



## Valmet in circular economy



# Contents

- Y Valmet's position in circular economy
- Y How Valmet applies circular economy
- Y Enabling circular economy for customers
- Y Driving circular economy in own operations
- Y Some new research results on CFB boiler ash behaviour



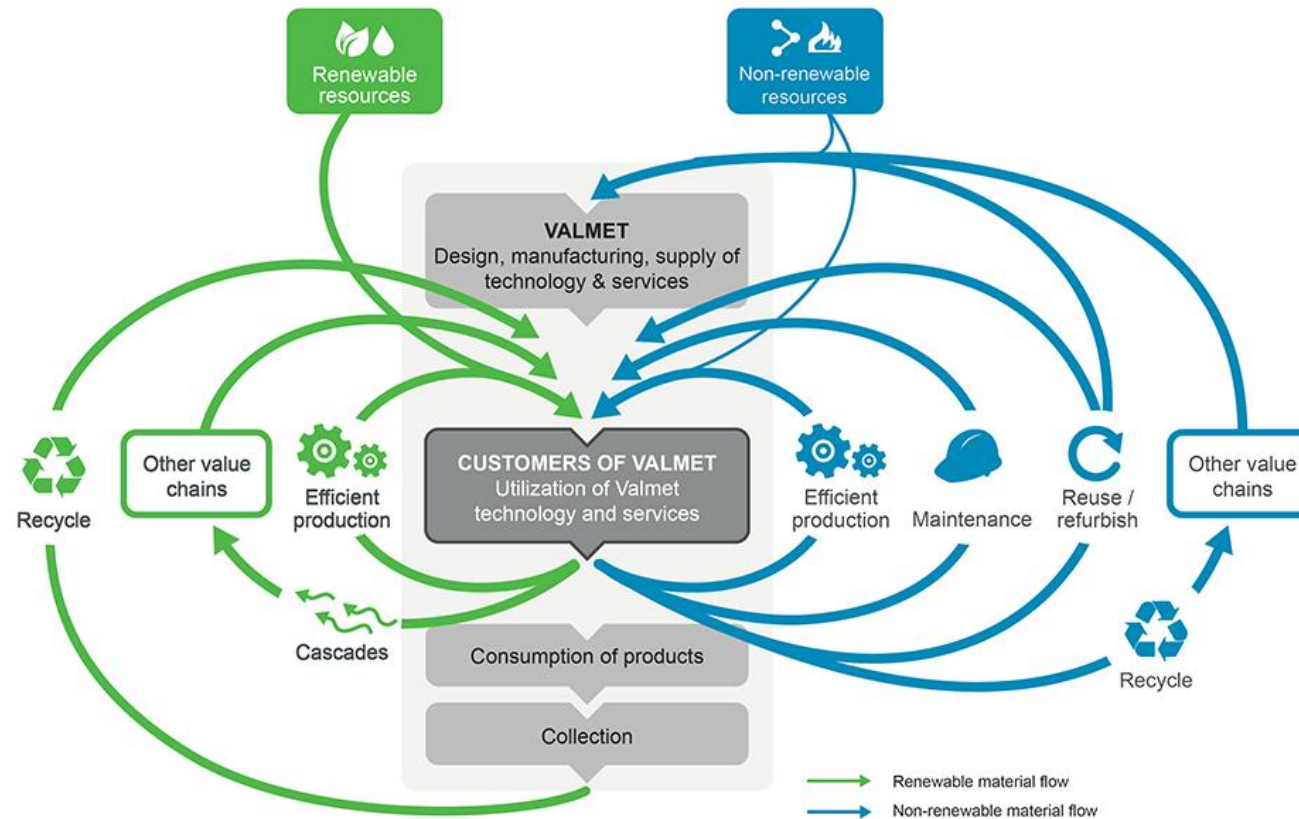


Valmet's mission is to  
convert renewable resources  
into sustainable results

Circular economy is inbuilt in  
Valmet's solutions



# Valmet's solutions enable its customers to apply circular economy



Utilization of renewable raw materials by customer

Process technology and services provided by Valmet

# Main circular economy themes from customers' point-of-view

## Resource efficiency

- 1 Improvement and optimization of resource efficiency
- 2 Flexible energy production

## Closed circles

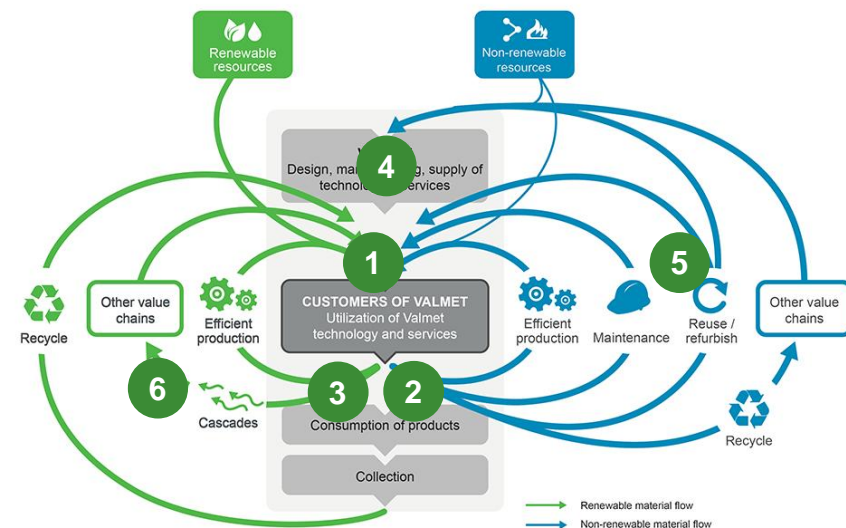
- 3 Chemical and energy recovery

## Longer circulation

- 4 Design enabling reuse and conversion
- 5 Maintenance and modernization of production technology

## Cascaded use across industries

- 6 New bio-based products



## 2. Flexible energy production



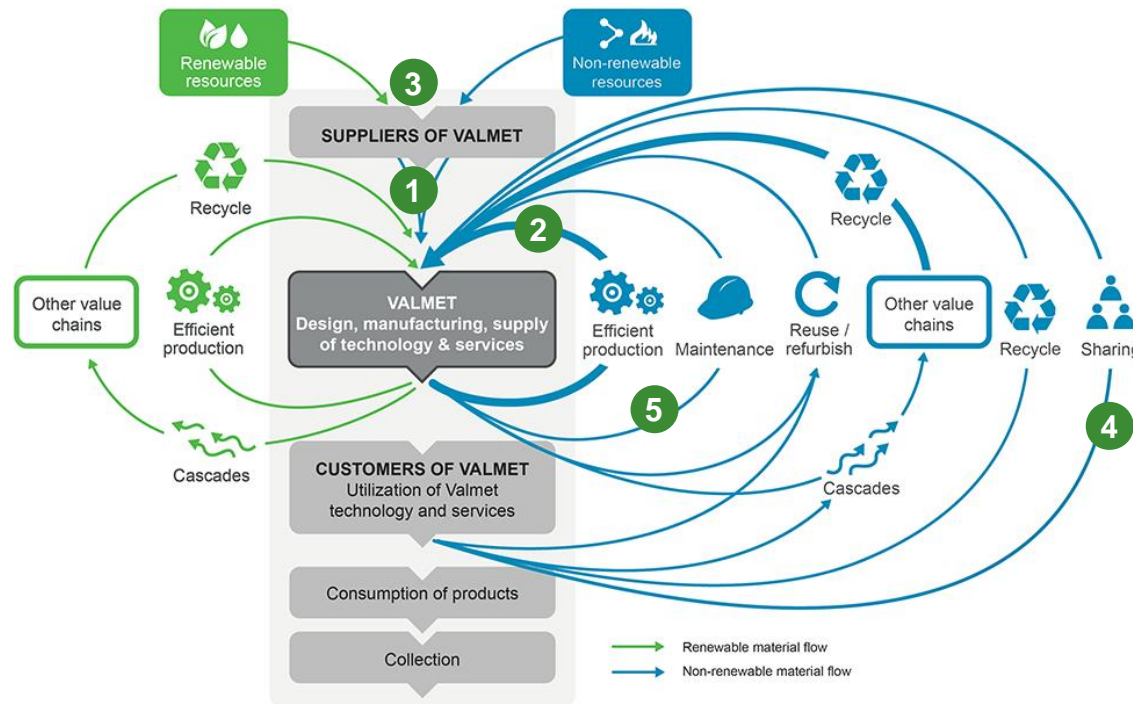
Valmet's energy production technologies reduce the need for non-renewable fuels and the amount of waste

### Concrete examples:

- Waste-to-energy solutions by fluidized bed boiler and gasification technologies enable efficient energy recovery
- Fuel flexibility with multi-fuel boilers, which can operate on fuel mixtures ranging from 100 % coal to 100% biomass
- Wider use of fuel sources by fluidized bed boilers, which can utilize fuels with varying energy value and moisture content



# Valmet's way to apply circular economy in its own operations




## Resource efficiency

- 1 Continuous improvement of resource efficiency
- 2 Maximum utilization of metals
- 3 Resource efficient supply chain
- 4 Shared use of assets

## Longer circulation

- 5 Preventive maintenance



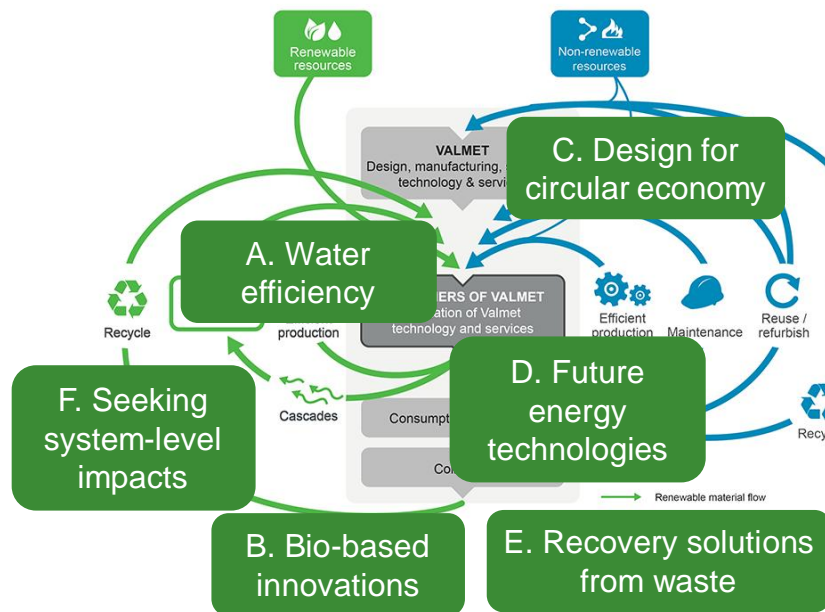
Identified future  
potential



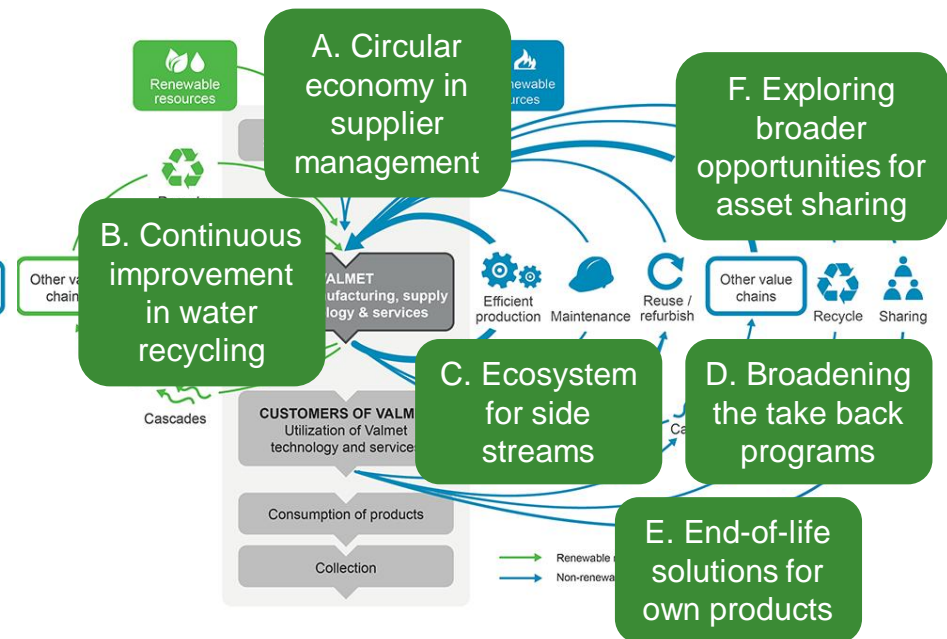
# Future potential in implementing circular economy

- Valmet has identified potential to further implement circular economy in both customer and own operations


## Customer operations



## Own operations



# Gasification technology for biomass and waste



Valmet's gasification technology converts biomass, recycled materials and waste into product gas. The gas can then be burned into energy in a power boiler or a lime kiln with

- excellent electrical efficiency
- minimized carbon footprint
- possibility to connect as co-gasifier to existing power boiler





# Gasification technology for biomass and waste

Valmet's gasification technology converts biomass, recycled materials and waste into product gas. The gas can then be burned into energy in a power boiler or a lime kiln with:

## Excellent electrical efficiency

Up to **60%**  
more electricity  
from same amount of waste  
compared to grate firing

Clean and corrosion free  
operation even with high  
steam parameters

## Minimized carbon footprint

Valmet's gasifiers use only  
low-carbon fuels such as  
biomass or waste

In co-gasification, the  
gasifier can replace  
up to

**100%**  
of fossil fuel

Possibility to connect as co-  
gasifier to existing boiler

Economical and time-  
efficient investment

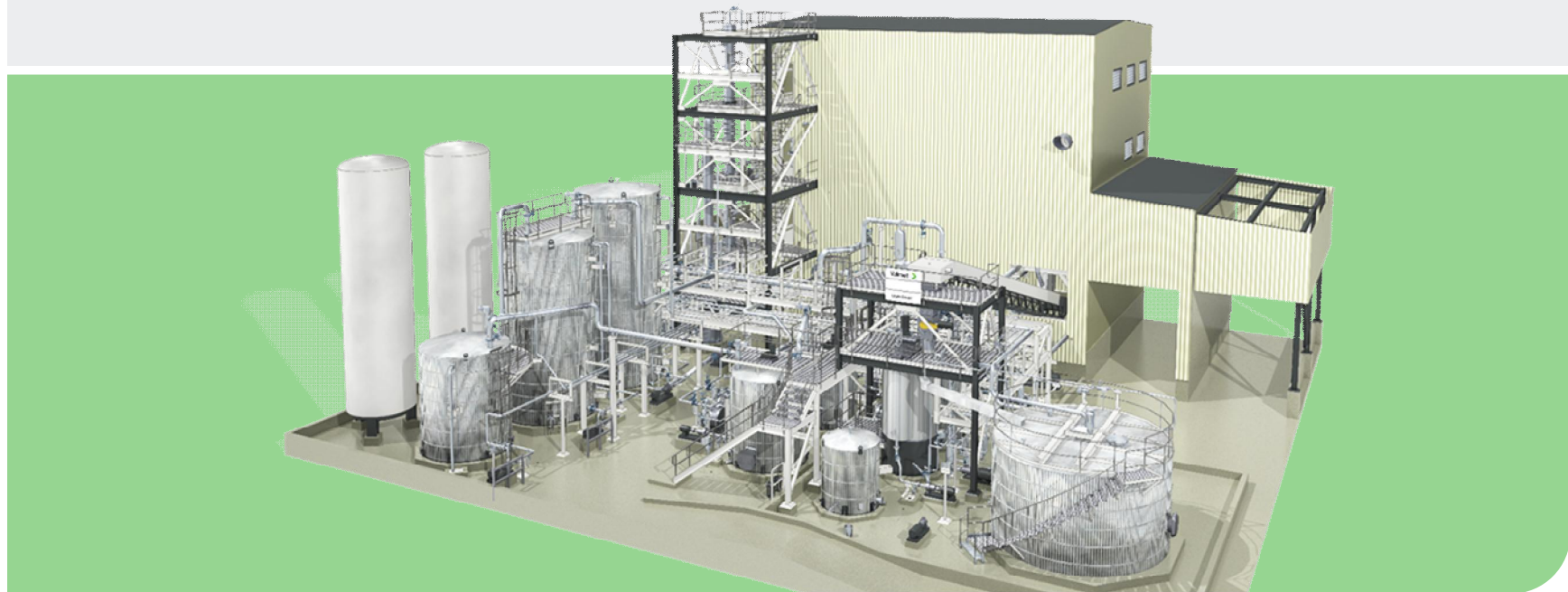
Minimal downtime  
of existing energy production

Co-gasifier extends  
existing boiler's service life

# LignoBoost lignin separation technology for pulp mills

LignoBoost separates lignin from kraft black liquor in pulp making

- Reducing the amount of lignin increases pulp production capacity
- Fossil fuels can be replaced with lignin to produce energy
- Lignin can become a new source of income for the pulp mill





# LignoBoost lignin separation technology for pulp mills

LignoBoost separates lignin from kraft black liquor in pulp making

**Increased pulp  
production capacity**

**Up to  
25%**  
more pulp by removing  
25%  
of the lignin  
in the black liquor

**Fossil fuels replaced  
with lignin to produce energy**

**50 liters**  
of oil saved  
per ton of produced pulp when  
firing lignin in the lime kiln

Lignin is a  
**CO<sub>2</sub>**  
neutral fuel

**New sources of income  
for the pulp mill**

Green energy from  
lignin can be profitably  
sold to the power grid  
Lignin can be sold as fuel in  
the form of pellets or powder

Lignin can be sold as  
raw material for bio  
products and chemicals

