Highway Bergen - Haugesund

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Norway

The 5th Concept Symposium on Project Governance

Valuing the Future - Public Investments and Social Return
20. – 21. September 2012

Symposium web-site: http://www.conceptsymposium.no/
Concept Research Programme: http://www.concept.ntnu.no/english/

Highway Haugesund-Bergen

Concept Symposium

21-23. September 2012

Stein R. Berntsen

Dovre Group and TØI

Dovre Group

- Consulting and resourcing for major projects
- Project Management and Procurement
- Established 1984, 420 employees

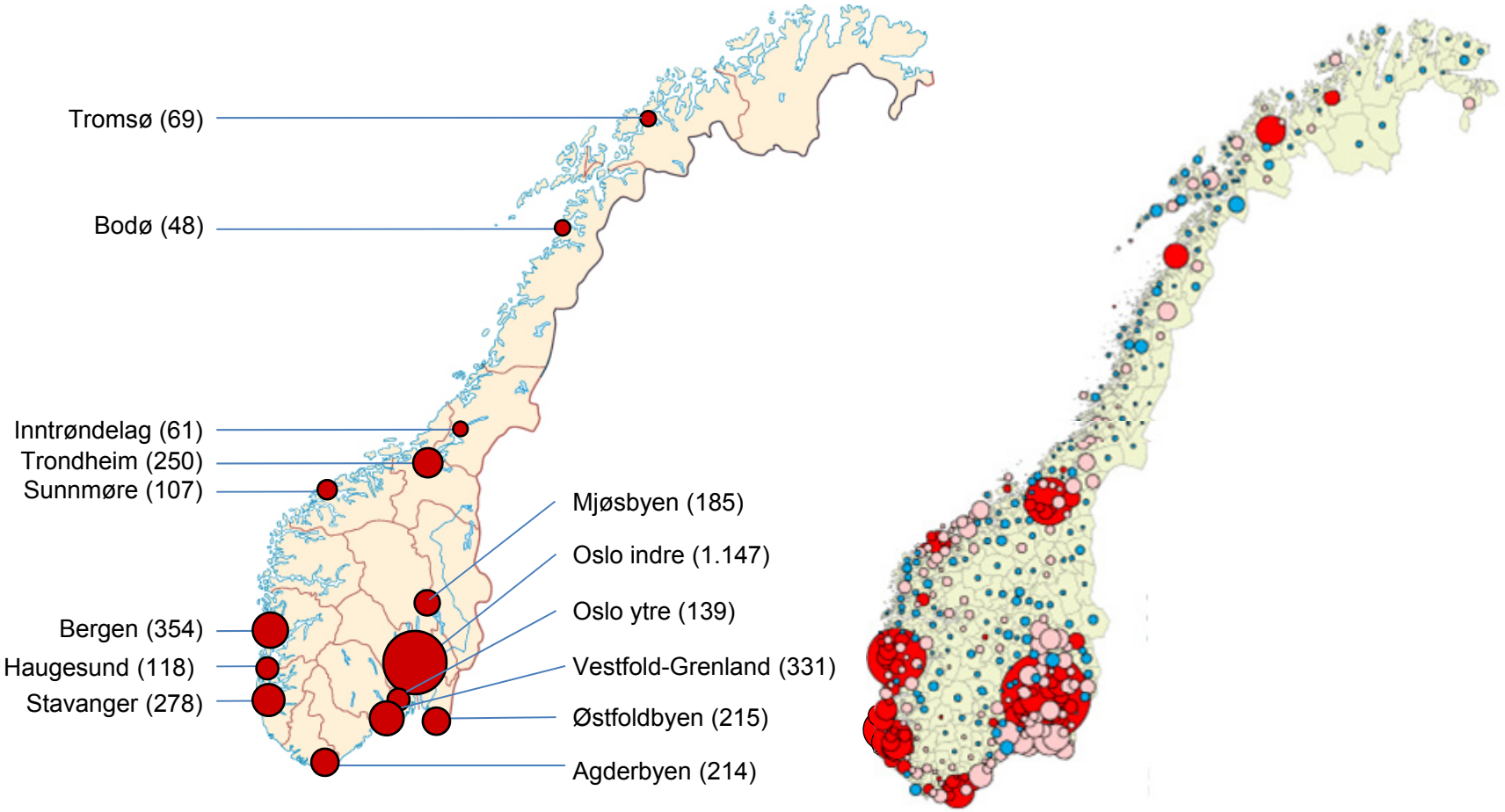
Institute of Transport Economics (TØI)

- Research and consulting in transportation
- Multidisciplinary transport research
- Established 1958, 90 employees

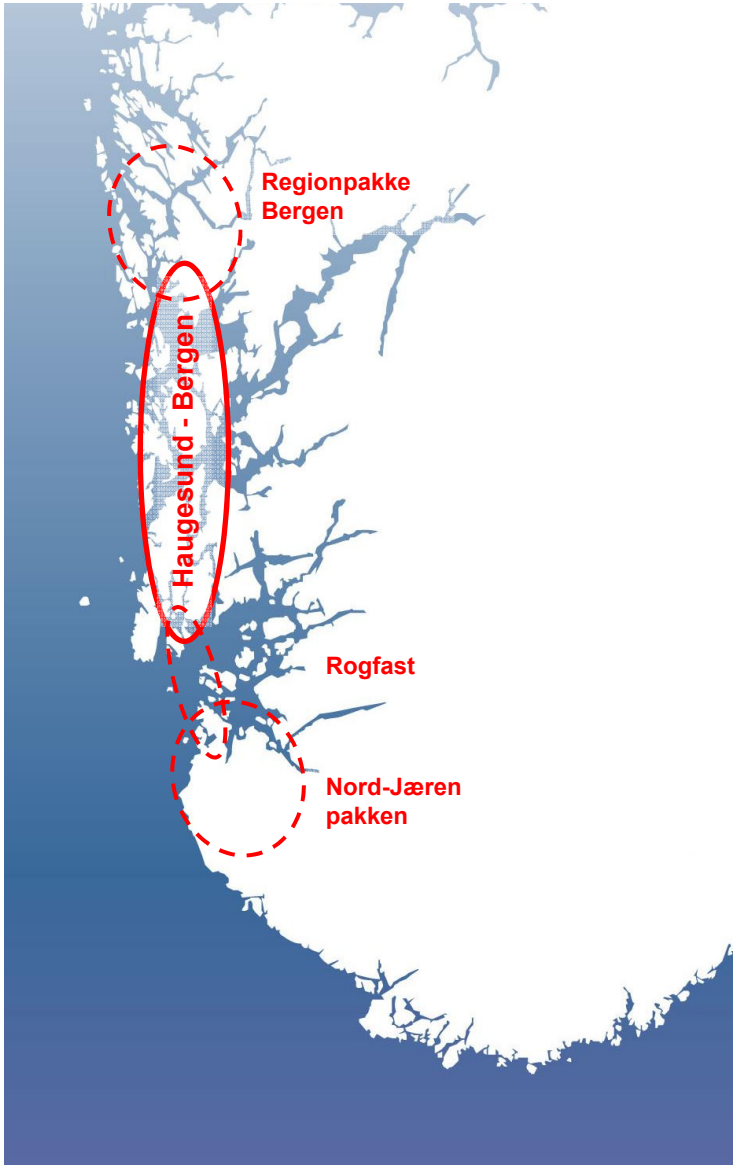
Joint Venture

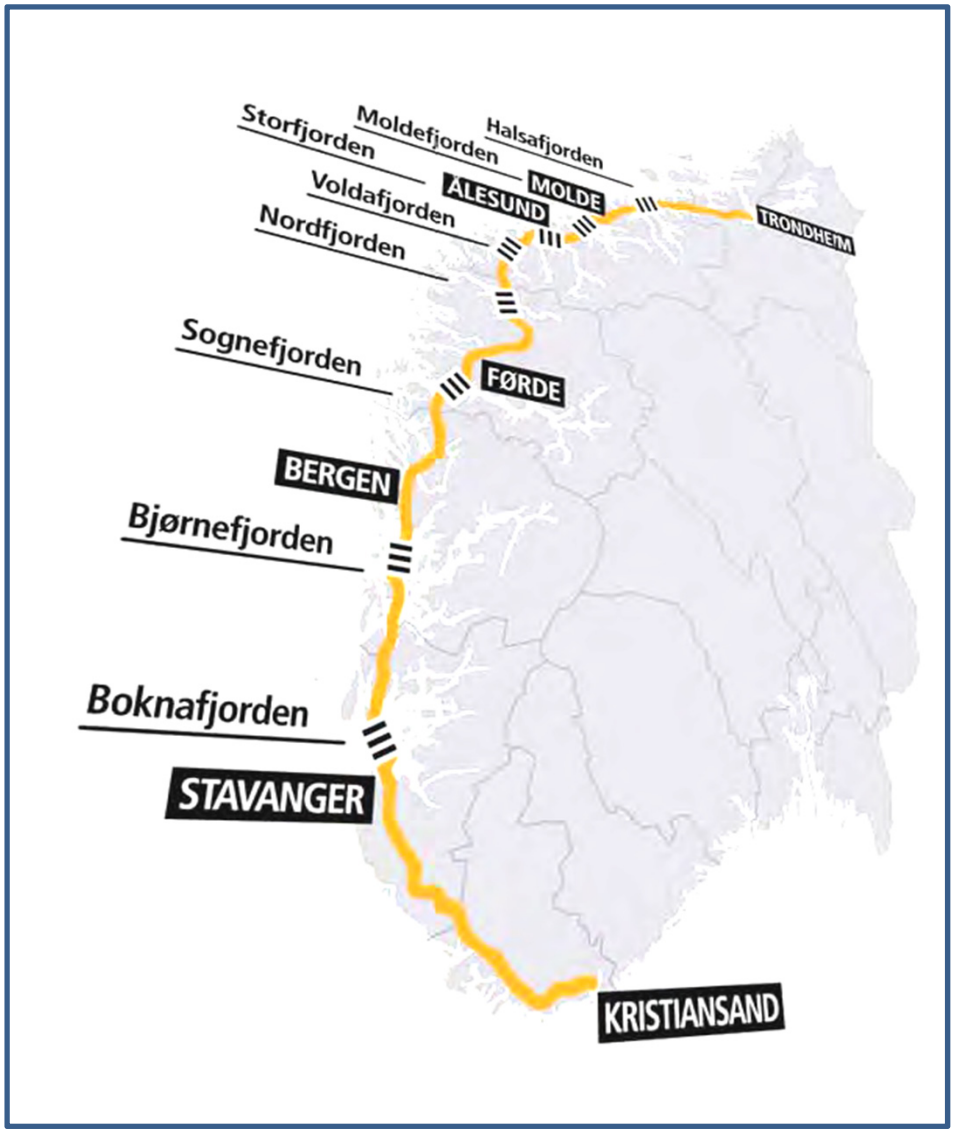
- Partners for QA framework agreement
- Cooperation since 2001

Norway - Population & Growth

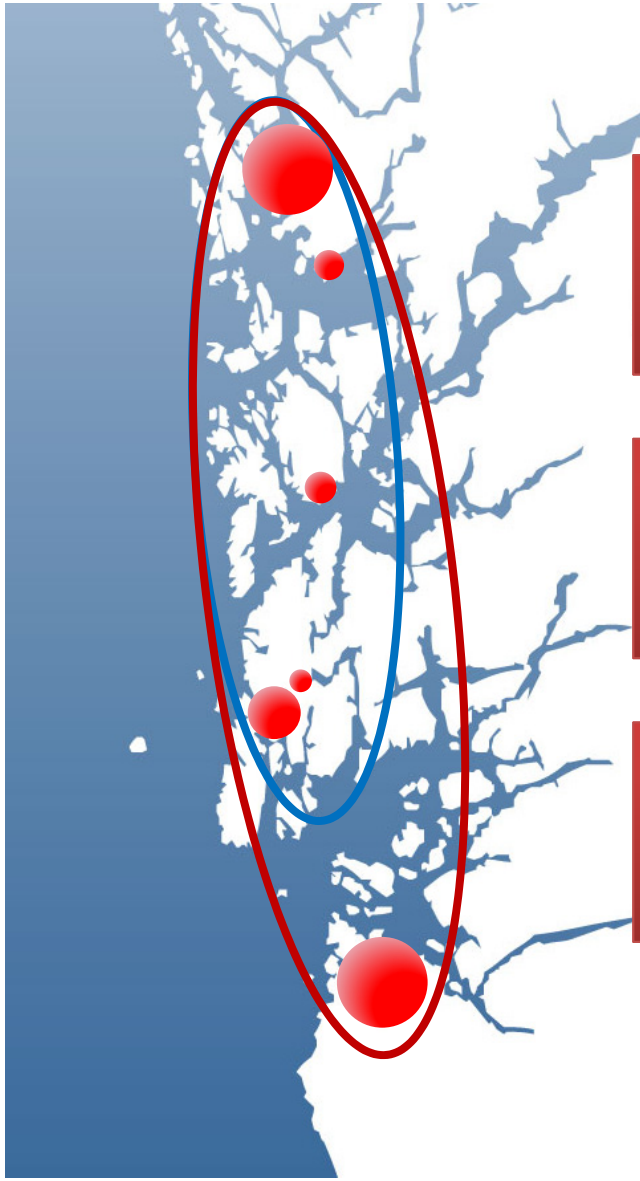


Overall purpose





Project objectives



Minimize travel time Stavanger - Bergen

Travel time Stavanger-Bergen *

Today	4:35 (45 km/h)
Potential	2:20 (90 km/h)

Reduce distance related cost by 40% Haugesund-Bergen

Minimize travel time between regional labour markets

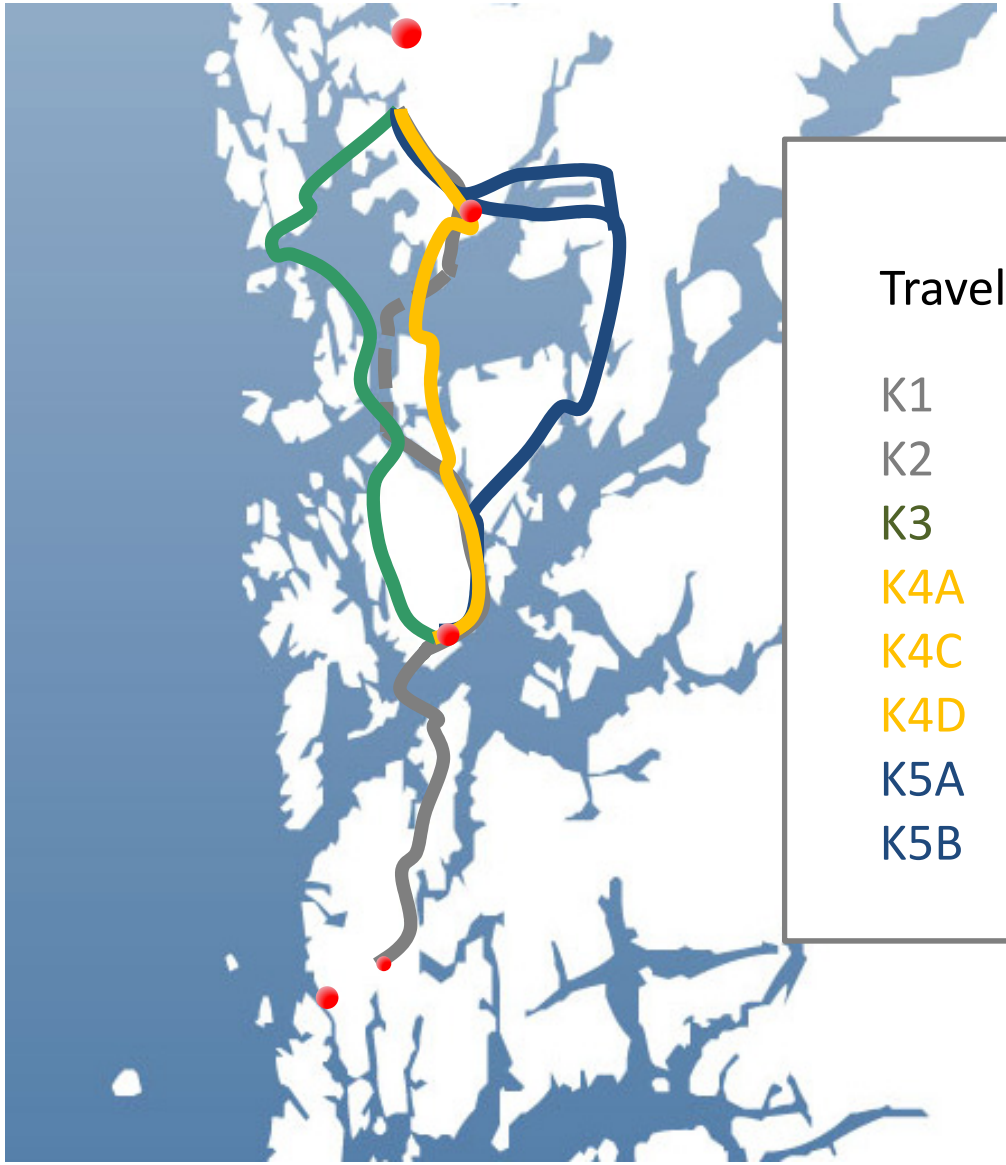
Travel time Stord-Bergen *

Today	1:57 (42 km/h)
Potential	0:55 (90 km/h)

Reduce distance related cost by 40% Stord-Bergen

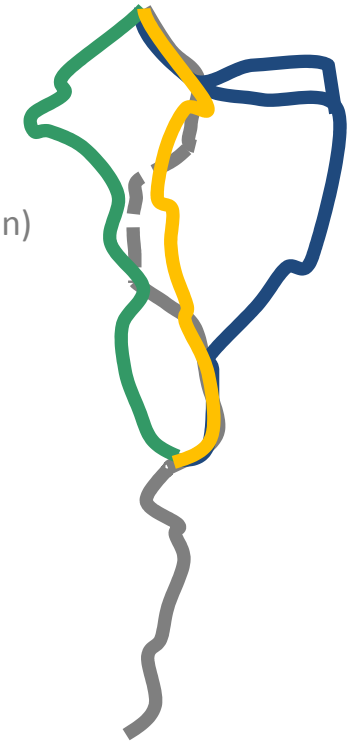
* My own approximations – to illustrate the problem

Alternative concepts

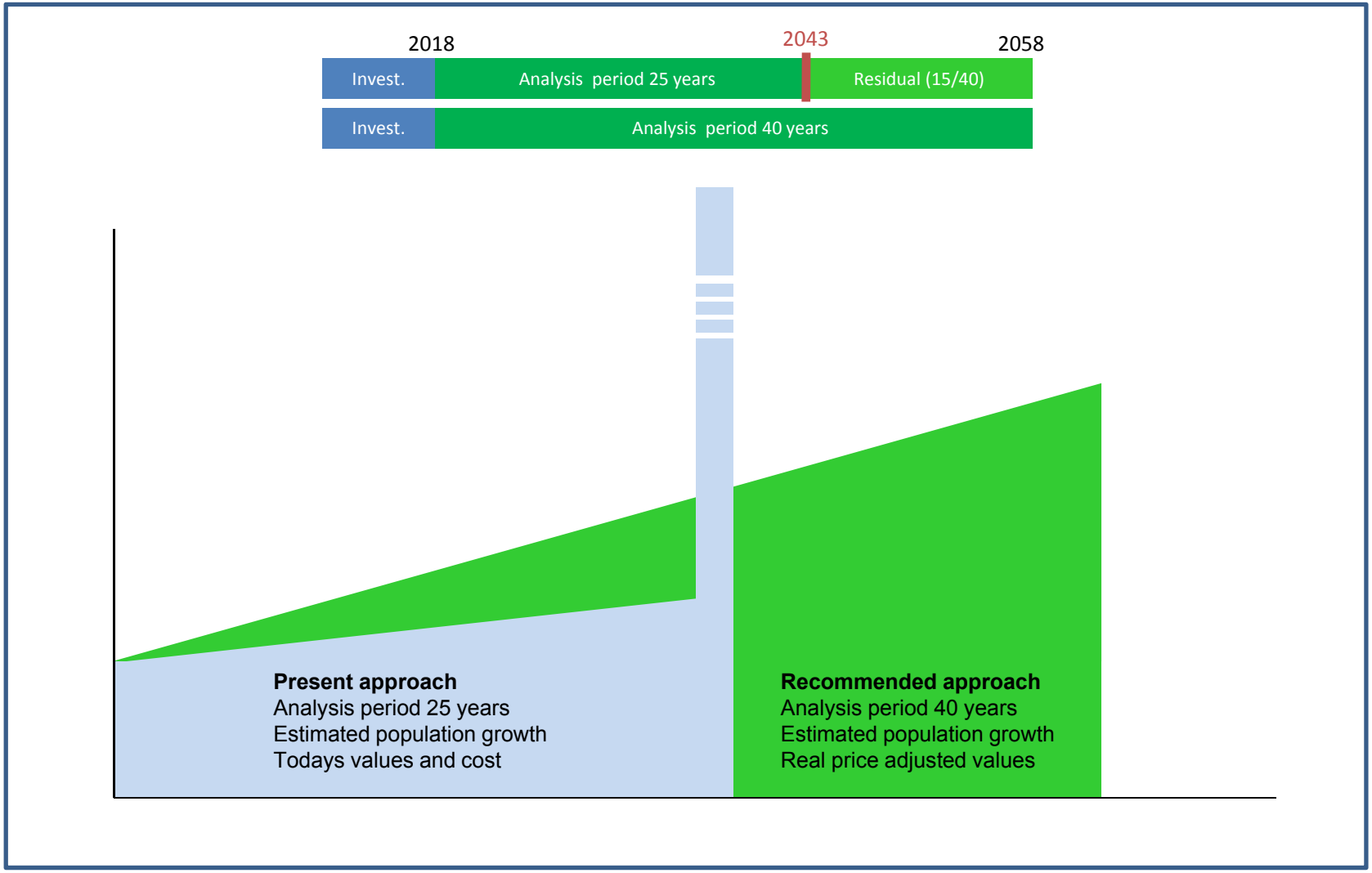


Travel time reduction

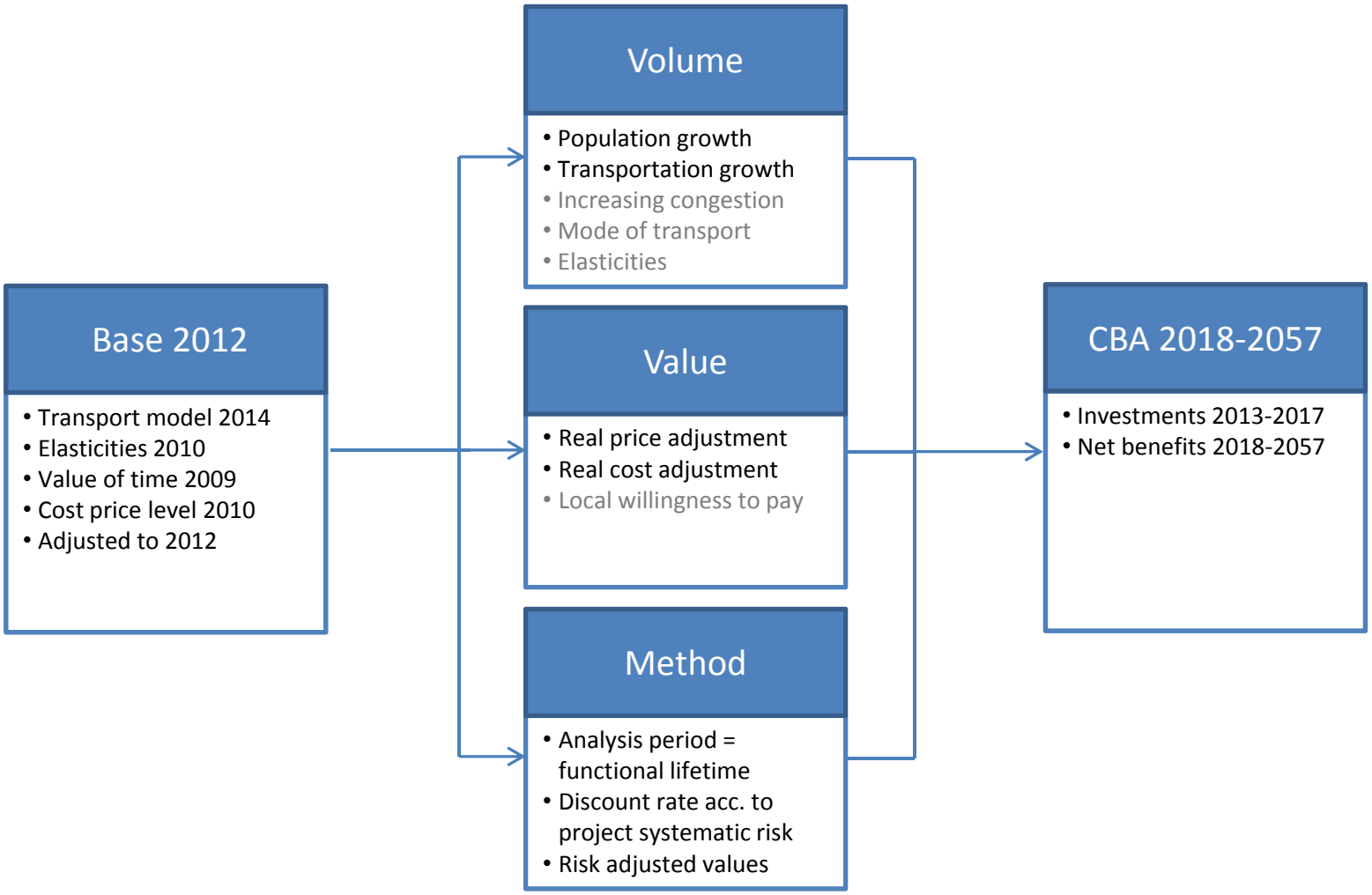
K1	0 min (149 min)
K2	9 min
K3	64 min
K4A	38 min
K4C	68 min
K4D	43 min
K5A	58 min
K5B	53 min



Method for independent CBA



Method for independent CBA



Results

Project objectives					
Overall objectives	K3	K4C	K4C with road tax	K4D (with ferry)	K5B
Minimize travel time Stavanger - Bergen	🟢	🟢	🟢	🟡	🟡
Minimize travel time between regional labour markets	🟢	🟢	🟢	🟡	🟡
Specific objectives					
Distance cost Aksdal - Bergen	🟢	🟢	🟡	🟡	🟡
Distance cost Stord - Bergen	🟢	🟢	🟡	🟡	🟡
Labour market effects	🟢	🟢	🟡	🟡	🟡
Travel time and environment					
Reduces travel time (min)	**64**	**68**	**68**	**44**	**52**
Environmental issues	🔴	🟡	🟡	🟡	🟡

Risk adjusted costs and benefits					
	K3	K4C	K4C with road tax	K4D (with ferry)	K5B
CAPEX	-28.9	-27.1	-27.1	-12.2	-21.2
OPEX	-3.6	-2.0	-1.9	-1.4	-2.2
Benefits	62.9	56.5	45.8	34.8	52.3
Net benefits	**30.3**	**27.5**	**16.8**	**21.2**	**29.0**
Net benefits/CAPEX	1.0	1.0	0.6	1.7	1.4

billion 2012 NOKs

Sensitivities

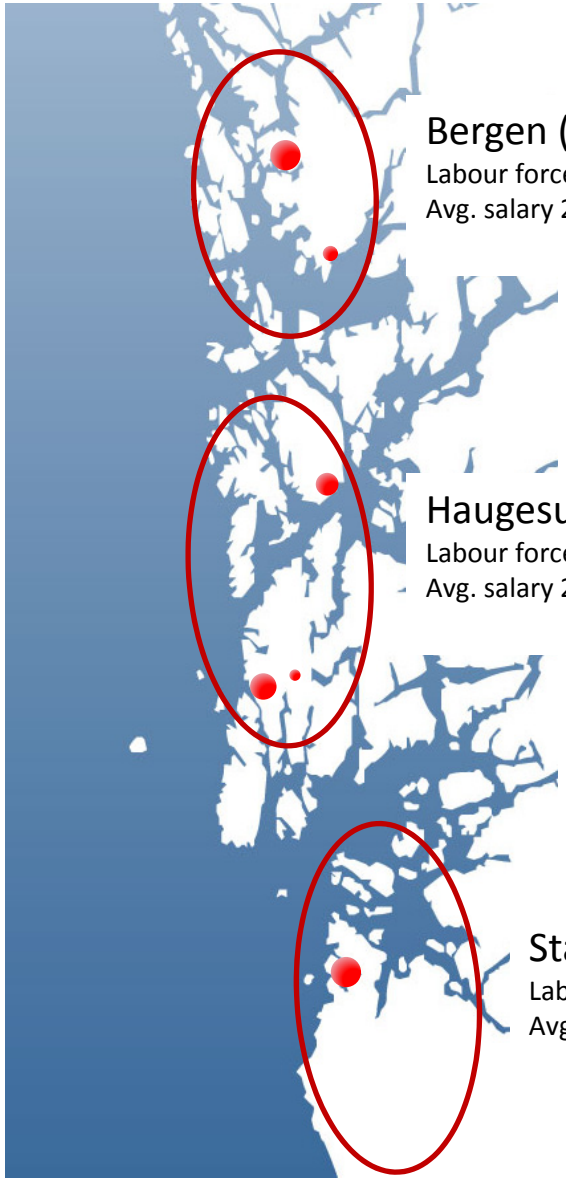
High growth - Risk adjusted costs and benefits					
	K3	K4C	K4C with road tax	K4D (with ferry)	K5B
CAPEX	-29.3	-27.4	-27.4	-12.4	-21.4
OPEX	-3.9	-2.2	-2.1	-1.5	-2.3
Benefits	83.4	74.7	61.8	45.4	69.6
Net benefits	**50.3**	**45.1**	**32.4**	**31.5**	**45.9**
Net benefits/CAPEX	1.7	1.6	1.2	2.6	2.1

Differentiated growth - Risk adjusted costs and benefits					
	K3	K4C	K4C with road tax	K4D (with ferry)	K5B
CAPEX	-28.9	-27.1	-27.1	-12.2	-21.2
OPEX	-3.6	-2.0	-1.9	-1.4	-2.2
Benefits	73.7	66.2	45.8	34.8	52.3
Net benefits	**41.1**	**37.1**	**16.8**	**21.2**	**29.0**
Net benefits/CAPEX	1.4	1.4	0.6	1.7	1.4
Growth	🟢	🟢	🟡	🟡	🟡

0.1% difference in growth is enough

One per mille higher annual growth in transportation gives, due to shorter travel time, K4C the same net benefits as K5B

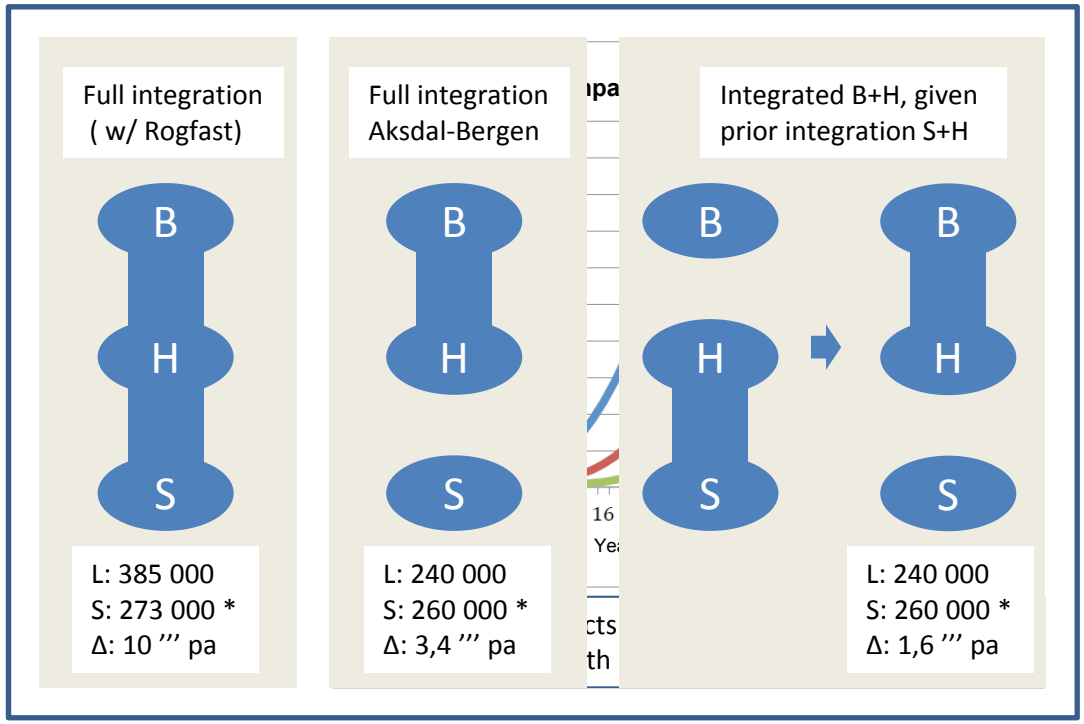
Wider impacts



Bergen (B)
Labour force 181 000
Avg. salary 253 000 *

Haugesund (H)
Labour force 59 000
Avg. salary 225 000 *

Stavanger (S)
Labour force 145 000
Avg. salary 247 000 *



Expected population growth is not included in the calculations

- Reasonable to assume wider impacts
- Size of effect very uncertain
- Largest effect for the Middle alternative

Integrated Bergen+Fusa
Δ: 0,4 ’’’ pa

Δ Middle/Inner: 1,2 ’’’ pa
NPV ≈ 10 ’’’

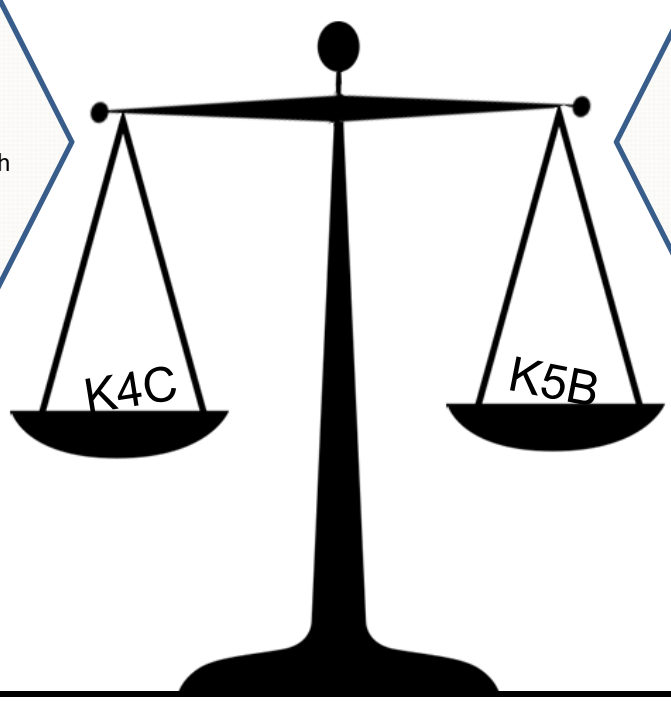
* Calculated from regression model that estimates salary based on labour market size (*Tørrskodd på jobb*)

Concept selection K4C v K5B

- Minimizing travel time on E39 the main purpose and objective
- Not significantly different level of complexity
- Not significantly different project execution time

Pros K4C

- Best achieval of objectives
- Best value of benefits
- 15 minutes shorter travelling time
- Wider impacts
- Best net benefits with 0.1% higher growth
- Option: Successive development (K4D)
- Option: Bridge to Austevoll
- Sustainability: Straight line between two of the largest city areas in Norway



Pros K5B

- Best net benefits with equal growth assumptions
- Lower investment cost
- Option: Connection to E134

Decision strategy

Recommendations

- **Concept 4C (Straight line alternative)**
- Direct funding – no road tax
- Preparations for later widening of the road

- Final decision after confirmation of feasibility and cost in the upcoming fjord crossing report

General conclusions

- The QA system improves the CBA methodology: analysis period, social discount rate, real price adjustment
- CBA is a very good tool for decision making
- Standard CBA assumptions does not answer important questions related to:
  - Purpose and objectives
  - Impact on growth and value assumptions
  - Wider impacts
  - Sustainability
- Reasonably robust conclusions may be taken on conceptual level, even under great uncertainty