

› TNO & MMIP'S 6, 7 EN 8

APRIL 9, 2019

ANTON WEMMERS

DEZE PRESENTATIE

- › Welke onderwerpen in MMIP 6
- › Circulaire plastics, TNO Circulaire Economie & Milieu

- › Welke onderwerpen in MMIP 7
- › CO2 neutrale industrie, ECN part of TNO

- › Welke onderwerpen in MMIP 8
- › Voltachem, TNO Industrie

- › Onderzoeksinfrastructuur



MMIP 6 HET SLUITEN VAN INDUSTRIËLE KRINGLOPEN

6.1: Circulaire grondstoffen en producten

6.2: Biobased grondstoffen en producten

6.3: Ontwerp en inbedding van nieuwe circulaire ketens

6.4: Toepassen CCS en maatschappelijke acceptatie



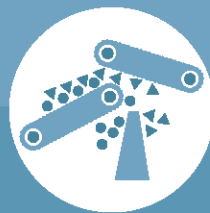
CIRCULAIRE PLASTICS



1
KETENONTWERP
EN LIFE CYCLE
ASSESSMENT



2
DESIGN
FOR
RECYCLING



3
SORTEREN EN
MECHANISCHE
RECYCLING



4
CHEMISCHE
RECYCLING



5
THERMISCHE
RECYCLING

MMIP 7 CO₂ VRIJ INDUSTRIEEL WARMTESYSTEEM

- 7.1: Warmte hergebruik, -opwaardering en -opslag
- 7.2: Diepe- en ultradiepe geothermie voor industrie
- 7.3: Toepassing klimaatneutrale brandstoffen
- 7.4: Systemconcepten voor warmte en koude
- 7.5: Maximalisering van proces-efficiency



Towards a CO₂-neutral INDUSTRY

GOALS 2050

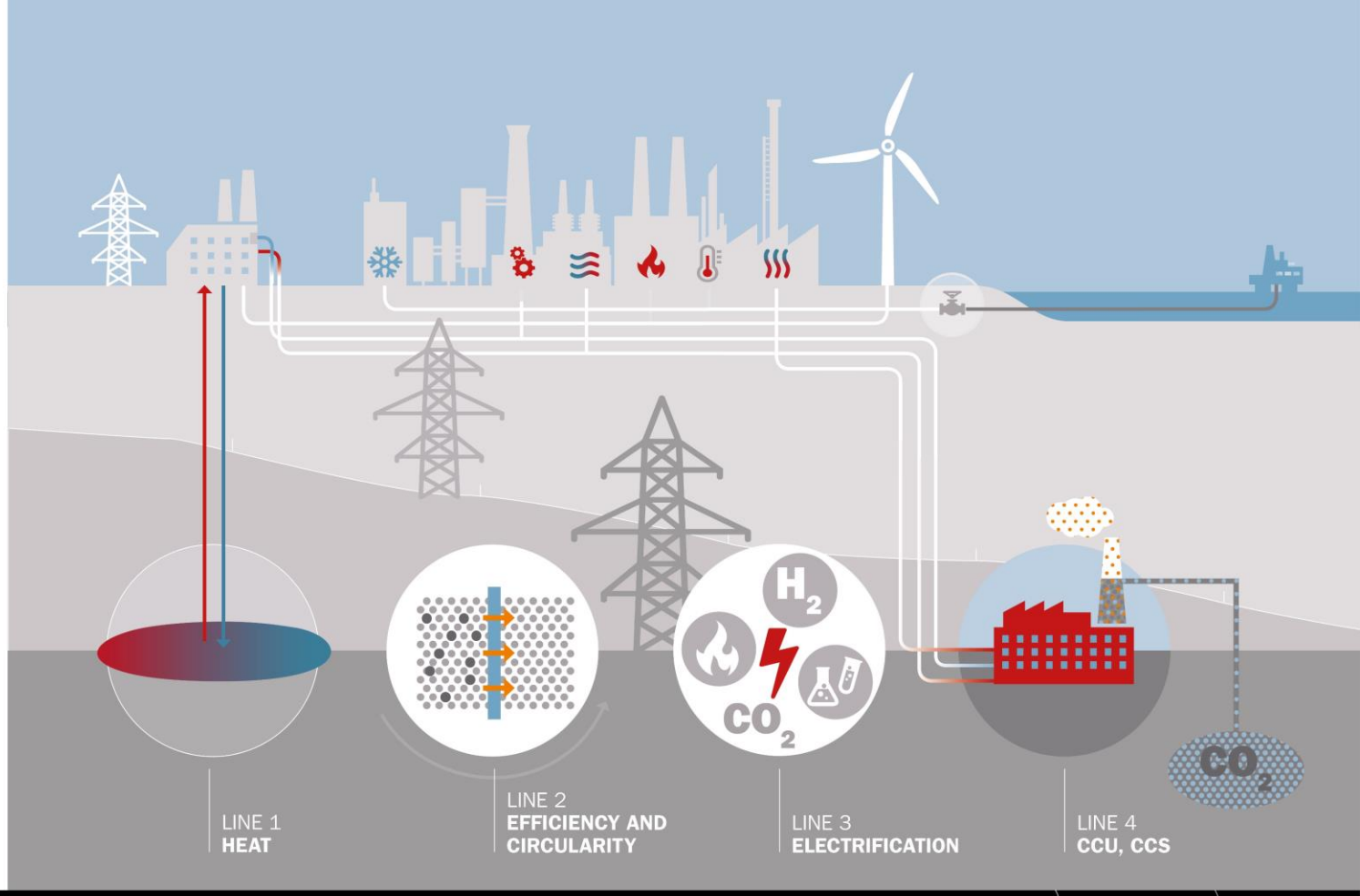
ALL INDUSTRY HAS A
**ZERO NET
CO₂ EMISSION**

SUSTAINABLE SUPPLY AND
(RE-)USE OF INDUSTRIAL
HEAT

> 40%
PROCESS EFFICIENCY
IMPROVEMENT

COMPLETE ELECTRIFICATION

CO₂ CAPTURE
CONVERSION
AND STORAGE



LINE 1
HEAT

LINE 2
EFFICIENCY AND
CIRCULARITY

LINE 3
ELECTRIFICATION

LINE 4
CCU, CCS

MMIP 8 ELKRIFICATIE & NIEUWE PROCESSEN

8.1: Waterstof en power-to-molecules

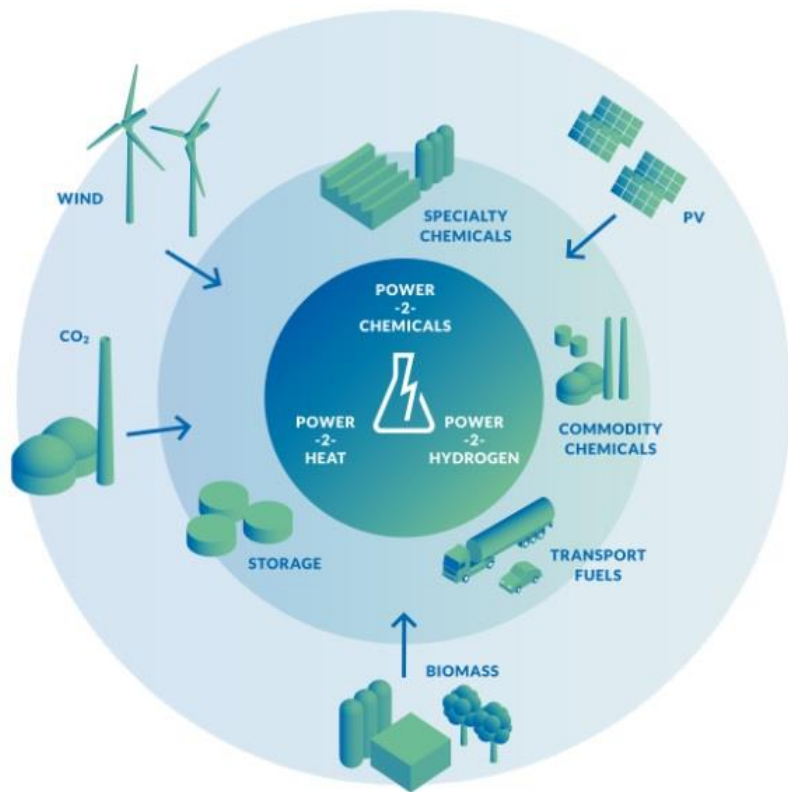
8.2: Elektrische aandrijving en apparaten

8.3: Flexibilisering en digitalisering

8.4: Radicaal vernieuwde processen





8.5: Maatschappelijke implicaties van industriële elektrificatie

VOLTACHEM IN 1 SLIDE



- › Public-Private **Shared Innovation Program** of 6M/year initiated in 2015 by TNO, ECN and Topsector Chemistry.
- › Accelerate innovation and implementation of **electrification for achieving decarbonization** in chemicals.
- › Initiate and facilitate **collaborative development** of technology and associated business models.
- › Addresses both the *indirect and direct use of electricity* within the chemical industry, involving stakeholders from **chemicals, energy & equipment supply**.

M€ 26 INVESTMENTS IN INFRA STRUCTURE

-  Carnot Lab
-  Faraday Lab
-  Solar Lab
-  SBT Lab

-  Else (*BEE*, *EMSA*, *WIND*)
-  Shared expedition

