



# Big decisions, big risks. Improving accountability in mega projects

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## Abstract

In terms of risk, many appraisals of very large infrastructure investments assume, or pretend to assume, that infrastructure policies and projects exist in a predictable Newtonian world of cause and effect where things go according to plan. In reality, the world of policy and project preparation and implementation is a highly stochastic one where things happen only with a certain probability and rarely turn out as originally intended. The failure to reflect the probabilistic reality of investment preparation and implementation is a central reason for the poor track record that can be documented for many major projects. The article describes lessons and recommendations on how to improve accountability in decision making on very large infrastructure investments in Denmark and Germany. The conventional approach to infrastructure investments is replaced by an alternative focusing on accountability. Redrawing the borderlines of private and public involvement, four specific measures to increase accountability are suggested and detailed: (1) Transparency, (2) Performance specifications, (3) Explication of regulatory regimes, and (4) Involvement of risk capital. The decision on whether or not to build a multi-billion dollar fixed link across the Baltic Sea connecting Scandinavia and Germany is used as an illustrative case. The cyclical process about the promotion of the German MAGLEV technology gives another good example for identifying basic failures in the political process. Beyond these examples from two countries, the approach developed is likely to be relevant for other major projects in other countries as well. © 2002 Elsevier Science Ltd. All rights reserved.

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## 1. Introduction

We were recently asked by the Danish Transport Council to undertake a review of plans to study the viability of fixed connections across the Baltic Sea at Fehmarn Belt.<sup>1</sup> Fehmarn Belt is the strait between Denmark and Germany located in the Western part of the Baltic Sea between the islands of Lolland and Fehmarn. The shortest distance across the Belt is 18.6 km (approximately 11 miles) between Rødbyhavn in Denmark and Puttgarden in Germany.

Whether or not to build a fixed Baltic Sea link at Fehmarn Belt is a major decision that will require careful deliberation. Firstly, a fixed link will be very costly. Estimates from the EU Commission suggest a cost of dkr 20–35 billion (US\$3.3–5.8 billion) for the coast-to-coast facility, and an additional dkr 15–30 billion (US\$2.5–5 billion) for upgraded access links. Secondly, traffic across Fehmarn

Belt is currently not very large. In the year 1996, passenger traffic was 19,500 passengers per day, which is in rough terms about half the road traffic across the Great Belt in Denmark and two thirds of the road traffic across Øresund between Denmark and Sweden, where a fixed link of comparable costs has been constructed. In addition, there are many alternatives for transport of a substantial part of the traffic across the Baltic. Thirdly, a fixed link may have major impacts on the environment. Of particular concern here is the impact on the marine environment of the Baltic Sea, which during the past decades has been subjected to a number of different interferences, the combined effects of which are currently not clear, and which a fixed Fehmarn link may further contribute to, depending on the design of the link.

The reason for the approach by the Transport Council was the considerable public debate that had emanated not only in Denmark from decisions taken during the past decade to build similar fixed connections across the Great Belt and Øresund, some of the largest infrastructure projects currently being implemented in the world, but also the debate in a number of other countries in connection with

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<sup>1</sup> This is the structure used hitherto for fixed links in Denmark.

the planning and implementation of several other major infrastructure projects, for example the Channel Tunnel between France and the UK. The aim of the Transport Council was to contribute to the development of the methodology for developing and evaluating the proposed project to ensure that the process leading to an eventual decision on the fixed connection would be economically viable and environmentally sound. The lessons and recommendations focused on in our study for the Transport Council are aimed at the Baltic Sea link, but could be of relevance for other major infrastructure investments as well.

It is a basic tenet of our work that good decision making is not only a question of better information and better methods but also of institutional arrangements that promote accountability. At an early stage, therefore, we decided to replace the conventional approach to infrastructure investments by an alternative focusing on accountability. We also held that our analysis and recommendations must be based on actual experience from investments that have already been made and that are comparable in size to a Baltic Sea link. The purpose was to ensure a realistic analysis as well as recommendations that are practically desirable and possible to implement.

This paper contains a summary of the work done with examining the past experience with a large number of infrastructure projects. In Section 2, we first summarise the issues characterising many large infrastructure projects. We then present a brief overview of the normative approach to better decision making through more reliable forecasts and improved cost-benefit and quantitative risk analysis. It is the basic motivation of this paper that better methods are only successful under an appropriate institutional regime. Therefore we will focus the rest of the paper on the institutional part, which starts with a review of the conventional approach as it is usually applied in transport policy making. After having analysed the shortcomings and weaknesses of the conventional approach we develop an alternative approach in the final sections. The proposed approach to appraisal of very large infrastructure investments has been adopted by the Danish Transport Council and the Council has recommended the approach as policy to the Danish Government and Parliament. In addition to the latter positive example for a political learning process will conclude with a negative example on the base of the experiences with German MAGLEV projects.

## 2. Lessons from experience with mega projects: costs, revenues, risks

The type of projects which will be examined in this paper and which we call ‘mega projects’ is characterised as follows:

- High investment expenditures of US\$1 billion and more.
- Long life time of 50 years and more.

- Considerable uncertainty with respect to demand forecasts and cost estimations.
- Club good property (not public in the sense of non-exclusion and free riding, but substantial role of the state).
- Considerable share of indirect benefits which cannot be captured by the operator (benefits not occurring to the users of the project rather than to third parties).

We restrict here to transport projects and transport investment programmes, such as for instance TEN or TINA corridors in Europe.<sup>2</sup>

The main lessons to be learnt from the major projects reviewed by us were:

- (i) Cost overruns of 50–100% in fixed prices are common for major infrastructure projects, and overruns above 100% are not uncommon. The cost overrun for the Channel Tunnel is estimated at more than 100%; for the Great Belt link an overrun of 55% had been incurred three years before the planned completion of the project; for the Øresund link the cost overrun was 10% for the coast-to-coast link even before construction of the link has begun; for the connecting links on the Danish side of Øresund the cost overrun was 38%. For other sectors than the transport sector, the picture is similar<sup>3</sup>.
- (ii) Traffic forecasts that are off by 20–70% compared with actual development are common for major transport infrastructure projects. Forecasts for rail appear to be particularly prone to large overestimates of traffic, often beyond 100% in the cases for which data is available (Flyvbjerg et al., 1995; Pickrell, 1990; Fouracre et al., 1990; Merewitz, 1973; Morris and Hough, 1987; Arditi et al., 1985).
- (iii) Forecasts of project viability for major transport infrastructure projects are often over-optimistic to a degree where such forecasts correspond poorly with actual development (Skamris and Flyvbjerg, 1996; Flyvbjerg et al., 1995; Pickrell, 1990; National Audit Office, 1988).

From the normative point of view the reasons for these

<sup>2</sup> TEN: TransEuropean Networks, TINA: Transport Infrastructure Needs Assessment (CEEC countries).

<sup>3</sup> The Danish Transport Council was set up by the Danish Parliament to improve the basis for Danish transport policy. The Council carries out independent studies of current transport issues and on this basis makes policy recommendations to the Danish Government and Parliament. The Baltic Sea link study was initiated by the Transport Council in 1994. The study team was comprised of the authors of this article assisted by Mette Skamris and Kim Lynge Nielsen; Bent Flyvbjerg headed the team. Full documentation of the study can be found in two reports published by the Danish Transport Council, both in English with extensive Danish, German and English summaries: Facts About Fehmarn Belt: Fact-Finding Study on a Fixed Link Across Fehmarn Belt and Fehmarn Belt: Issues of Accountability: Lessons and Recommendations Regarding Appraisal of a Fixed Link Across Fehmarn Belt (Copenhagen, 1995).

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