



EVALUATION OF JAPAN'S TOP RUNNER PROGRAMME

WITHIN THE FRAMEWORK OF THE AID-EE PROJECT

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1 Characterization of the instrument

Japan's Top Runner programme is a regulatory scheme designed to stimulate the continuous improvement of the use-phase energy efficiency of products within selected segments of markets for household and office appliances, vehicles, *etc.* Through Parliamentary decision in 1998, the programme is incorporated as an element of the Japanese Law Concerning the Rational Use of Energy (the Energy Conservation Law). It is administered by the Agency for Natural Resources and Energy under METI, the Ministry of Economy, Trade and Industry.

A noteworthy and important feature of the Top Runner scheme is its focus on the supply-side, not the demand-side, of product markets. The obligation of compliance with Top Runner regulations rests entirely with manufacturers and importers. Neither retailers, nor product owners or users are targeted .

Through its design, the Top Runner programme undergoes recurring revisions, allowing its scope to be continuously modified. In iterative cycles, it introduces product-specific energy performance requirements, where the basis for the adoption of standards is pre-defined as the use-phase energy performance of the best technology available on the market at the time of revision. Exact standard levels, however, along with appropriate target years, are agreed on in extensive consultative processes involving several stakeholder groups. Thereafter, when promulgated by the regulator, the targets become mandatory for all manufacturers and importers in Japan (except for very small actors). To date eighteen product categories have been brought into the Top Runner scheme and an additional three are currently considered for inclusion.

NB!

In the recent past there have been discussions about possibilities for a European Top Runner approach, particularly in Germany, where Greenpeace introduced, in May 2005, a proposal for Top Runner legislation (Greenpeace, 2005a; 2005b).

It should be noted, however, that Greenpeace's German proposal presents a scheme which is quite different from the Japanese Top Runner concept.

Both, it is true, represent benchmarking approaches. However, the two concepts ought not to be confused with each other. This report does not address the Greenpeace labelling proposal; therefore all use of the phrase Top Runner refers to the Japanese programme design. However, a few comments on the differences between the two schemes is offered in chapter 4.6.

1.1 Aim and targets, including relation to end-use sector and relation to national Kyoto target

When, in the wake of the 1970s oil crises the importance of end-use energy efficiency first received widespread attention in Japan, markets reacted with considerable improvements in the use-phase energy performance of new vehicles and office and household appliances. By the 1990s, however, this successive “business-as-usual” advance in the energy efficiency of new product models had stagnated.

In Japan, as well as in many other countries, the aggregated number of appliances and vehicles in use continues to increase, and the utilisation of products is expected to contribute to a growing share of the national energy balance – and of the volume of greenhouse gases emissions. Against this background, and partly pursuant to the country’s commitment under the Kyoto Protocol, Japan adopted the Top Runner programme in 1998.

Top Runner’s primary purpose is to push manufacturers and importers of energy-consuming equipment to accomplish and implement technological improvements that will revitalise, for targeted product categories, the stagnated (post–oil-crisis) trend of continuously increased end-use energy efficiency of marketed goods. Designed to incentivise actors on the supply-side of appliance and vehicle markets, the Top Runner programme in Japan does not address actual energy use as such, and the aggregated energy-savings effect of the programme is not a steering indicator or evaluation parameter.

Still, the Top Runner scheme *is* expected to contribute substantially to Japan’s overall energy savings ambition. Estimates of the quantitative significance vary, but expectations seem to fall within the range of 16 to 25 % of the entire national savings target by 2010, which totals about 2 000 to 2 500 PJ by 2010 (see Table 2 in chapter 3.10 for details and references).

1.2 Period the policy instrument was active

The Top Runner programme started in 1999 with 10 product categories and it has since been expanded to include 18 categories. See Table 1. Target years have now (in 2006) been reached for most of these products. Processes for updates of fulfilled and expired standards are underway, as are processes for the inclusion of additional categories of products. There is no indication of any plans to discontinue the programme as such. Individual product categories, however, may be taken out of the scheme.

1.3 Actions, specific technologies and/or energy efficiency measures

Table 1 presents the 18 product categories included in the Top Runner programme so far, as well as the three categories that are currently nominated for addition.

During the standard setting process, categories are often and for technical reasons divided into sub-categories. Some of these sub-divisions can be seen in the table.

Two categories, cathode-ray tube television sets and video cassette recorders, are about to be phased out from the programme. This is due to their rapidly declining energy importance, as new technologies take over the market. Whether newer-generation flat-screen TVs and DVD players will replace their predecessors as designated Top Runner products remains to be seen.

The choice and timing of actions to be taken in order to comply with Top Runner standards are totally in the hands of manufacturers and importers. Once standards have been promulgated, the regulator takes no official action until target years are reached, compliance is to be controlled (and, if need be, enforced) and a revision process for the formulation of new targets commences. (The issue of enforcement and sanctions available against non-compliers is presented and further discussed in chapter 3.8). Informal interim evaluations can be performed, however. In the case of computers, where the entire field of actors achieved compliance well before the initially determined target year, such evaluations caused a formal revision of standards to be initiated ahead of time (Tojo, 2005).

Table 1. Product categories in the Top Runner scheme (ECCJ, 2005a).

Product category	Year of inclusion	Target year	Expected energy savings
Gasoline passenger vehicles		2010	~23 % (cf. 1995)
1 Diesel passenger vehicles		2005	~15 % (cf. 1995)
LPG passenger vehicles		2010	~11.4 % (cf. 2001)
2 Air conditioners coolers/heaters		2007 (2004)	~63 % (cf. 1997)
coolers only		2007	~14 % (cf. 1997)
3 Fluorescent lights		2005	~16.6 % (cf. 1997)
4 Cathode-ray tube television sets		2003	~16.4 % (cf. 1997)
5 Copying machines		2006	~30 % (cf. 1997)
6 Computers		2005	~83 % (cf. 1997)
7 Magnetic disk units		2005	~78 % (cf. 1997)
8 Diesel freight vehicles		2005	~7 % (cf. 1995)
Gasoline freight vehicles		2010	~13 % (cf. 1995)
9 Video cassette recorders		2003	~58.7 % (cf. 1997)
10 Electric refrigerators and freezers		2004	~30 % (cf. 1998)
11			
12 Gas space heaters		2006	~1.4 % (cf. 2000)
Oil space heaters			~3.8 % (cf. 2000)
13 Gas cooking appliances		2006	~13.9 % (cf. 2000)
14 Gas water heaters		2006	~4.1 % (cf. 2000)
15 Oil water heaters		2006	~3.5 % (cf. 2000)
16 Electric toilet seats		2006	~10 % (cf. 2000)
17 Vending machines		2005	~33.9 % (cf. 2000)
18 Oil-filled transformers		2006	~30.3 % (cf. 1999)
Mold transformers		2007	
Electric rice cookers			
Microwave ovens			
Heavy vehicles			

1.4 Target groups

The Top Runner programme targets the individual manufacturers and importers of listed products. These are the primary stakeholders, which are legally subjected to a twofold obligation. First, they are required to provide publically information about the end-use energy performace of every individual product model that they release on the Japanese market. Second, they have to ascertain that, come the target year, the weighted average energy performance of all the listed products, which they sell in a year, meets or exceeds the target standard of the product (sub-)category in question. Manufacturers and importers with annual sales volumes of less than a certain number (which is prescribed separately for each product category) are exempted from the requirement to meet the standard, but they still have to supply information about their products' performance.

Secondary stakeholders such as retailers, purchasers and users are not targeted by the Top Runner programme itself. There are, however, a collection of parallel schemes (presented in chapter 2.2) that use the Top Runner standards as tools in addressing other actor groups as well.

1.5 National context

The Top Runner programme has not drawn much attention within Japan. Affected domestic stakeholders, *i.e.* Japanese appliance and vehicle manufacturers, though initially surprised by the concept (Tojo, 2006), are complaisant and participate constructively throughout the programme cycle (which is described by Figure 2 in chapter 2.1). There is a tradition in Japan of close strategic co-operation between industry and the government.

1.6 International context

Concerns have been voiced that if complaints were made, Japan's Top Runner requirements could be unfavourably deemed as trade restrictions in breach of WTO regulations. A contributing factor for this not to have happened may be the fact that domestic companies dominate the regulated markets almost competely (Tojo, 2005). Other factors that reduce the risk of international opposition are strategies to involve, or at least allow the involvement of, foreign interests in the standard-setting procedures of the Top Runner scheme. *Cf.* the discussion in chapter 3.2.

1.7 Market failures to overcome

Because of stagnant product end-use energy performance curves in the 1990s, in combination with the increasing overall use of energy consuming appliances and vehicles, the share of Japan's aggregated energy balance that is taken up by the operation of these products has been increasing. This situation is perceived (by the Government) as a problem, not least in light of Japan's commitments under the Kyoto Protocol – but also from a wider perspective of national energy security. Despite the technical potential to further bring down the use-phase energy need of electric and other appliances, as well as vehicles, market forces alone fail to realise

such a development. In the 1990s, industry, by its own initiative, was seen to invest insufficient effort in the continuous increase of the use-phase energy efficiency of the products that they manufacture and sell. The Top Runner programme is designed to address and overcome this specific market inadequacy.

1.8 Organisations, which are responsible for implementation and execution

On behalf of Japan's *Ministry for Economy, Trade and Industry* (or, in the case of vehicle standards, the *Ministry of Land Infrastructure and Transportation*) the *Agency for Natural Resources and Energy* acts as the regulator for the Top Runner programme. The Agency's *Energy Efficiency and Conservation Division* is the organisational home of the *Advisory Committee for Natural Resources and Energy*, which sits at the top of the hierarchy of committees that define the programme. See Figure 1.

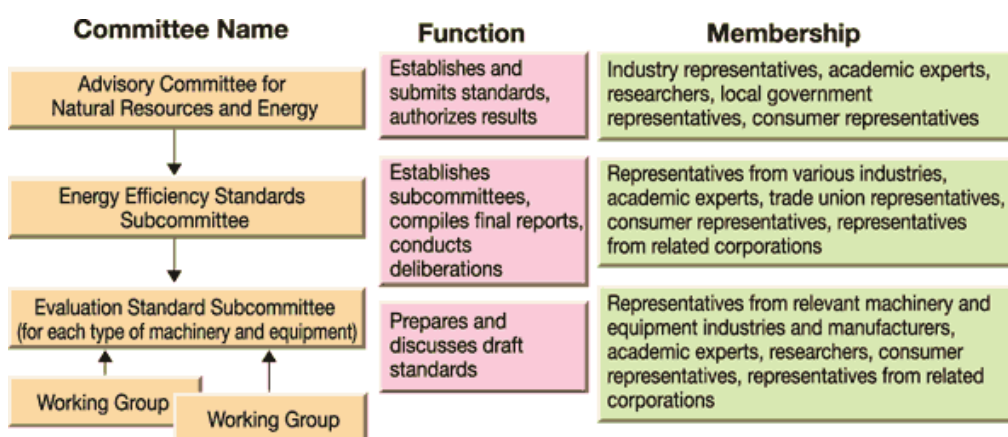


Figure 1. Organisational structure of the Top Runner committee hierarchy in Japan. From ECCJ (2005b: ch. 3-1).

Committee meetings and deliberations are not public, but before standards are promulgated, the Ministry publishes and circulates review reports presenting the committee propositions (Tanaka, 2005). The *Energy Conservation Center, Japan* (ECCJ) acts as information point and disseminator for the general public regarding the programme.

1.9 Available budget

The government's budget for the Top Runner programme is not known. It is claimed to be an inexpensive regulatory instrument. Of course though, it gives rise to cost within as well as outside of the national budget. Cf. chapter 3.12 for further comments and discussion.

1.10 Available information on initial expected effectiveness and cost-efficiency of the instrument

The Top Runner programme was launched with the expectation that it would contribute positively to the development and refinement of technologies in appliances and vehicles sold in Japan, leading to energy savings in the end-user segment. Cost-efficiency was not an indicator for which there were explicit expectations. With respect to the *ex ante* expectations expressed, it seems that the programme has been successful, in cases even surpassing them.

1.11 Side effects

The consumer prices of products that belong to the listed categories can be affected by the programme. For example: car manufacturers comment that new generations of engines now have shorter economic lifetimes, whereas previously the cost for development of new technical solutions could be distributed over a substantially larger number of vehicles (Tojo, 2005). Such an effect might, in theory, inhibit consumption. However, the government offers tax reliefs for the purchase of cars that exceed standards, which is meant to stimulate consumer demand for advanced vehicles.

2 Policy theory

No established policy theory for the Top Runner programme is related in the reviewed literature. This chapter, therefore, presents the instrument's causal composition as understood by the author of this report.

2.1 Cause-impact relations, indicators and success and fail factors

The Top Runner programme is a regulatory policy instrument directed at manufacturers and importers of energy consuming devices. The constituting policy framework is laid down in Japan's Energy Conservation Law. The scope, however, *i.e.* the subset of actors subjected to the scheme, is dynamic and continually revised by the Agency for Natural Resources and Energy. Product categories (and thereby their manufacturers and importers) can be brought into as well as be excluded from the programme. Procedurally, a cyclic approach in three phases is applied: see Figure 2. Depending on product category, phases, and therefore cycles, vary in duration. This means that, over the whole range of designated products, phases constantly overlap.

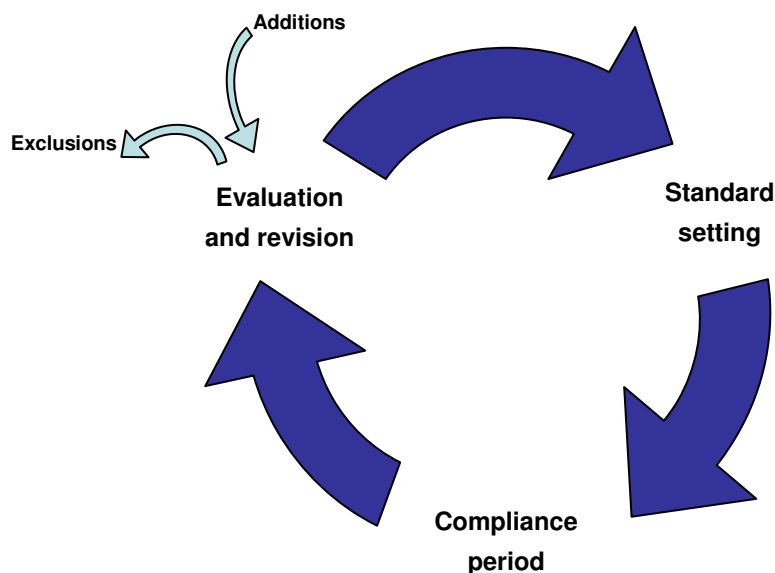


Figure 2. The Top Runner cycle in three phases.

In a linear policy-theory sequence, the Top Runner cycle can be described as in Figure 3 (overleaf). Note that actual energy savings that are expected to occur due

to the programme do not form part of the instrument cycle: the scheme, in itself, does not address the use of energy-efficient products. This notwithstanding, the energy saving step is included – as a sidetrack – in the policy theory below.

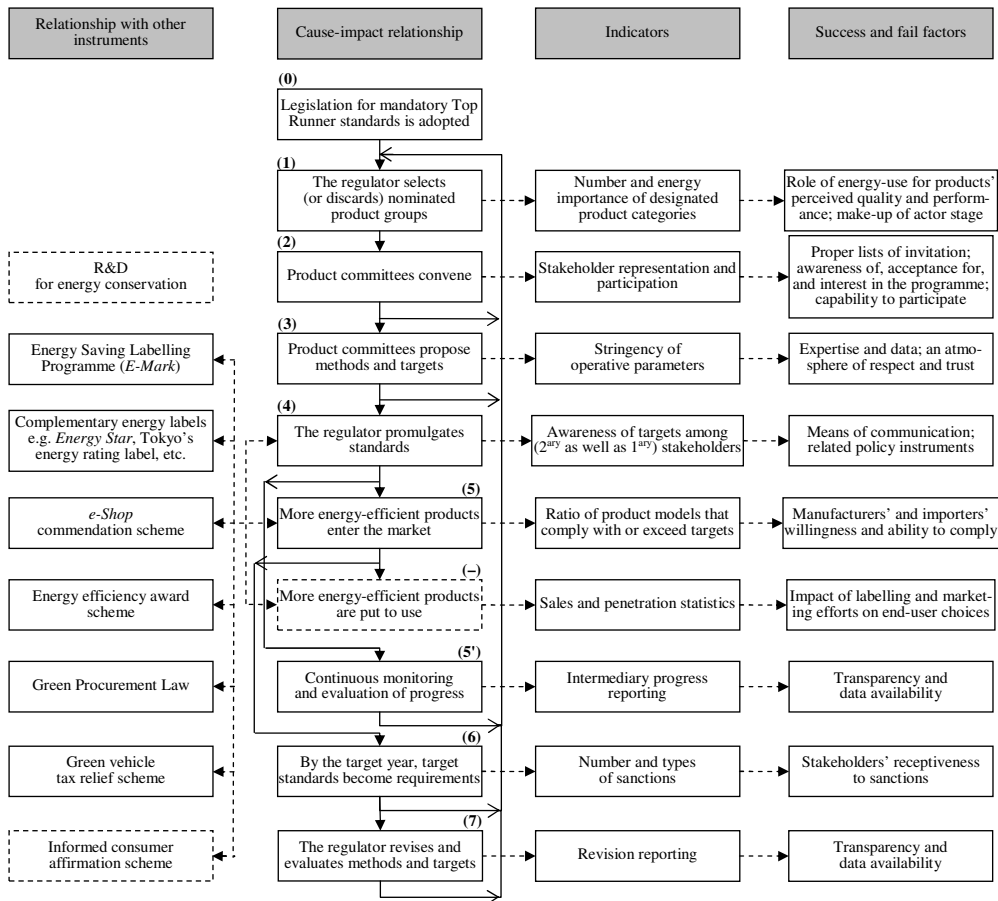


Figure 3. Linear policy-theory sequence describing a Top Runner cycle.

After the establishment of a defining legal framework as the initial causal act, the cause-impact sequence of a loop through the Top Runner cycle runs through the following steps:

- (1) The regulator designates or discards product categories (whether they are nominated additions to the programme or revised and previously adopted designees).
- (2) Product committees negotiate and suggest appropriate conditions. As an important prerequisite for standard setting, the committees have to present methods for measuring and determining products' energy performance.
- (3) Methods, target standards and target years proposed by product committees are officially published (in so-called interim reports) for public review.

- (4) Targets are set and promulgated by the regulator. This step signifies the commencement of commitment periods.
- (5) Increasingly, producers and importers take measures to comply with up-coming obligations, for example through technical research and development. The aggregated energy efficiency performance of marketed products shifts.
 - //The improved products are sold by retailers and put to use in various sectors such as industry, commerce, administration and households.//
- (5') During commitment periods, the regulator may monitor and evaluate interim progress.
- (6) Commitment periods end, and target standards become legally obligatory minimum performance standards, as stipulated by the regulator.¹
- (7) *Ex post* revisions and evaluations of methods and targets are conducted by the regulator. (This step may coincide with step number 2.)

The suggested indicators of this cause-impact sequence, and their success and fail factors, are explicated in chapters 3.1–3.9.

2.2 Interaction with other policies

The Top Runner programme has paved the way for complementary instruments that target the sales and penetration of (energy-wise) better-performing products. Such instruments are indicated in the left-hand column of Figure 3. Since the Top Runner scheme was added to the Energy Conservation Law in 1998, it has become a foundation for, and an important component of, a whole family of policy complementary programmes. These are briefly commented on in the following.

- Support schemes for research and development have been around since long before the launch of the Top Runner programme, which also primarily targets the development of more energy efficient technologies. Principally, conventional R&D programmes and Top Runner function quite independently: they neither rely on nor exclude one another.
- There are several energy performance labelling schemes for products in Japan. These may be totally disconnected from Top Runner, as for example, the *Energy Star* label (ECCJ, n.y.). They may also utilise Top-Runner-related criteria in their design, which is the case for a local energy rating label that has been adopted by Tokyo's municipal administration (Tojo, 2005).
- A specifically Top-Runner-adapted energy label is the voluntary e-Mark programme, which was introduced for five Top Runner product categories in 2000, see Figure 4 (overleaf). By 2005 it had been expanded to include thirteen product categories (ECCJ, 2005b). The degree of application can

¹ This means that manufacturers and importers of designated products have to ascertain that the mean performance of their total annual shipment meets or exceeds the standard. Actors with annual shipment volumes below a prescribed level are exempt from the obligation.

vary considerably between product categories, although lately the vast majority of manufacturers who may do so tend to use the labels (Tojo, 2005).

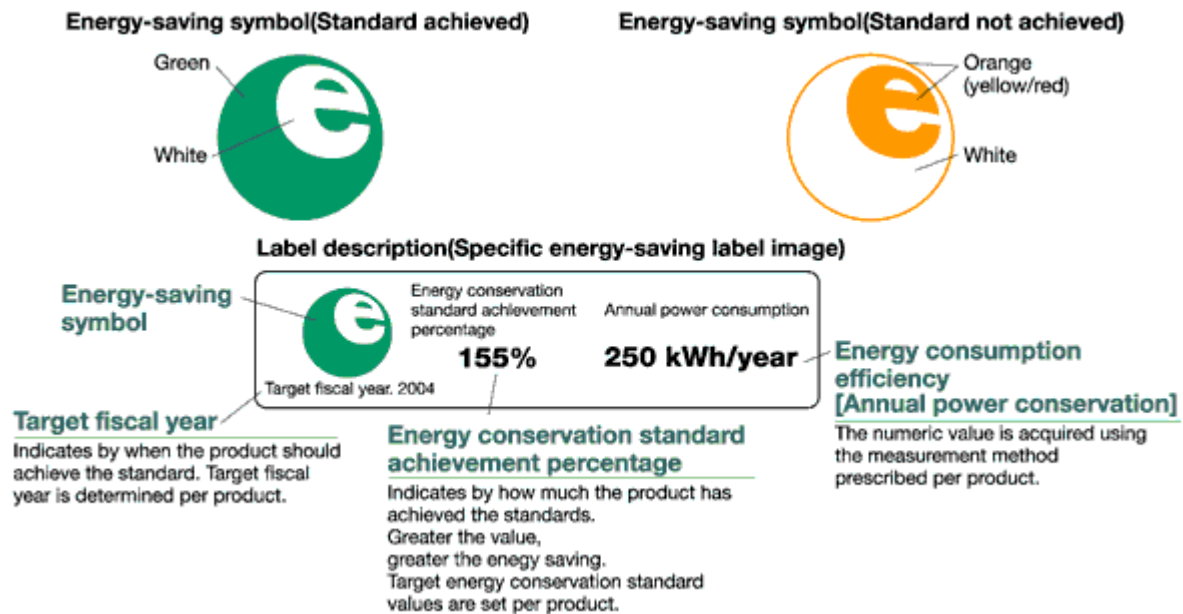


Figure 4. The voluntary e-Mark labelling system. From ECCJ (2005b: ch 5-2).

- The e-Shop commendation scheme targets retailers. It was launched by METI in 2003, allowing household appliance retailers over a certain size (those with a floor area exceeding 1000 m²) to compete for a succession of six prizes and for the privilege of being named an e-Shop, a title which is valid for three years. In the first year close to 500 stores applied, out of which 43 stores were granted the title – and the right to use the e-Shop logotype. It is intended that the programme be gradually extended to include appliance retailers of all sizes. (Murakoshi *et al.*, 2005).
- Since 1990 (thus predating the Top Runner programme by nearly a decade) the ECCJ runs an annual energy-efficiency award scheme, which singles out and rewards product that, in terms of energy efficiency, are deemed to be remarkably superior. However, the selection criteria also include other characteristics such as resource efficiency, innovativeness, safety, *etc.* (Tojo, 2005).
- Under Japan's Green Procurement Law, which dates back to 2001, lists are put together of product categories, for which certain criteria have to be met when items are purchased by public institutions. In terms of energy efficiency these criteria incorporate, if applicable, targets defined by the Top Runner programme (Tojo, 2005; Tanaka, 2005).
- Top Runner standards have also been incorporated in the Japanese green vehicle tax-relief scheme, which, however, also contains other criteria, such as exhaust emission performance. In all, there are nine types of vehicle

taxes in Japan, but only the so-called acquisition tax and the automobile tax have Top Runner relief clauses (Tojo, 2005).

- The informed consumer affirmation concept has been discussed within the municipal administration in Tokyo. It is intended to oblige car retailers to obtain signatures from all customers, whereby they affirm that before purchasing a vehicle they have received information about its energy performance and rating (Tojo, 2005).

3 Evaluation

This chapter elaborates, in twelve subsequent sections, on a set of indicators that may be used for evaluation of the Top Runner programme.

3.1 Number and energy importance of designated product categories

The number of designated product categories is an obvious Top Runner indicator. Currently eighteen categories have been brought into the scheme, and three more are under consideration (see Table 1). Two designated categories are deemed to be obsolete, and they are therefore about to be phased out of the programme.

To assess the energy importance of products, three criteria are used in the selection of designated Top Runner categories (Tojo, 2005):

- (1) Products should be commonly used in Japan.
- (2) Products should require a sizeable supply of use-phase energy.
- (3) Products should have a potential for energy efficiency improvements.²

The regulator (*i.e.* the Agency for Natural Resources and Energy) is responsible for the evaluations that decide which product categories fulfill the criteria. It can be presumed, therefore, that the Agency possesses processed data about the aggregated energy importance of designated products – in absolute as well as relative terms.

Designated Top Runner products are used within all sectors of the economy, and naturally their relative energy importance varies between sectors. In the residential sector in Japan (for example) Murakoshi *et al.* (2005) suggest that approximately two-thirds of all energy is accounted for by currently designated products. They also estimate that, by 2010, the Top Runner programme will have decreased residential energy use in Japan by 10 %.³

² Naturally, this criterion includes the evaluation of aspects that have to do with the technological maturity of different categories of products.

³ Neither the bases for these estimates, nor the corresponding savings figure in absolute numbers, are given by the authors. The baseline used, however, is one where products' energy performance values remain frozen at levels corresponding to the average efficiency of all appliances that were shipped in the year when Top Runner standards were promulgated. Thus, the baseline deviates from a business-as-usual scenario that (holding all else constant) takes into account product performance changes that would have occurred in the absence of the programme. In reference to the situation described in chapter 1.7 of this report, however, one could argue that the applied baseline – in this case – is a functional approximation of a business-as-usual scenario.

The application of the concrete importance criteria given above can be seen as a success factor in the product selection process, which is the first step in the cause-impact sequence of the Top Runner policy theory. A possible fail factor, however, is the risk that functionality or quality concerns are not included in the criteria. This aspect has emerged in Japan in discussions about standards for electric rice-cookers, where critics suggest that measures to realise technical energy-savings potentials will negatively effect the appliances' main function, *i.e.* their ability to properly cook rice. The potential programme failure pointed at, however, is not the technical aspect *per se*. It is more of a qualitative concern, and the risk which is being run is that the discussion harms the general confidence in the Top Runner programme as such. A cultural component is evident in this particular example. Rice constitutes a cornerstone in Japanese cuisine, and the complaints, therefore, are not insignificant (Tojo, 2006).

3.2 Stakeholder representation and participation

The work and co-ordination of committees, sub-committees and working groups constitute a key part of the Top Runner cycle. The fundamental tasks of these committees and groups are to reach practical and workable agreements on, first, methods for measuring products' energy performance, and, second, reasonable standard levels and compliance periods. Typically, this phase of the cycle lasts for 1 to 2½ years, where, in the most intense periods, weekly meetings with relevant stakeholders are required (Tojo, 2006; 2005).

No published information has been found that accounts in detail for the amount of time – in person-hours or person-months – that is devoted to standard-setting processes, neither in aggregation nor by stakeholder. Nevertheless, such information would constitute an important indicator that ought to be evaluated both qualitatively, in terms of the satisfactoriness of the scope of participating stakeholders, and quantitatively, in terms of cost. (*Cf.* the discussion in section 3.12.3.)

A decisive success factor for the Top Runner programme in Japan is stakeholders' – in particular industry's – willingness and capability to co-operate extensively with the regulator and each other, devoting considerable time and resources in the process. Their acceptance of the programme as a concept is also important. Although initially surprised by it when it was first introduced in 1998 and 1999, manufacturers did not object to the Top Runner method of defining product performance requirements. Since the programme uses existing best performers as bases for standard setting, actors seem reluctant to argue against the targets (Tojo, 2006). The tradition in Japan that allows and supports far-reaching co-operation between the regulator and industry probably contributes to the high acceptance of the scheme among manufacturers (Tanaka, 2005).

A possible fail factor would be resistance from powerful non-Japanese actors. There is a risk that international opposers perceive Top Runner standards to constitute improper trade restrictions. However, the fact that imported products make up marginal shares of regulated markets, *i.e.* that affected segments are mainly populated by Japanese companies, reduces the likelihood of conflict. Formal complaints against the programme have not occurred. As mitigative efforts, the Japanese regulator invites the World Trade Organisation to review and comment committee results, and importers' organisations (when applicable) are given the opportunity to take part in the work of Top Runner standard setting committees (Tanaka, 2005).

3.3 Stringency of operative parameters

Naturally, the effectiveness of the entire Top Runner programme – in terms of its energy-saving capacity – ultimately depends on the stringency of the product-specific and operative parameters that are negotiated in the consultative processes of committee and working group meetings. The following parameters are especially highlighted in the literature: first, methods for energy-efficiency measurements, second numeric levels of target standards, and, third, target years.

- (1) Methods naturally need to be practical – while, however, representing as closely as possible products' actual use-phase energy requirements.
- (2) Standards must relate in a sensible way to the actual “top runner” at the time of adoption. Singularly well achieving or patented technologies may have to be disregarded, while, conversely, a reasonable amount of business-as-usual product development needs to be accounted for and added to the standard.
- (3) Target years have to be, on the one hand, sufficiently far from the present in order to allow manufacturers time for adaptation. On the other hand, they must not be too distant, in which case estimates of business-as-usual development become too uncertain. If, as a consequence, promulgated target standards come too close to (and risk falling below) the expected business-as-usual achievement, the programme could become counteractive and delay technological progress rather than propel it.

An issue and a potential fail factor when determining all of these three parameters is the definition of product subcategories. They have to be wide enough to allow for and stimulate market competition – as well as narrow enough to ensure fair comparability between product models. Another dimension of the success and failure balance is the programme's influence on the development of new and innovative technical solutions: Top Runner's failure to address such development is a recurring item of critique.⁴

⁴ There are, however, no indications in the reviewed literature of discussions about linking the programme with other and more conventional support schemes for industrial research and development.

Finding ways to construct indicators that can give *ex ante* information about the stringency of the operative parameters would be helpful in addressing an important fail factor which has been observed in Japan, and which relates closely to the above-mentioned three parameters. Early and massive overcompliance has occurred, for example in the cases of computers and passenger vehicles (Tojo, 2005). This suggests that the agreed compliance period may have been too long, that standards may have been too lax – or both. However, there are features of Japan’s target-setting process, which are intended to reduce the risk of this kind of situation emerging. For example, negotiations over standards are conducted, as much as possible, with individual manufacturers as participating stakeholders, rather than with branch organisations. The reason for this is the assumption that branch representatives, in these cases, would tend to defend the interests of the least good performer (Tojo, 2005).

A success factor, connected to the acknowledgement in Japan of the risk mentioned above, is that the programme is flexible enough to allow the re-opening of consultative deliberations before the promulgated target year.

3.4 Awareness of targets among stakeholders

When targets are promulgated, primary stakeholders (*i.e.* affected manufacturers) are well aware of them. This is a result of the preceding and extensive consultative process, where industry’s participation is a prerequisite for target setting. It represents an important success factor.

Top Runner is designed to push supply. As for the penetration and increased use of more energy-efficient products (through demand-pull), these are issues that fall outside of the programme. Through their interest organisations, secondary stakeholders (such as retailers and users) do take part in the standard setting process. However, they do not participate to the degree and extent that manufacturers do, and the awareness of targets among secondary groups is not addressed or measured within the Top Runner framework. This circumstance might not qualify as a fail factor as such, as it does not directly affect the attainment of the Top Runner programme’s objectives.

At the same time, one should be aware that the Top Runner programme has become the central pillar of an extended package of instruments that address not only the supply of energy-efficient products, but issues of demand and usage as well. From this vantage, the level of awareness among secondary stakeholders is a significant indicator, the success and fail factors of which have to do with means and partners of communication. One such communication effort is the voluntary e-Mark labelling programme (see Figure 4). Moreover, measures to actually record awareness and awareness-promoting activities have been taken by the ECCJ in preparation for

(and as components of) the e-Shop Commendation scheme, which was launched in 2003 (Murakoshi *et al.*, 2005).

3.5 Ratio of product models that comply with or exceed targets

During compliance periods, manufacturers and importers are expected to launch, successively, increasing numbers of product models that comply with or exceed target standards. This development is monitored by the ECCJ: twice yearly they publish comprehensive product catalogues, where all product models available at the time are presented. These overviews specifically highlight models' use-phase energy performance (and, where applicable, Top-Runner-related e-Mark symbols are used). From these publications, time series of the ratio of models in compliance can be constructed. So far, expectations have been fulfilled: as target years approach, the share of models that do not meet standards dwindle.

The ECCJ's catalogues constitute a tangible success factor. In a straightforward and explicit way (using colour-coded e-Mark labels) they supply not only consumers and retailers but also manufacturers and importers – and, of course, the regulator – with concrete information about the degree of overall compliance achieved at the time of their publication. They function, therefore, as regularly updated and readily available benchmarks for evaluation. Since energy efficiency is generally regarded as a competitive advantage, such information may have a positive effect on primary stakeholders' willingness and efforts to comply.

3.6 Sales and penetration statistics

As previously mentioned, Top Runner regulations address the supply, not the use, of energy-efficient products. Applying a wider focus, however, the programme plays a central part in a family of interrelated policy instruments, where the reduction of energy use constitutes the end objective. Recognising that the aggregated energy-saving effect cannot, in a meaningful way, be divided and attributed to each instrument separately, this report points at product sales and penetration statistics⁵ as important indicators – also within the narrower Top Runner context.

At the end of the compliance period, sales statistics constitutes part of the regulator's information requirements. It is needed for the evaluation of manufacturers' and importers' compliance with Top Runner standards, and it is collected, from the industry, by the Agency for Natural Resources and Energy. This information, however, is not publicly accessible: cases of non-compliance are publicised only after failure by offenders to adhere to first-step corrective advice from authorities (see section 3.8). Not only the Agency, but branch organisations

⁵ In this report, the *penetration* of a product is a relative measurement, denoting the share it holds of the entire working stock (of a particular category of products). Penetration, thus, can be quantified both in numbers of items and in figures of energy use.

too, are known to collect sales statistics. Such information is intended for internal use only. It is not published or shared with the ECCJ or the public.

Penetration statistics is an even more elusive indicator. Making estimates of the extent to which new appliances either replace or complement old ones is a tricky exercise, but assumptions about appliance life-times can be made and used for such a purpose. Whether and how this kind of information about penetration is available in Japan is not clear. It might be an indicator in evaluations of the e-Mark labelling scheme, and ought, perhaps, to be considered as such also for Top Runner.

3.7 Intermediary progress reporting

Information about the extent and scope of intermediary progress reporting during Top Runner compliance periods would constitute a useful indicator, against which assessments of the quality of continuous monitoring and evaluation efforts could be made. There is, however, no function that refers or lists, or let alone synthesises, such information. It is known that monitoring activities for internal purposes do occur within industrial branch organisations, but the communication about timing and findings is restricted (Tojo, 2005).

3.8 Number and types of sanctions

Japan's Top Runner programme allows for a succession of sanctions to be applied, should manufacturers or importers fail to comply with the requirements that come into force at the end of commitment periods.

- (1) First, the Ministry issues so-called advice to the actor at fault. The information of such correspondence occurring is, however, confidential, so that corrective measures may be taken without embarrassment.
- (2) Failure to respond to ministerial advice will lead to a public proclamation, in which the transgressor is officially named and shamed.
- (3) As a further step, the regulator may expressly order an erring company to comply, and levy a fine if it does not.

Whether, so far, any sanctions have been effectuated in Japan as a consequence of non-compliance with Top Runner regulations is not known. No sanctions are reported, and it is unclear whether information about the number and frequency of first-level, advisory notifications would be, at all, publicly accessible. Sanction statistics (in combination with information about the total number of regulated actors) would, however, serve as a telling performance indicator, specifying of the overall degree of Top Runner target attainment.

A success factor that deserves attention in this context is the alleged receptiveness in Japan to "name and shame" instruments. This observation is brought forth in other literature as well (although it also receives critique) (Tojo, 2005).

3.9 Revision reporting

End-of-cycle revision reports constitute excellent opportunities for the collection and analysis of all kinds of indicators. Changes in the affected market segments, for example, may be examined here. These occur in terms of product development trends and sales figures, of course – but also in terms of actor dynamics: it is known in a few cases that, as target years have approached, non-compliant manufacturers of designated products have decided to withdraw from the market (Tojo, 2006).

3.10 Net impact

This report defines *net impact* as the end-use energy consumption avoided as a result of a programme's implementation. No conclusive information has been found in the literature about the Top Runner programme's actual net impact in this sense.⁶

Nonetheless, there are quantitative estimates of the anticipated net impact of the Top Runner programme (including adjoining schemes). Depending on the source, however, figures vary (see Table 2), but in orders of magnitude, they indicate expected savings by 2010 of over 200 PJ within the residential and commercial sectors, while for the transportation sector estimates range between 200 and 350 PJ. None of the sources examined explicitly states what the baselines for these projections are, and the figures are therefore quite unreliable. They may be compared though, with the Japanese government's national (and Kyoto-related) energy-efficiency target of 2 100–2 500 PJ by 2010 (ANRE, 2005). The comparison reveals that the Top Runner policy package is expected to contribute a significant portion of the total efficiency quota (roughly in the range of one sixth to one quarter, depending on data source and choice of figures).

Table 2. Quantitative energy savings targets in Japan according to three different sources.

Source	unit ⁷	Top Runner savings target, by sector				Total energy savings target	by cf.	
		ind.	res. & comm.	transportation				
			base case	addi-tional	base case	addi-tional		
ANRE, 2005	10 ⁶ kl coe PJ	n.i.	5.7 220	~0.1 ~3.9	8.7 340	~0.1 ~3.9	54.6–65.0 2 100–2 500	2010? n.i.
ANRE, n.y.	10 ⁶ kl coe PJ	n.i.	5.4 210	1.2 46	5.4 210	0.5 19	50.0–57.0 1 900–2 200	2010? n.i.
Schröder, 2003	10 ⁶ kl coe PJ		→	9.0 350		←	56.0 2 200	2010? n.i.

n.i. = no information

⁶ A reason for this may be the fact that the scheme, in itself, is not intended to exert any direct influence on end-users. It is, instead, an instrument designed to promote the development and *supply* of better technologies, not, specifically, to increase the *demand* for and use of energy efficiency equipment.

⁷ In Japan, national energy statistics are usually reported in (multiples of) the base unit *kilolitres of crude oil equivalents* (kl coe). Here, they are converted into PJ using the factor 38.7 PJ per million kl coe (adopted from Nakata *et al.*, 2003: Annex 4.1, Table 1).

3.11 Effectiveness

In terms of goal attainment, there is wide-spread agreement among stakeholders in Japan that the Japanese Top Runner programme has been effective: So far, as target years approach, marketed products in the designated categories are seen to conform to requirements – and in many cases even to exceed them by secure margins. This fact, however, may raise, in turn, the issue of whether the programme’s standard-setting procedure is effective or not. If there is a tendency to set target standards too low, it constitutes a fail factor that needs to be addressed (as discussed also in section 3.3).

Quantitatively, the investigated literature tend to express product-specific expectations on the energy impact of Top-Runner targets only in relative terms (as in Table 1). Absolute savings figures (as in Table 2) seem inconclusive and available only on aggregated levels. As input to an energy impact evaluation, however, access to absolute values (for objectives and baselines as well as for achievements) would be needed also on a per-category basis, and could be included as indicators in end-of-cycle revision reports (*cf.* section 3.9). (Important indicators include stock figures, sales and penetration statistics, expected product life-times, *etc.*)

3.12 Cost efficiency

Cost efficiency, expressed as a quotient of balanced monetary input and output divided by the net impact, can be a useful indicator for programme evaluation. On an aggregated level, however (*i.e.* taken across all designated categories and cycles), it is interesting primarily for the conduction of comparisons of various policy schemes. From an internal programme perspective, the cost efficiency of each separate Top Runner cycle is probably a more useful and informative indicator than a crude aggregation of figures over the entire spectrum of product categories. It is not known, however, whether or not the Japanese regulator actually takes this indicator into consideration during programme revisions and evaluations. The focus represents a distinctly attributive ambition and, in the mind of a person interviewed for this report, perhaps a rather “European” way of thinking (Tojo, 2006). A general inclination in the reviewed literature towards evaluations of goal attainment, rather than of attribution, can explain the scarcity of information and discussions about cost and cost efficiency.

Numerator and denominator, both, need to be known when calculating cost efficiency. These data requirements are not sufficiently met in this report. As for the denominator (and as discussed above in section 3.10), there is great uncertainty in the figures available on Top-Runner-related energy savings. The discussions below explicate on the challenges of determining as well a correctly balanced numerator of relevant monetary expenses and savings.

3.12.1 Government

In principle, public cost for the Top Runner programme can be divided into three main categories:

- O* overhead, *i.e.* the cost for administration and information not attributable to any specific product categories,
- P* product-specific cost, and
- F* fiscal effects, which represents the loss of tax revenue due to avoided use of energy – minus the increase of tax revenue pursuant to higher sales prices of more efficient products.

The total cost, *C*, can be expressed as

$$C = O + \sum_{i=1}^n (P_a + P_b + P_c)_i + F$$

where *n* represents the number of designated product categories, and sub-indices *a*, *b* and *c* represent the three phases of the Top Runner cycle (*cf.* Figure 2), *i.e.*

- a* standard setting,
- b* compliance period and
- c* evaluation and revision.

The information needed to calculate the total cost is not available from the reference material of this report. It seems to be implied that government expenditure for the Top Runner programme is low, but from an attributive perspective it should be recognised that the government incurs cost also through adjacent policy schemes, such as labelling, green procurement and tax relief programmes, all of which contribute to Top Runner achievements.

Although it is not known how much of the government's money that is spent on Top Runner (and Top-Runner-related) activities, the *total* public budget in 2002, for all publicly financed energy efficiency measures, was 130 000 million JPY (ANRE, n.y.), which is equivalent to 880 million EUR.⁸ This represented an increase by 20 % over the 2001 budget.

3.12.2 End-users

Manufacturers have to invest substantial resources in Top Runner participation and compliance efforts, which will likely lead to increased product prices. Therefore, end-users (*i.e.* consumers of designated products) are the ones who bear the final cost of the programme (unless, in a competitive market, manufacturers are unable to be price-setters, thus having to become price-takers instead). From the consumer's point of view, however, more energy efficient products cost less to operate. With time and accumulated use, the avoided cost for energy can be expected to compensate for incremental investments, resulting in savings of money as well as of energy. Pay-back times vary between models and product categories, and in the

⁸ Using a conversion factor of 6.787 EUR per 1 000 JPY (11th April 2006).

case of vehicles, where a Top-Runner–connected tax-relief scheme has been introduced, the government has chosen to subsidise investments in order to reduce the pay-back period for those who purchase energy-efficient cars.

Far too little data are known for a presentation here of comprehensive and reliable calculations on end-users' cost and cost efficiency. However, a sketchy attempt to calculate the order of magnitude of avoided end-user cost in the transportation sector yields a result of 580 or 940 million EUR per year (depending on which figure is used for the expected Top Runner energy savings in the sector: 210 PJ or 340 PJ, *cf.* Table 2).⁹

3.12.3 Other organisations

Throughout its cycle (*cf.* Figure 2), the Top Runner programme causes cost to occur for a multitude of actors. In the setting of standards, to start with, there is a broad set of stakeholders that are involved – in addition, of course, to representatives of the regulator and of individual manufacturing companies. Such actors include academia, local governments, consumer and branch organisations, trade unions, *etc.* (ECCJ, 2005b). For each participating stakeholder, the cost is a function of the amount of time devoted to the process. During compliance periods as well, additional cost occurs due to Top Runner regulations: in particular this is true for those manufacturers and importers, who need to invest in extended product development efforts. Branch organisations, as is mentioned above, sometimes carry out evaluative studies to assess their members' performance, *etc.* There are, however, no estimates available on the number of person-hours or person-months that are put in by different actors. Therefore, no cost-efficiency calculus can be carried out here.

As mentioned in the preceding section, manufacturers and importers, who are the stakeholder group targeted by the Top Runner programme, put in considerable effort and time into participation and compliance. It can be presumed that, insofar as they are able, they will use the price mechanism as a means of passing most or all of their additional cost over to consumers.

3.12.4 Society

Society's cost for the Top Runner programme consists of the sum of all actors' expenditures and losses, subtracted by the value of avoided cost for energy use and investment. It cannot be quantified here. A crude attempt at an estimate of the order

⁹ For this calculation, the following assumptions and simplifications are made: (i) the savings are evenly distributed over a period of 10 years from 2000 to 2010, (ii) all energy saved is accrued to the avoided use of petrol, (iii) the energy content of petrol is 31.4 MJ per litre (STU, n.y.), (iv) the price of petrol at the pump in Japan remains constant at the equivalent of 1.49 AUD per litre (Caltex, 2006), where the exchange rate of 0.58 EUR to the AUD (11th April 2006) is also constant:

- $\frac{1}{10 \text{ yrs}} \times \frac{210 \text{ PJ} \times 1.49 \text{ AUD/l}}{31.4 \cdot 10^{-9} \text{ PJ/l}} \times 0.58 \text{ EUR/AUD} \approx 580 \text{ 000 000 EUR/yr}$
- $\frac{1}{10 \text{ yrs}} \times \frac{340 \text{ PJ} \times 1.49 \text{ AUD/l}}{31.4 \cdot 10^{-9} \text{ PJ/l}} \times 0.58 \text{ EUR/AUD} \approx 940 \text{ 000 000 EUR/yr}$

of magnitude of society's avoided cost for transportation fuel, however, suggests savings worth 240 or 380 million EUR per year (depending on what figure is used for the expected Top Runner energy savings in the sector: 210 PJ or 340 PJ, cf. Table 2).¹⁰

¹⁰ For this calculation, the following assumptions and simplifications are made: (i) the savings are evenly distributed over a period of 10 years from 2000 to 2010, (ii) all energy saved is accrued to the avoided use of petrol, (iii) the energy content of petrol is 4.99 GJ per barrel (STU, n.y.), (iv) the price of petrol in Japan remains constant at the equivalent of 70 USD per barrel (IEA, 2006), where the exchange rate of 0.80 EUR to the USD (11th April 2006) is also constant:

- $\frac{1}{10 \text{ yrs}} \times \frac{210 \text{ PJ} \times 70 \text{ USD}/\text{bbl}}{4.99 \cdot 10^{-6} \text{ PJ}/\text{bbl}} \times 0.80 \text{ EUR}/\text{USD} \approx 240 \text{ 000 000 EUR}/\text{yr}$
- $\frac{1}{10 \text{ yrs}} \times \frac{340 \text{ PJ} \times 70 \text{ USD}/\text{bbl}}{4.99 \cdot 10^{-6} \text{ PJ}/\text{bbl}} \times 0.80 \text{ EUR}/\text{USD} \approx 380 \text{ 000 000 EUR}/\text{yr}$

4 Conclusions

4.1 Net impact, effectiveness and cost efficiency

There is insufficient access to quantitative information on the Top Runner programme's energy savings achievements in Japan. All figures available in the reviewed material are *ex ante* estimates, and, on a per-category basis, mostly relative numbers are given (*cf.* Table 1). Absolute (and aggregated) numbers of a rather inconclusive nature have been found in overviews of national energy savings ambitions.

Among possible explanations for the scarcity of data regarding Top Runner's energy impact, the following three are highlighted here.

- The primary targets of the Japanese Top Runner programme are technology development and market transformation from a supply-side perspective. Energy savings accrued in the user phase might be considered as secondary effects of the programme.
- Those reporting on Japan's Top Runner approach so far have been more interested in investigating goal attainment than in performing attributive and quantitative programme evaluations.
- Few Top Runner cycle revisions have been completed. As increasing numbers of evaluations are carried out, more quantitative information about achieved energy savings might become available (although it is far from certain that this will be the case).

Given that the Top Runner programme has given rise to a whole family of related policy schemes, it would be a challenging exercise to carry out a comprehensive and attributive evaluation of realised energy savings. Disregarding such aspects, however, observers expect that Japan's Top Runner approach (the programme itself and all supplementary schemes included) will contribute to substantial savings in the residential, commercial and transportation sectors. For industry, no estimates are given; presumably these savings are considered negligible. It is indicated that the Top Runner approach might contribute to about one sixth or more of the total Japanese savings ambition by 2010.

So far, Japanese stakeholders agree that the Top Runner programme, as a whole, has been effective. Set standards are being achieved – though sometimes, it seems, almost too easily. The effectiveness of target setting procedures might therefore

gain from closer scrutiny. Nevertheless, goals are attained and there is little critique against the programme.

Like net energy impact, the cost (including therefore the cost efficiency) of a programme is an indicator that requires availability of comprehensive quantitative information, most of which is currently lacking for the Top Runner scheme in Japan. Large parts of its cost, however, are relayed, via manufacturers, to end-users, who are expected to regain their incrementally increased investment cost through avoided energy expenses. In any case, the programme does not appear to constitute a too heavy component of the total public budget for energy savings activities (which in 2002 amounted to 880 million EUR).

4.2 Success factors

Domestically, the general perception of the Top Runner programme is that it is more than satisfactory: it achieves its objective of pushing appliance and vehicle manufacturers to launch increasingly energy-efficient products. There are several reasons for the success.

- Primary stakeholders (those subjected to the regulation) are themselves involved in setting targets. This means that awareness and commitment levels are high. It also ensures that targets are feasible and not overly ambitious.
- Industrial stakeholders in Japan are used to and at ease with close collaboration with national regulators. In other contexts, where leaner government and individual stakeholder integrity are highly prized, a similar scheme layout may be problematic due to perceptions of regulator intrusiveness.
- The instrument is iterative and designed to be flexible, dynamic and adaptive, allowing failures and shortcomings to be addressed and remedied.
- A collection of supportive policy instruments have developed around the Top Runner programme.
- Energy-efficiency in products is usually perceived as a competitive advantage, meaning that no manufacturer has a stake in the opposition of the scheme's objectives.
- The Top Runner approach turns the free-rider effect into an advantage: actors who perform well already at the start of a cycle become free-riders in the sense that they need invest less additional effort during the compliance period that follows.
- Regulated markets are very much dominated by domestic actors. Thus the risk of complaints by stakeholders from the outside is reduced.
- Name-and-shame sanctions are effective deterrents in Japan.

4.3 Fail factors

As perceived in Japan, there are few fail factors that spoil the Top Runner programme. The standard-setting phase's narrow focus on energy consumption has been mentioned as a potential flaw that may threaten, in the future, the wide-spread acceptance that the scheme has enjoyed so far. The discussion in Japan about standards for rice cookers illustrates this. Another thing that has generated critique is that, for some product categories, premature and extensive over-compliance across the entire field of manufacturers has occurred. If standard-setting procedures do not properly account for the potential for technological development (which may already be achieved, but yet remains commercially untapped), the programme runs the risk of being sub-optimal. On the other hand, the built-in flexibility of Japanese Top Runner cycles allows the programme to address and correct such failures.

The most common critique directed at Top Runner in Japan is that the approach only encourages incremental technical improvements, while innovations receive no incentives under the scheme.

4.4 Monitoring and evaluation

The modular nature of the Top Runner approach provides for excellent monitoring opportunities. From the perspective of this report though, far too few data are available in order for a satisfactory quantitative evaluation of the Japanese scheme to be conducted.

Markets in Japan are well documented through updated product catalogues that are published twice yearly and that clearly relate all available models in terms of their Top Runner performance. Information about the penetration, however, of the different models cannot be obtained from this source. Individual manufacturers' sales figures are confidential, and there is no synthesised and anonymised information that would allow the calculation of a penetration indicator. During compliance periods, the regulator has no official monitoring task – and it is not known to what extent end-of-cycle revisions and evaluations publically report on penetration. Without this information, however, the net energy impact of Top Runner cycles cannot be estimated.

A reason for the observed lack of data may be that quantitative Top Runner targets are not defined in terms of energy savings. The programme is strictly supplier-oriented. Therefore, targets are related to product performance, not to their aggregated energy impact.

In order to perform net impact and cost efficiency calculations related to Japan's Top Runner programme there is a lot of additional information that needs to be provided and synthesised. Baselines, for example, have to be developed and clearly presented. Because of its design as a composite of several (and iterative) sub-units,

the programme can easily be adapted to hold a consistent, continuous and probably relatively inexpensive monitoring effort that evaluates, cycle by cycle, energy impact as well as cost from the perspectives of various stakeholders. The programme, in its entirety, may then be represented as the aggregate of all per-cycle parameters – with, in the case of cost, account taken also of overhead expenditure and financial reallocations (and other consequences) that follow from the avoided use of energy (*cf.* the equation on page 24).

4.5 Summary: Learning experiences

Japan's Top Runner programme demonstrates the benefits that can be accrued within a framework that commits stakeholders through involvement in common target setting. It is modular and iterative; therefore it lends itself very well to monitoring and evaluation efforts, which can easily be incorporated into the common, overarching framework. Which indicators to monitor and to evaluate against naturally depends on the programme's explicit objectives and on the ambitions of the regulator. This report has a quantitative and attributive ambition, which does not constitute a paramount concern within the Japanese Top Runner programme. Instead, goal attainment (albeit in quantitative as well as qualitative terms) receives the main focus in the studied material.

This report notes that the mandatory but still inclusive and consensus-oriented supply-side focus of the Japanese programme represents an indirect – and unique – approach to the policy challenge of improving energy end-use efficiency. If combined with more user-oriented perspectives, it might become a quite powerful policy tool.

An important question, of course, is whether the Top Runner approach is transferrable to other markets and cultural contexts besides Japan. For countries interested in adopting themselves a Top Runner approach, a piece of learning offered here is to start off with a clear definition of what the programme's objectives should be and, importantly, how targets are to be formulated. In order to complement the Japanese approach with an attributive ambition, a co-ordinative information and evaluation function needs to be clearly defined (with or by the regulator), charged with the tasks of (i) continuous data collection from stakeholders in all concurrent Top Runner cycles, and from all phases of these cycles, (ii) complementing this information with overhead and overarching data for aggregation and synthesis, and (iii) communicating the findings.

4.6 "Top Runner" in Europe

Unlike the Japanese programme, Greenpeace's proposal for German "Top Runner" legislation (*cf.* the information box on page 5) does not include a standard setting phase (*i.e.* steps 2 and 3 of the policy theory in Figure 3 are completely left out).

Thereby, the component of active participation and consensus formation is lost; the very feature that constitutes the cornerstone of Japan's Top Runner programme and that not only creates the incentive for stakeholder commitment to the programme but – importantly – also enables stringency through flexibility in the setting of operative parameters (*i.e.* measuring methods, standard levels, and target years).

The Greenpeace alternative contains none of this. Instead of a participatory process, it suggests a rigid and automatic standard-setting function. Moreover, it features a mandatory labelling scheme, which has been subjected to heavy critique in Germany (Irrek, 2006). A reason for this seems to be fear for its incompatibility with current and established efficiency labelling systems in Europe. Although there are several consumer-oriented efficiency labels in Japan that use Top Runner standards as criteria, it is important to note that the Japanese Top Runner approach itself is not a labelling scheme, nor does its effectiveness rely on labels. Thus, the current discussion in Germany ought to be restricted to its proper context (*i.e.* the Greenpeace proposal). Due to Greenpeace's allusion to the Japanese programme by their use of the title "Top Runner", however, it is obvious that there will be confusion, and that possibly justified critique against the proposal by Greenpeace for Germany might spill over rather indiscriminately to a parallel discussion of prospects for applications in a European environment of Japan's Top Runner experience. There is reason to be wary of this. The following comments (like this entire report) only concerns itself with Top Runner as it works in Japan – not with Greenpeace's proposal.

If European countries, or, more appropriately, the European Union, were to consider adopting a Japanese Top Runner approach, many features would need to be altered. For example, the sanction system would most likely have to be adapted to local conditions. Also, attention would need to be given to the fact that large shares of products sold in Europe are manufactured by international companies – indeed, often by Japanese ones. Standard-setting procedures in a European Top Runner programme, therefore, would have to account for this and make sure that companies that have to participate under different national schemes are not unnecessarily subjected to conflicting requirements – for example through discrepant and inconsistent energy-efficiency measurement methods. Moreover, it is far from self-evident that European manufacturers would be as complaisant as their Japanese counterparts in participating in the iterative, extensive, lengthy and resource-intensive standard-setting exercises that have been successful in Japan. It needs to be figured out whether alternative designs for the standard-setting phase may be more conducive in a European environment – and, if so, how the incentives that create stakeholder awareness and commitment can still be maintained.

The development in Japan of parallel policies should also be noted. It might be effective in a new environment to launch from the beginning a whole package of

co-ordinated Top Runner instruments. Functional, transparent and multi-goal-adapted evaluative strategies should be a component of such a package.

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