



NEXT GENERATION RECYCLING TECHNOLOGY FOR SUSTAINABLE ENERGY PRODUCTION



IF YOU THINK
THE ENVIRONMENT
IS LESS IMPORTANT
THAN THE ECONOMY

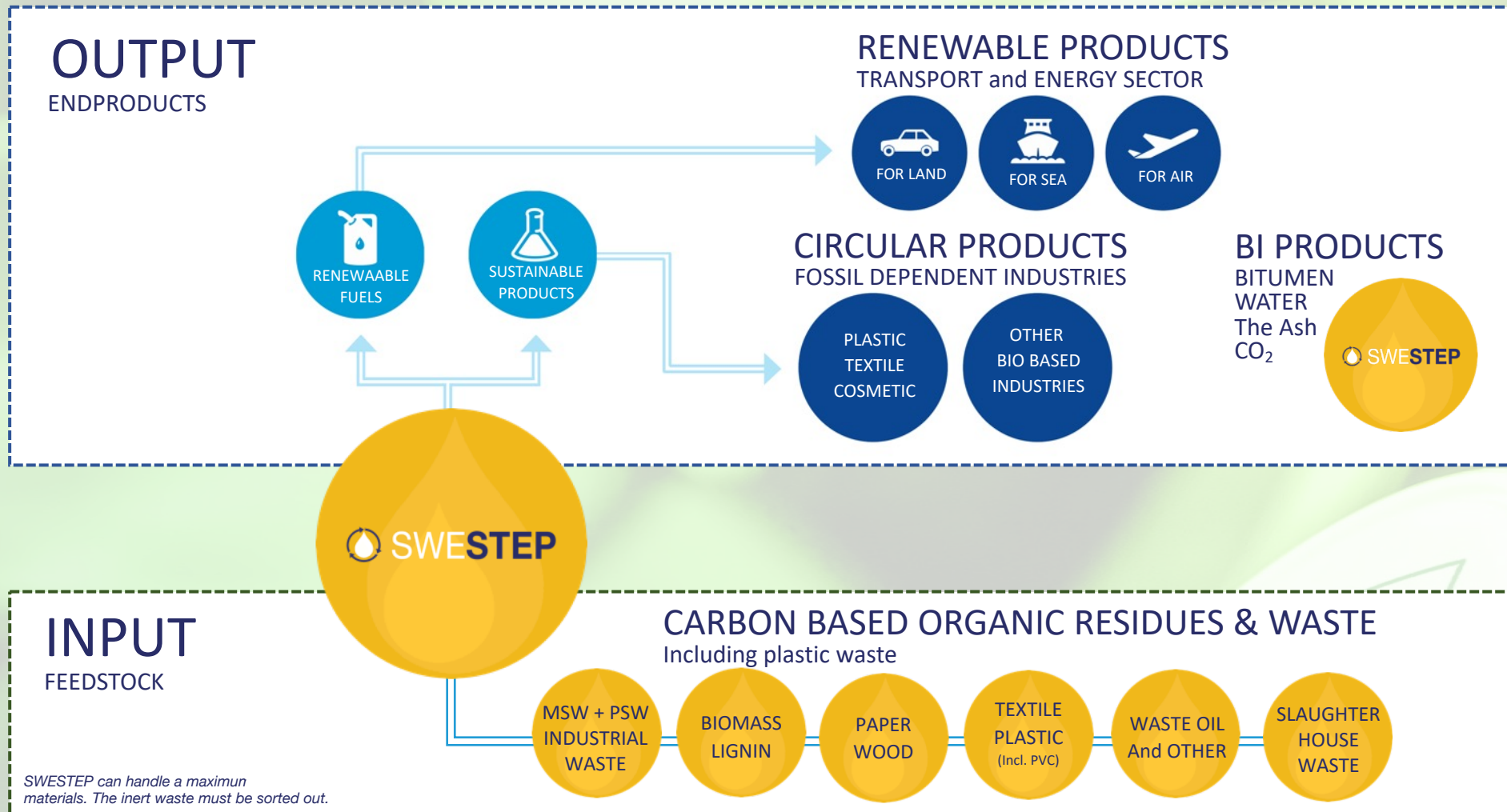
TRY HOLDING
YOUR BREATH
WHILE COUNTING
YOUR MONEY

PROBLEM – CHALLENGE - SOLUTION

- **ENVIRONMENT AND WASTE MANAGEMENT**
One solution on two problems
- **FOSSIL DEPENDENCE**
Reduce Fossil Dependence
- **TRACEABILITY** - New feedstock streams
- **WATER** - Water is already in short supply in many countries
- **BITUMEN** - No matter what fuel aircrafts or cars use, they land on asphalt or they land or run on asphalt



TURNING TRASH TO CASH





HOUSEHOLD
WASTE



PLASTIC
WASTE



TEXTILE
WASTE



PAPER
WASTE



USED TIRES
WASTE



SLAUGHTER
RINSE



BIOMASS
WASTE



USED OIL
WASTE



LIGNINE
WASTE



FUEL
AIR LAND SEA



LUBRICANTS
Oil and BINDING
MATERIALS



PARAFFIN'S
ADDITIVES



TEXTILE
FASHION



MEDICAL
CHEMICALS



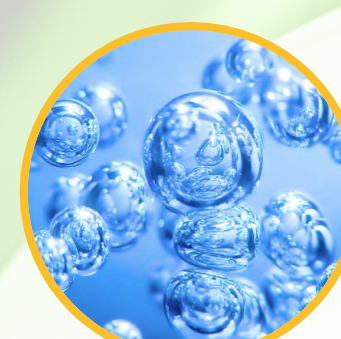
COSMETICS
FOOD



WATER
 H_2O



ASPHALT
BITUMEN



CARBON DIOXID
 CO_2

OUR AGENDA

ROLL OUT - SWESTEP PLANTS

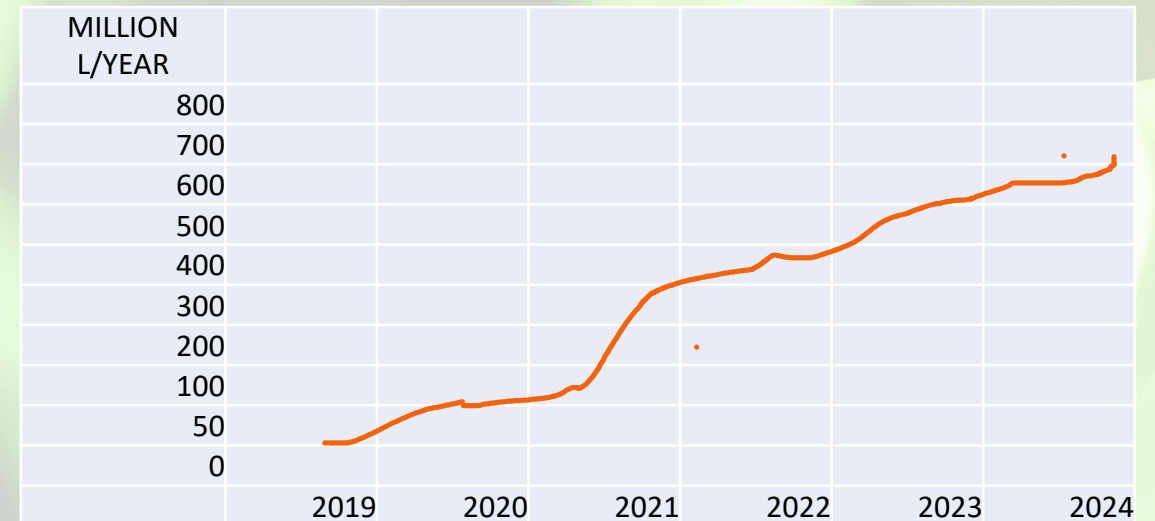
FIRST SWESTEP PLANTS - CONSTRUCTION BEGINS Q1 2019

Two signed orders in Sweden. Denmark and Norway are next in line.

Planned production is **Synthetic Renewable Diesel** ("Oil products") for the Scandinavian market

PLANNED CAPACITY - SCANDINAVIA

Year	2020	2021	2022	2023	2024
Million L/Year	40	100	300	500	600



RAW MATERIAL TO END PRODUCT

INPUT MATERIAL	OUTPUT MATERIAL
PLASTIC WOOD PAPER	2,60 kg gives 1kg Diesel
PLASTIC	1,50 kg gives 1kg Diesel
USED OIL	1,15 kg gives 1kg Diesel
BIOMASS	3,30 kg gives 1kg Diesel
PLASTIC BIOMASS	2,30 kg gives 1kg Diesel

EXAMPLE - Test Report

Diesel yield per ton of mixture Polyethylene – Biomass 50:50 in dependency of the water content

In the following table you can see the amount of diesel you can produce from one ton of Polyethylene-Biomass mixture in dependency of the water content.

Water content (%)	0%	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%
Heating value (kwh/kg)	8,40	7,95	7,50	7,05	6,59	6,14	5,69	5,24	4,79	4,34	3,89
Heating value (MJ/kg)	30,24	28,62	26,99	25,37	23,74	22,12	20,49	18,87	17,24	15,62	13,99
Heating value (BTU/lb)	13001	12302	11604	10905	10207	9508	8810	8111	7412	6714	6015
Diesel yield (kg) (ash free)	576	545	514	483	452	421	390	359	328	297	267
Diesel yield (l) (ash free)	678	641	605	568	532	496	459	423	386	350	314
Ash (2,0 %) (kg)	20	19	18	17	16	15	14	13	12	11	10
Sulphur (0,1%) (kg)	1	1	1	1	1	1	1	1	1	1	1
Calziumhydroxide for Sulphur (kg)	4	4	4	3	3	3	3	3	2	2	2
Chlorine (0,01%) (kg)	0	0	0	0	0	0	0	0	0	0	0
Calziumhydroxide for Chlorine (kg)	0	0	0	0	0	0	0	0	0	0	0
Calziumhydroxide Inorganic (kg)	1	1	1	1	1	1	1	1	1	1	1
Inorganic total (kg)	21	20	19	18	17	16	15	14	13	12	11
Bitumen (kg)	43	41	39	36	34	32	30	28	26	24	21
Diesel yield (kg)	555	525	495	465	435	405	375	345	316	286	256
Diesel yield (l)	652	617	582	547	512	477	442	406	371	336	301

· Diesel yield from mixture Polyethylene – Biomass in dependency of the water content

NEXT STEP

AVIATION INDUSTRY

TODAY

- Synthetic Renewable Diesel - EN-590
- Kerosene (First Generation, to be ASTM approved)
- Chemical Raw Materials (Performance Chemicals)
- Test and Lab Results

PARTNERING

- Joint Test Run – Aviation Industry
To confirm that primarily SWESTEP's diesel but also the kerosene meets the requirements set by ASTM.



THE TESTS INCLUDE THE FOLLOWING

- Feedstock, feed-in, production flow, end products analyses at independent and accredited /certified laboratory etc.

THE JOINT TEST RUN – TIME AND COST

- Time 14 working day's
- Cost 150,000 €
- Maximum 8 participating partners.

FEEDSTOCK PROPOSELS

- | | |
|-----------------------|----------------------------|
| 1. MSW mix* | 2. PWP mix* |
| 3. Textiles + Biomass | 4. Plastics + Biomass |
| 5. Paper + Biomass | 6. Residual Oils + Biomass |
| 7. Tires + Biomass | 8. Food Residues + Biomass |

THE OUTCOME OF THE TEST

- Input materials converted to oil
- Traceability
- The quality of the oil
- The potential uses of the oil
- Mass balance
- Energy balance
- Carrier oil
- Price Calculations/business plan
- Emissions
- LCA*
- MSDS*

**PWP = Paper Wood Plastics*

**LCA = Life Cycle Assessment*

**MSW = Municipal Solid Waste*

**MSDS = Material Safety Data Sheet*



NEXT GENERATION
RECYCLING TECHNOLOGY

SWESTEP

FOR SUSTAINABLE
ENERGY PRODUCTION

Thank You For Your Attention