



## Major Bridge Projects—A multi-disciplinary approach

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## Summary

Modern bridge building is much more than concrete, steel and money. The overall socioeconomic impact, influence on people migration, traffic, use of primary materials, safety of construction impact on the environment, energy, risk scenarios, health, and most relevant now: climate and CO<sub>2</sub> emissions, are amongst the parameters which enter into the decision process at the overall holistic conceptual level, the more detailed level of selection of bridge sites, and selection of bridge types as well as construction methods and selection of materials and products.

The paper illustrates these dilemmas and illustrates by specific examples how this complicated decision process can be managed and structured in order to arrive at an overall satisfactory solution for design, construction and maintenance throughout the lifetime (life cycle) to these sometimes contradictory parameters and requirements.

**Keywords:** bridges, materials, climate, risk, safety, environment, socioeconomics, traffic, CO<sub>2</sub>, energy, life cycle, society, aesthetics

## 1. Introduction

For the Store Belt East Bridge in Denmark, decided, designed and built 1991 to 1998, the process involved many steps.

The original concept studied through technical investigations and conceptual designs led to a design with several relative short spans in the range of 3 ~ 400 m. Such short spans were believed adequate for the international shipping in the Belt. However the necessary span to ensure satisfactory low risk level after thorough and multiple investigations of navigation safety, risk policy, environmental impact from the construction of water flow blocking piers in the water current etc. proved to be more than 1 500 m. This resulted in a complete different bridge scheme to be selected, and a different optimisation for minimum construction, maintenance and life cycle cost.