



## **Transformative Infrastructure – Innovation for Zero Emissions**

This memo briefly describes the initiative Transformative Infrastructure – Innovation for Zero Emissions, which the Swedish Environmental Protection Agency (The Swedish EPA) has launched. The initiative represents a new format for collaboration in a new type of innovation competition for developing innovative concepts for zero emissions of greenhouse gases by the year 2045. These concepts are supplemented with proposed policy innovations and suggestions on how to realise the innovations. The first sector to compete in our innovation competition is the infrastructure sector.

### ***Summary***

The Swedish EPA is collaborating in a co-creative process with the Swedish Transport Administration, the Swedish Energy Agency, Formas (The Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning), the Swedish National Board of Housing, Building and Planning, Vinnova (The Swedish Innovation Agency) and the Swedish Agency for Growth Policy Analysis, as well as industry, research institutes and academia in this competition within the infrastructure sector. The competition runs from autumn 2017 through spring 2018. Two competing teams within infrastructure have been created by the Strategic Innovation Programme InfraSweden 2030. The teams are represented by the cement industry, steel industry, construction industry, consultants, research institutes and academia. The teams will work on a bridge construction as an illustrative case. In total, the competition includes five two-day live-in seminars in different parts of Sweden. The first day is a conference with inspiring lectures from other sciences and sectors, that provides input to the work of the teams for day two during the ideation phase of the seminars. CEOs and DGs from the competition's participating organisations alternate hosting and kicking off the seminars.

Many innovative concepts are expected to emerge from the competition for achieving zero emissions of greenhouse gases for the construction of a bridge, with accompanying policy innovations and proposals for implementing the innovations. Yet another outcome of the competition is the new collaborative format and the application of this new type of innovation competition. These outcomes will be

evaluated by the Agency for Growth Policy Analysis to improve future competitions.

Transformative infrastructure involves an innovative format for collaboration among the triple helix of government, industry and academia. For the chosen industry sector – infrastructure – the entire value chain is engaged, where innovative concepts and solutions are expected to emerge along different points of the innovation chain. The infrastructure sector promises to be especially interesting, since the competition addresses both sustainable industrial development and sustainable urban development.

The starting point for the competition is a model used by the EU pulp and paper industry association CEPI. Read more about the competition in the appendices, and at [www.naturvardsverket.se/innovationstavling](http://www.naturvardsverket.se/innovationstavling).

### *Activities*

The competition is comprised of the following competition seminars:

- 10-11 October 2017, in Malmö, with the theme “The challenge and the paradigm shift” addressing the challenge that lies ahead and shift needed to reach zero emissions. Study visits took place at the Öresund Bridge and Sweden’s first composite bridge. The first idea-generation session resulted in close to 100 ideas for innovation from each of the teams.
- 7-8 December, in Gothenburg, with the theme “Climate-neutral materials and design.” This session was held at Chalmers University of Technology, with inspiration from areas like biomimicry – imitating nature to produce slimmer designs and new materials for infrastructure. The teams’ innovation ideas were completed, clustered and categorised based on their possible transformative effects.
- 30-31 January 2018, in Kiruna, with the theme “Leading-edge technologies and societal transformation.” Inspiration will be drawn from space technology, digitisation, artificial intelligence and Kiruna’s relocation, with study visits to LKAB’s mine.
- 19-20 March 2018, on Gotland, with the theme “Beyond zero emissions – new opportunities for mankind and nature” with study visit to CEMENTA and inspiration sessions about eco system services, bio-CCS and behaviourism.
- 18-19 April 2018, in Stockholm, with the theme “Environmental challenges bringing new business models”.

The competition submissions will be judged in June by a pre-jury of experts and a final jury with CEOs and DGs and an NGO. The awards ceremony will take place during Almedalen in July, with the Swedish Minister for the Environment and the Swedish Minister for Enterprise and Innovation.

Additionally, we are planning to take Transformative Infrastructure – Innovation for Zero Emissions to a side event at UNFCCC COP24 in Poland in the autumn of 2018.

## *Appendix 1*

### *About the infrastructure industry's participation in the competition*

As part of the Swedish EPA's work with Sweden's new climate policy framework, the Swedish EPA wishes to work more proactively on emission reductions. According to the goals set by Sweden's climate act, Sweden is to achieve zero emissions for the basic materials industry by 2045. Sweden has also declared itself to be a model country for zero emissions and a fossil-free country.<sup>1</sup> To reach the goals, the Swedish Transport Administration have set a target to reduce the climate impact from construction, operation and maintenance for all infrastructure by 15 % until 2020 and by 30 % until 2025 compared to 2015.

The emissions originating from construction and maintenance of infrastructure by the Swedish Transport Administrations have a magnitude of about 1 million metric tons of carbon dioxide equivalents annually. Tunnels and bridges have significantly more climate impact per metre than roads on level ground. When building roads and railways, the raw material input of steel, cement and asphalt, as well as management of excavated soils and rock, are the largest contributors to material-related greenhouse gas emissions<sup>2</sup>.

The Øresund Bridge has been chosen as a reference object for the competition. It was assessed to be a showcase both at home and abroad, and with good data availability for calculations of potential greenhouse gas emission reductions if different innovations would be realised.

The construction industry with partners has taken on the challenge. With the help of the strategic innovation programme InfraSweden2030 two competing teams have been created with representatives from the cement and steel industry, the construction industry, universities and research institutes. The two teams will aim to discover methods and technical solutions that drastically reduce greenhouse gas emissions within the infrastructure sector.

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[http://www.regeringen.se/4add1a/contentassets/790b8b0d7c164279a39c9718ae54c025/faktablad\\_fossilfritt\\_sverige\\_webb.pdf](http://www.regeringen.se/4add1a/contentassets/790b8b0d7c164279a39c9718ae54c025/faktablad_fossilfritt_sverige_webb.pdf)

<sup>2</sup> The Swedish Transport Administration performs climate calculations separate from its economic calculations since 2015. In 2016 the Swedish Transport Administration implemented environmental performance as a requirement in its procurement process.

## Appendix 2: Participants in the competition

The competition includes a competition secretariat, a government agency group and a communications group.

The Swedish EPA	InfraSweden2030	NCC
The Swedish Transport Administration	The Swedish Construction Federation	KTH
The Swedish Energy Agency	Chalmers University of Technology	Peab Asfalt
Formas	CBI Cement and Concrete Research Institute	RISE, Research Institutes of Sweden
The National Board of Housing, Building and Planning	Cementa	Sandvik Materials Technology
Vinnova	ELU Konsult AB	SBI Swedish Institute of Steel Construction
The Agency for Growth Policy Analysis	EPFL	Skanska
	Gabriell Development	Sweco
	IVL Swedish Environmental Research Institute	Swerea MEFOS
	Luleå University of Technology	Swerock
		Tyréns
		WSP
		VTI Swedish National Road and Transport Research Institute

