOLOGY

The starting point of the Dutch programme STD, which was conducted in the period 1993-1998, is *a time horizon of 50 years*. It is argued that given the expected growth of prosperity in that period by a factor 5, of world population by a factor 2 and, in the meantime the inordinately large impact on the environment (factor 2), the use of the environment and natural resources should in the same period be reduced by a factor 20. This ‘factor 20’ is not a strict dogma but can be regarded as a motive to think about what can be done now to realise sustainable development in 2050. Another element of STD is system innovation. Trying to achieve sustainable technology development, one has to deal with culture, structure and technology. *Culture* stands for needs like shelter, safety, health and comfort. It also concerns traditions, behaviour, habits at home and at work, etc. People often only accept changes when these connect with their needs and are attractive. *Structure* stands for the existing rules, laws, the economic system, the labour market, spatial planning, physical infrastructures, networks between people and companies, knowledge etc. *Technology* concerns all current and future possible technological options and solutions. Technology in itself is often not the problem. However, in implementing technology on a larger scale, culture and structure often appear to raise barriers. STD shows us that only an *integral* analysis of culture, structure and technology can achieve the realisation of system innovation and steps towards sustainable development in the year 2050. STD has developed a methodology that can support long term policy planning as well as the formulation and implementation of STD-projects. The steps are illustrated below.

Figure 1. STD methodology, steps to follow



3. CASE STUDY: HOT WATER

The STD philosophy and methodology have been used (by the author) in a case study to develop (on paper so far) a strategy for reducing energy use related to hot water for showers, bathes, cleaning, kitchens, etc. The various steps have been worked out, and the main headlines are described below:

1. *Strategic problem orientation*: It is useful to start with an analysis of the current situation. What needs are fulfilled, why is it a problem, what is unsustainable, is there an alternative, which networks do exist? It appears that with regard to hot water, trends in society like more comfort and income are relevant. For hot water this means higher comfort standards and more frequent use of shower and bath, for pleasure and to relax instead of hygiene. The trends cause more emissions and depletion of fossil fuels. It also becomes clear that hot water is strongly related to various technological and societal infrastructures. Examples are the energy and water supply, health sector, safety rules, sewer system, cleaning sector, distribution network, etc.

2. *Creating a vision*: Having described the problem, one can learn a lot by analysing existing visions of the future, like e.g. a leading role for sustainable energy, drastic energy savings, energy-neutral villages, smart domotica, and/or hydrogen. Each vision has a certain time horizon and hides a perception of the flexibility and strength of nature behind it. The best is to create with all involved actors together a desired future situation for the theme they are concerned with. It helps the involved actors to dissociate themselves from daily practice and it connects and motivates heterogeneous actors to strive for one similar goal. Depending on the character of the subject, methods like brainstorms, essays, interviews or consumer panels can be applied to create a vision. In the case study hot water, given the factor 20, the desired vision for 2050 is one of no fossil energy use in the built environment, a sunboiler for each roof, dry cleaning methods as a standard, heat recovery from waste water from showers and baths, groupbathing , smart showers and the implementation of a new sewer system.

3. *Backcasting:* The next question is how to decrease the gap between the desired and the current unsustainable situation. In an iterative process, the involved actors should explore the actions and interim results necessary to reach the desired future. Using backcasting in the case hot water, three different paths came out that ideally should be implemented in parallel. (a) Product developments should lead to less energy-intensive alternatives for showering and baths to fulfil the human need to relax. (b) Technology development should reduce energy demand by the heat recovery of waste water (c) System innovation should lead to the development of a new sewer system that can cope with smaller volumes of colder water in future.

4/5. *Redefinition*: Since the problem is complex, it might in this phase be necessary to redefine the project. The challenge is to be ambitious and realistic at the same time, when it concerns the definition of interim objectives.
Next, with the help of a stakeholder analysis, it can become clear what preconditions for technology implementation are relevant and which partners are needed to achieve a big leap in time with regard to the objectives set. In the case study hot water, it became clear that new networks had to be created. For example, in general no active networks do exist between specialists in energy conservation, sewing systems and cleaning technologies. Neither do dermatologists and the sanitary sector have much contact among each so far.

6/7. *Realisation*: Then it is time to define and to implement projects. They should have a scope such that on the short-term results can become available that are somehow attractive to each individual actor joining the project. A process manager is needed to control the continuity and the balance between short-term interests and long- term objectives. In the case study hot water four projects have been defined that might fulfil the requirements described. The selected project are (a) a search for alternatives for hot bubble bathes and excessive showers in co-operation with consumer panels (b) the development of a dry cleaning cloth in co-operation with staff engineers in space technology (c) creation of a network between sewage system planners and energy policy makers and finally (d) support for manufacturers trying to develop heat recovery systems for shower water.

4. CONCLUSIONS

The exercise so far has only been done on paper without involvement of relevant actors. However, it made clear already that strategies needed in the future for hot water require a new focus, with broader attention than only technology and efficiency improvements, with new partners and with communication and co-operation across the regular networks and working fields. The STD philosophy and methodology have contributed to a better understanding of the problem and to the ability to think in terms of opportunities instead of barriers. Re-thinking the Kyoto emission reduction objectives set and using backcasting to find out what is to be reached in 2008, STD can help to make more clear what our policy should be at this very moment. This can be of use in the communication both to (inter)national governments as well as to those who in the end have to do the job.

5. BIBLIOGRAPHY

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