



KALUNDBORG SYMBIOSIS

VERDENS FØRENDE INDUSTRIELLE SYMBIOSE
- ET UNIKT OFFENTLIGT-PRIVAT PARTNERSKAB

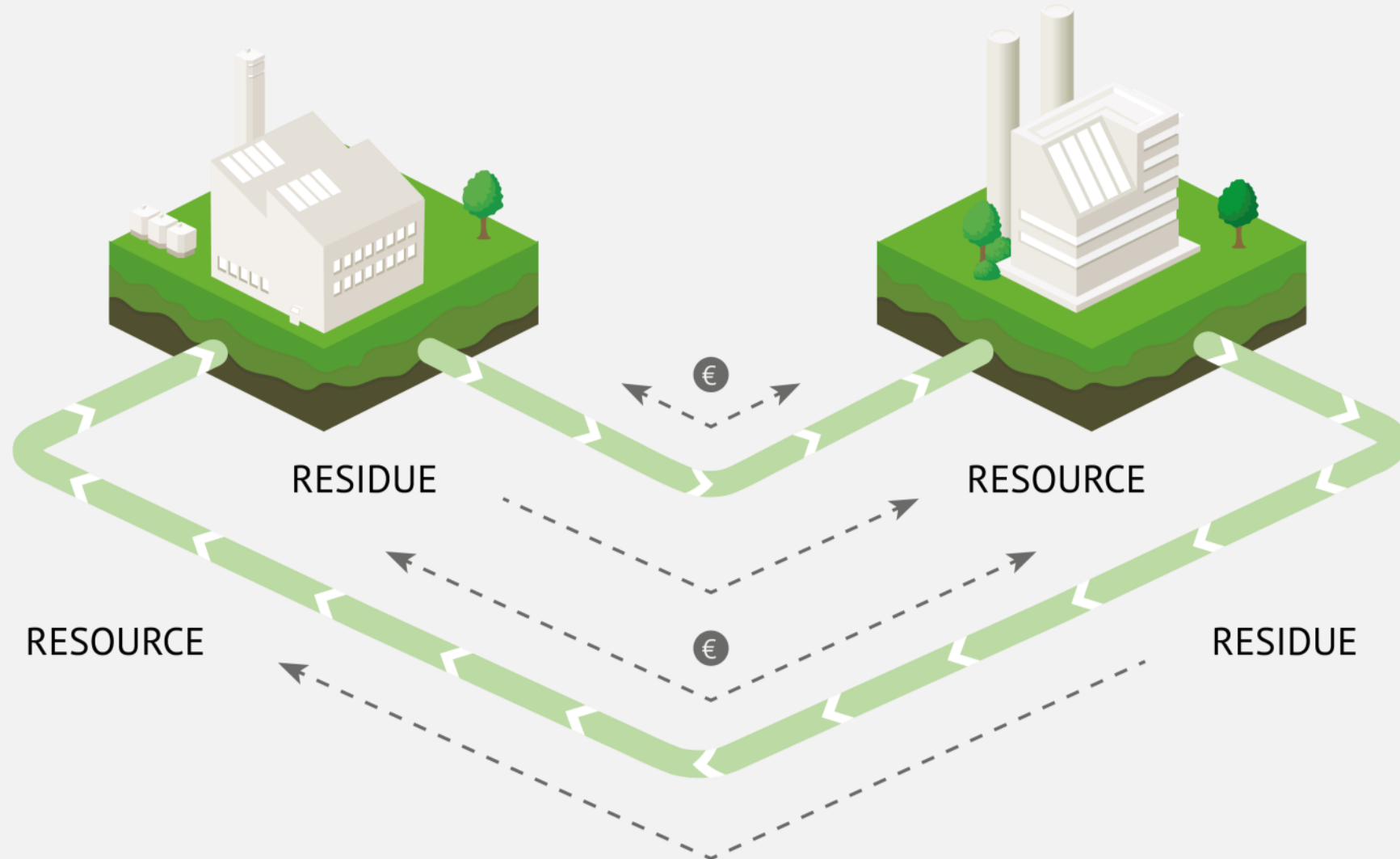
Per Møller
Centerleder
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ATV's Teknologiske Topmøde 2019: Verdensmål i et techperspektiv

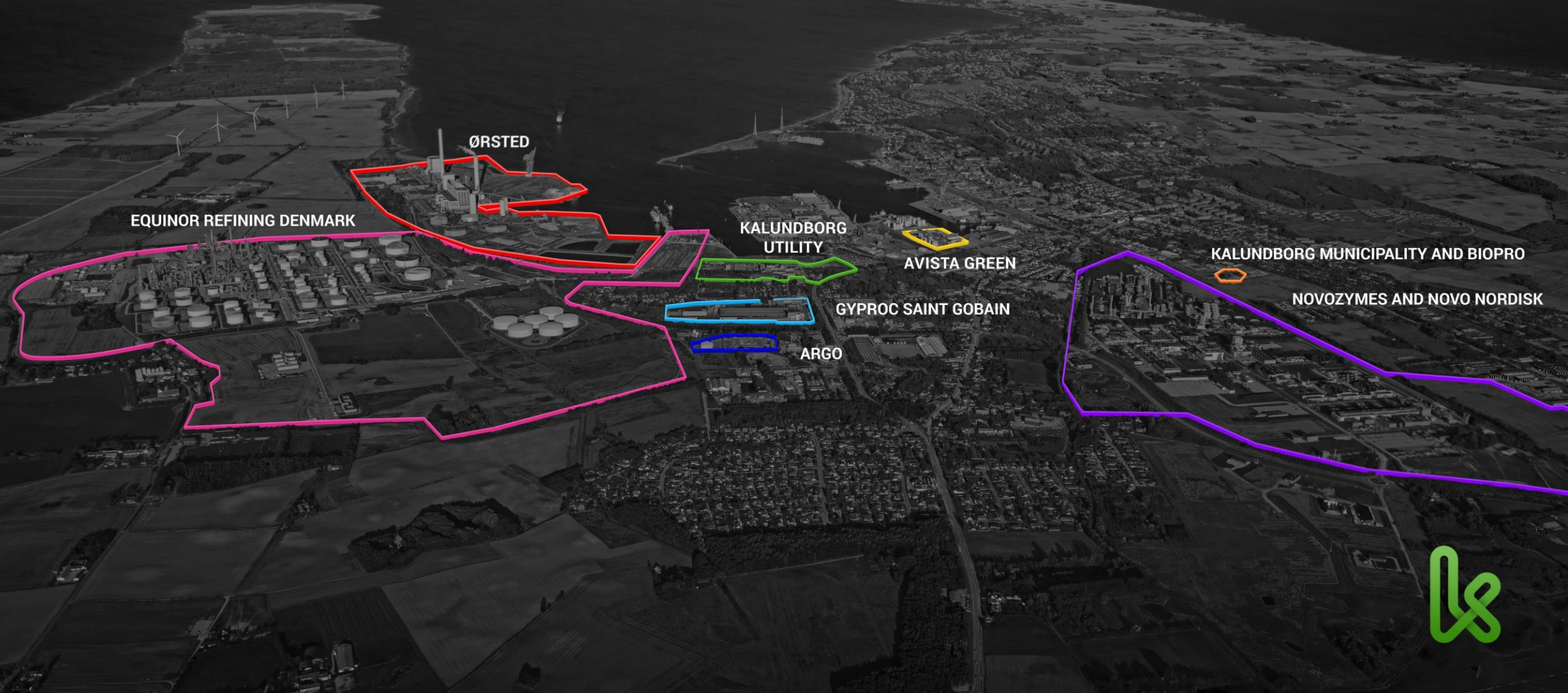
12. November 2019, København



INDUSTRIEL SYMBIOSIS



KALUNDBORG SYMBIOSIS



ØRSTED

EQUINOR REFINING DENMARK

KALUNDBORG
UTILITY

AVISTA GREEN

KALUNDBORG MUNICIPALITY AND BIOPRO

NOVOZYMES AND NOVO NORDISK

GYPROC SAINT GOBAIN

ARGO



MERE END 45 ÅRS SAMARBEJDE

PROJECTS

Surface water
1961

Surplus gas
(First symbiosis project)
1972

Steam supply
1982

Using residual stream
1993

Algae plant
2012

Green Energy
2017

ORGANIZATION

1989
Naming the system:
Industrial Symbiosis

1996
Partners forming the
Symbiosis Center

2011
Kalundborg Symbiosis
formed as an association

2015
Symbiosis Center
Denmark



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SYMBIOSIS

GRØN ENERGI OMSTILLING 2017

Biogas from wastewater

Steam from biomass

Biomass converted into
biogas and fertilizer

Wastewater turned into
district heating

1961

1972

1982

1993

2012

2017

Green Energy



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SYMBIOSIS

ÅRLIGE BESPARELSER

BASERET PÅ LIFE CYCLE ASSESSMENT (LCA)

635.000 ton

CO₂ (miljø)



The same amount of CO₂ discharged on average over a year by **37.352 Danes**.

16,5 mill.

USD (socioøkonomisk)



Enough to buy **354 brand new** electric powered cars

28 mill.

USD (virksomheder)



Equivalent to having **252 academics** employed for a year



KALUNDBORG
SYMBIOSIS

THE WORLD'S LEADING INDUSTRIAL SYMBIOSIS WITH A CIRCULAR APPROACH TO PRODUCTION.

Renew - Strengthening of the partnership

Connect - Full resource utilization

Promote - Sharing of the symbiotic mindset



NEXT STEP

1. Facilitere udvikling af symbiose samarbejde ind i den cirkulære dagsorden
2. Kortlægge og matche gennem ressource screeninger
3. Realisere nye grønne forretningsmodeller
4. “Value proposition” – investeringer, job, uddannelse og eksport



A black and white photograph of a worker in a trench. The worker is wearing a hard hat and work clothes, and is using a pipe cutter to cut a large pipe. The trench is lined with corrugated metal. There are several large pipes visible, some of which are being cut. The worker is positioned in the center of the frame, leaning over the pipe. The background shows some vegetation and the trench walls.

SYSTEMS MAKE IT POSSIBLE
PEOPLE MAKE IT HAPPEN

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