Roadmap for the decarbonisation of the cement industry

Overall Roadmap

Vision 2050

• Significant reduction in fossil CO₂ quantities from the provision of process heat

- Minimising the generation of process-related \mbox{CO}_2 through clinker efficiency
- CCUS (only) for $\rm CO_2$ quantities that cannot be avoided in any other way
- Permanent binding / storage of captured CO₂ as far as possible
- Utilising CO₂ as a carbon source where appropriate
- Climate-positive contributions from biogenic fuels in combination with CCUS
- Contributing to a circular economy as far as possible

	short-term 2030 medium-term 2040 long-term 201	50
Transformation pathway	Fossil fuels (Phase-out) Fossil fuels only if absolutely necessary	SS
	Increase share of waste-based fuels (only processed, non-recyclable waste)	ener, Iv
	Direct use of renewable electricity for process heat (bivalent)	mal e
	Green hydrogen	Ther
	Sustainable biomass (from energy crop cultivation)	-
	New cements / binders	ents retes
	New concretes	cem
	Differentiated CO ₂ - and resource-ontimised use of cement/concrete according to application requirements	New and c
	Dilot (demonstration plantsConversion (construction of carbon conture (full coale) at compart plants	<i>⊷</i> .0
	COnversion / construction of carbon carbon carbon carbon carbon carbon scale) at centent plants	
	Pilot-/demonstration plants	SUC
	Demo CCS chain up to storage CO ₂ storage in offshore storage sites (Norway, Netherlands, possibly UK)	Ŭ
	Development of supraregional CO ₂ infrastructure (connecting cement plants with users and seaports)	
Drivers	Increasing CO ₂ price	
	Digitisation	
	Developments towards a circular economy - including recycling of demolished concrete and concrete components	
	Development of CO ₂ storage sites and construction of CO ₂ transport infrastructures in other European countries	
	(Possible) future carbon demand of the chemical/fuel industry	
Barriers	Lack of economic viability compared to conventional construction / production and imports	
	Limited availability and high costs of renewable energy carriers	
	Limited availability of suitable input materials	
	Challenges of integrating NCC into construction practice	
	Today's legal framework	
	Lack of CO ₂ infrastructure	
	Low social acceptance (especially locally) for pipeline infrastructures	
Fields of Action	Legal framework continuous further development mail 🙉 🛱 🖗	Å
	Creation of level-playing field preservation of level-playing field m R	3
	Integrated, cross-sectoral energy strategy	- -
	Niches for / promotion of CO ₂ -efficient construction methods	5
	Integration of new cements / binders / concretes / construction technologies in building practice 🚑 🖄 🕸 🌆 🎬 🛱	B J
	Development of a comprehensive circular economy in the construction industry 🗛 🍪 🖄 👘 🏛	Ì
	Planning of CO ₂ Construction and ongoing planning of the	•
	Infrastructure CO ₂ transport infrastructure III III III III III III III IIII III	2
	Social dialogue on CO ₂ infrastructure and local participation processes	2
	R&D (direct electrification, use of H ₂ , new cements and concretes,	R
		5





Umwelt 🌍 Bundesamt