Scenario Analysis using System Dynamics Modelling:
The case of Production Portfolio Change in the Dutch Paper and Board Industry (Supporting Material)

1. Dutch P&BI model equations

The structure of the model equations of the Dutch P&BI model is as follows:

> Element type (Level, Auxiliary – including Rates –, Constant), Variable name {variable type (Boolean, Integer, Real or Complex); variable unit; variable definition; inflow {}; outflow {}}

The previously defined units for the Dutch P&BI model appear in table SM1.

Table SM1: Dutch P&BI system basic units

Unit	Unit Information
EUR	{**def** __CURRENCY("EUR"); **doc** Euro}
kg	{**def** __KILOGRAM; **doc** Kilogram – Mass}
p	{**def** ATOMIC; **doc** person}
tn	{**def** kg*1000, **doc** tonne}

It is possible to enter units from the list, which were previously defined in the, or let the package derive the units from the equations by ticking in the verification box. The model equation indicates the former situation by adding 'unit' in the model equation while in the later situation appears 'autounit'.

Table SM2 presents the model equations of the quantitative model of the Dutch P&BI system, ordered by element type.

Table SM2: Model equations of the Dutch P&BI system

Element Type	Element Information
Auxiliary	% Collected P&B for NL {**autotype** Real; **def** .3}
Auxiliary	% Imported P&B {**autotype** Real; **def** 3.5}
Auxiliary	% P&B for NL {**autotype** Real; **def** 0.3}
Auxiliary	% Recovered P&B {**autotype** Real; **def** 0.7488; }
Auxiliary	Accumulation Period {**autotype** Real; **unit** yr; **def** 0.08}
Auxiliary	Ageing of Machinery Coefficient {**autotype** Real; **unit** 1/yr; **def** 0.055}
Auxiliary	Annual Divestment Cost {**autotype** Real; **autounit** EUR/yr; **def** 'Average Annual Compensation'*'Persons in Compensation'}
Auxiliary	Annual Energy Cost {**autotype** Real; **autounit** EUR/yr; **def** 'Annual Unitary Energy Cost'*('Processing Pulp'+'Recovered P&B Rate'+'Wood Pulp Production')}
Auxiliary	Annual Labour Cost {**autotype** Real; **autounit** EUR/yr; **def** Employees*'Average Annual Compensation'}
Auxiliary	Annual Maintenance Cost {**autotype** Real; **autounit** EUR/yr; **def** 'Unitary Maintenance Cost'*('Current Processing Pulp Capacity'+'Current; Recycling P&B Capacity'+'Current Wood Pulp Capacity') }
Auxiliary	Annual Other Cost {**autotype** Real; **autounit** EUR/yr; **def** 'Annual Unitary Other Cost'*'Processing Pulp'}
Auxiliary	Annual Raw Material Cost {**autotype** Real; **autounit** EUR/yr; **def** 'Average Unitary Raw Material Cost'*('Foreign Recovered P&B Rate'+'Purchased; Amount Wood Pulp'+'Recovered P&B Rate'+'Wood Pulp Production')}
Auxiliary	Annual Unitary Energy Cost {**autotype** Real; **unit** EUR/tn; **def** 23.82}
Auxiliary	Annual Unitary Other Cost {**autotype** Real; **unit** EUR/tn; **def** 63.53}
Auxiliary	Average Annual Compensation {**autotype** Real; **unit** EUR/(yr*p); **def** 57000}
Auxiliary	Average Unitary Raw Material Cost {**autotype** Real; **unit** EUR/tn; **def** 327.43}
Auxiliary	Collection Period {**autotype** Real; **unit** yr; **def** 0.04}

Element Type	Element Information
Auxiliary	Compensation period {**autotype** Real; **unit** yr; **def** 10}
Auxiliary	Current Processing Pulp Capacity Utilisation {**autotype** Real; **def** 'Processing Pulp'/'Current Processing Pulp Capacity'}
Auxiliary	Current Processing Pulp Reduction {**autotype** Real; **autounit** tn/yr²; **def** 'Processing Pulp Divestment Multiplier'*('Current Processing Pulp Capacity'-('Processing Pulp'/'Processing Pulp Capacity Threshold for Divestment'))/1<<yr>>}
Auxiliary	Current Recycling P&B Capacity Utilisation {**autotype** Real; **def** 'DP&BI Recycling P&B'/'Current Recycling P&B Capacity'}
Auxiliary	Current Recycling P&B Expansion {**autotype** Real; **autounit** tn/yr²; **def** ('Expected Recycling P&B Capacity'-'Current Recycling P&B Capacity')/'Investment Period'}
Auxiliary	Current Recycling P&B Reduction {**autotype** Real; **autounit** tn/yr²; **def** 'Recycling P&B Divestment Multiplier'*('Current Recycling P&B Capacity'-('DP&BI Recycling P&B'/'Recycling P&B Capacity Threshold for Divestment'))/1<<yr>>}
Auxiliary	Current Wood Pulp Capacity Utilisation {**autotype** Real; **def** 'Wood Pulp Production'/'Current Wood Pulp Capacity'}
Auxiliary	Current Wood Pulp Reduction {**autotype** Real; **autounit** tn/yr²; **def** 'Wood Pulp Divestment Multiplier'*('Current Wood Pulp Capacity'-('Wood Pulp Production'/'Wood Pulp Capacity Threshold for Divestment'))/1<<yr>>}
Auxiliary	Decline {**autotype** Real; **unit** p/yr; **def** 'NL Decline Index'*'NL Population'}
Auxiliary	Depreciation Period {**autotype** Real; **unit** yr; **def** 25}
Auxiliary	Disposal Rate {**autotype** Real; **autounit** tn/yr; **def** ('NL P&B Accumulation'*(1-'NL % Collection')/'Accumulation Period')}
Auxiliary	DP&BI Recycling P&B {**autotype** Real; **autounit** tn/yr; **def** MIN('Raw Material Requirement'*'% Recovered P&B', 'Current Recycling P&B Capacity')}
Auxiliary	End of Compensation {**autotype** Real; **autounit** p/yr; **def** 'Persons in Compensation'/'Compensation period'; }
Auxiliary	Expected Processing Pulp Expansion {**autotype** Real; **autounit** tn/yr²; **def** 'Processing P&B Investment to Capacity'*'Processing Pulp Investment Delay'}
Auxiliary	Expected Processing Pulp Reduction {**autotype** Real; **autounit** tn/yr²; **def** 'Current Processing Pulp Reduction'}
Auxiliary	Expected Recycling P&B Expansion {**autotype** Real; **autounit** tn/yr²; **def** 'Recycling P&B Investment Delay'*'Recycling P&B Investment to Capacity'}
Auxiliary	Expected Recycling P&B Reduction {**autotype** Real; **autounit** tn/yr²; **def** 'Current Recycling P&B Reduction'}
Auxiliary	Expected Wood Pulp Expansion {**autotype** Real; **autounit** tn/yr²; **def** 'Wood Pulp Investment to Capacity'*'Wood Pulp Investment Delay'}
Auxiliary	Expected Wood Pulp Reduction {**autotype** Real; **autounit** tn/yr²; **def** 'Current Wood Pulp Reduction'}
Auxiliary	Foreign Consumption Rate {**autotype** Real; **autounit** tn/yr; **def** 'Foreign Population'*'Foreign Average Consumption per Capita'}
Auxiliary	Foreign Disposal Rate {**autotype** Real; **autounit** tn/yr; **def** ((1-'Foreign % Collection')*'Foreign Paper Accumulation')/'Accumulation Period'}
Auxiliary	Foreign Growth {**autotype** Real; **unit** p/yr; **def** 971587.9}
Auxiliary	Foreign P&B Collection Rate {**autotype** Real; **autounit** tn/yr; **def** ('Foreign % Collection'*'Foreign Paper Accumulation')/'Accumulation Period'}
Auxiliary	Foreign Recovered P&B Rate {**autotype** Real; **unit** tn/yr; **def** MIN(IF((('% Recovered P&B'*'Raw Material Requirement')-'NL Recovered P&B Rate')<0<<tn/yr>>,0<<tn/yr>>,(('% Recovered P&B'*'Raw Material Requirement')-'NL Recovered P&B Rate')),'Foreign P&B Collection Rate')}
Auxiliary	Growth {**autotype** Real; **unit** p/yr; **def** 'NL Growth Index'*'NL Population'}
Auxiliary	Hiring {**autotype** Real; **autounit** p/yr; **def** ('Current Recycling P&B Expansion'/'Recycling P&B Capacity to Labour')+('Processing Pulp Expansion'/'Processing Pulp Capacity to Labour')+('Wood Pulp Expansion'/'Wood Pulp Capacity to Labour')}
Auxiliary	Imported P&B {**autotype** Real; **autounit** tn/yr; **def** ('P&B NL Sales')*'% Imported P&B'}
Auxiliary	Increase in Foreign % Collection {**autotype** Real; **unit** 1/yr; **def** 0.0137}
Auxiliary	Increase in Foreign Consumption per Capita {**autotype** Real; **unit** tn/(yr^2*p); **def** 0.0045}
Auxiliary	Increase in NL % Collection {**autotype** Real; **unit** 1/yr; **def** 0.0102}
Auxiliary	Increase in NL Consumption per Capita {**autotype** Real; **unit** tn/(yr^2*p); **def** 0.005<<tn/(yr^2*p)>>+0.001<<tn/(yr^2*p)>>*COSWAVE(20,5<<yr>>,2.5<<yr>>)+STEP(0.03<<tn/(yr^2*p)>>,STARTTIME+7<<yr>>)+STEP(-0.037<<tn/(yr^2*p)>>,STARTTIME+9<<yr>>)}
Auxiliary	Increase of % Waste {**autotype** Real; **unit** 1/yr; **def** 0.0049}
Auxiliary	Increase of Raw Material {**autotype** Real; **unit** 1/yr; **def** 0.0058}
Auxiliary	Increase Unitary Maintenance Cost {**autotype** Real; **autounit** EUR/(yr*tn); **def** 'Ageing of Machinery Coefficient'*'Unitary Maintenance Cost'}
Auxiliary	Investment Delay {**autotype** Real; **unit** yr; **def** 1}
Auxiliary	Investment Period {**autotype** Real; **unit** yr; **def** 4}

Element Type	Element Information
Auxiliary	Last Year Profits {**autotype** Real; **autounit** EUR/yr; **def** DELAYPPL('Total Profits',1<<yr>>)}
Auxiliary	Last Year´s P&B Sales {**autotype** Real; **autounit** tn/yr; **def** DELAYPPL('P&B International Sales'+'P&B NL Sales',1<<yr>>)}
Auxiliary	Layoffs {**autotype** Real; **autounit** p/yr; **def** ('Current Recycling P&B Reduction'/'Recycling P&B Capacity to Labour')+('Current Processing Pulp Reduction'/'Processing Pulp Capacity to Labour')+('Current Wood Pulp Reduction'/'Wood Pulp Capacity to Labour')}
Auxiliary	Net Inflow for Reserve {**autotype** Real; **autounit** EUR/yr; **def** '% Reserve'*'Total Profits'}
Auxiliary	NL Collected P&B Export Rate {**autotype** Real; **autounit** tn/yr; **def** ((1-'% Collected P&B for NL')*'NL P&B Collection'/'Collection Period')}
Auxiliary	NL Consumption {**autotype** Real; **autounit** tn/yr; **def** 'NL Population'*'NL Average Consumption per Capita'}
Auxiliary	NL Decline Index {**autotype** Real; **unit** 1/yr; **def** 0.0087}
Auxiliary	NL Growth Index {**autotype** Real; **unit** 1/yr; **def** 0.015}
Auxiliary	NL Recovered P&B Rate {**autotype** Real; **autounit** tn/yr; **def** ('% Collected P&B for NL'*'NL P&B Collection'/'Collection Period')}
Auxiliary	P&B Collection Rate {**autotype** Real; **autounit** tn/yr; **def** ('NL P&B Accumulation'*'NL % Collection'/'Accumulation Period')}
Auxiliary	P&B International Sales {**autotype** Real; **autounit** tn/yr; **def** (((1-'% P&B for NL')*'P&B Consumption Forecast'))}
Auxiliary	P&B NL Sales {**autotype** Real; **autounit** tn/yr; **def** ('% P&B for NL'*'P&B Consumption Forecast')}
Auxiliary	P&B Sales Change {**autotype** Real; **autounit** tn/yr; **def** 'Last Year´s P&B Sales'+'P&B Sales Difference'; }
Auxiliary	P&B Sales Difference {**autotype** Real; **autounit** tn/yr; **def** ('P&B International Sales'+'P&B NL Sales')-'Last Year´s P&B Sales'}
Auxiliary	P&B Sales Forecast {**autotype** Real; **autounit** tn/yr; **def** MIN('P&B Consumption Forecast','P&B Sales Change')}
Auxiliary	Processed P&B for NL Consumption {**autotype** Real; **autounit** tn/yr; **def** MIN('Imported P&B'+'P&B NL Sales','NL Consumption')}
Auxiliary	Processing P&B Investment to Capacity {**autotype** Real; **unit** tn/(yr*EUR); **def** 0.001}
Auxiliary	Processing Pulp {**autotype** Real; **autounit** tn/yr; **def** MIN('Current Processing Pulp Capacity','P&B Sales Forecast')}
Auxiliary	Processing Pulp Capacity Threshold for Divestment {**autotype** Real; **def** 0.2}
Auxiliary	Processing Pulp Capacity Threshold for Investment {**autotype** Real; **def** 0.9}
Auxiliary	Processing Pulp Capacity to Labour {**autotype** Real; **unit** tn/(p*yr); **def** 10000}
Auxiliary	Processing Pulp Depreciation {**autotype** Real; **autounit** EUR/yr; **def** 'Processing P&B Capital Stock'/'Depreciation Period'}
Auxiliary	Processing Pulp Divestment Multiplier {**autotype** Real; **def** IF('Current Processing Pulp Capacity Utilisation'<'Processing Pulp Capacity Threshold for Divestment' AND 'P&B Sales Change'<0<<tn/yr>>,1,0,0)}
Auxiliary	Processing Pulp Expansion {**autotype** Real; **autounit** tn/yr²; **def** ('Expected Processing Pulp Capacity'-'Current Processing Pulp Capacity')/'Investment Period'}
Auxiliary	Processing Pulp Expected Capacity Utilisation {**autotype** Real; **def** 'Processing Pulp'/'Expected Processing Pulp Capacity'}
Auxiliary	Processing Pulp Investment {**autotype** Real; **autounit** EUR/yr; **def** 'Processing Pulp Investment Multiplier'*'Processing P&B Investment Requirement'/1<<yr>>}
Auxiliary	Processing Pulp Investment Budget Consumption {**autotype** Real; **autounit** EUR/yr; **def** 'Processing Pulp Investment Budget'/'Investment Period'}
Auxiliary	Processing Pulp Investment Delay {**autotype** Real; **autounit** EUR/yr; **def** DELAYPPL('Processing Pulp Investment',1<<yr>>)}
Auxiliary	Processing Pulp Investment Multiplier {**autotype** Real; **def** IF('Reserve for Investments'>'Reserve Threshold' AND 'Processing Pulp Expected Capacity Utilisation'>'Processing Pulp Capacity Threshold for Investment' AND 'Profits Moving Average'>0<<EUR/yr>> AND 'P&B Sales Change'>0<<tn/yr>>, 1,0,0)}
Auxiliary	Profits Moving Average {**autotype** Real; **autounit** EUR/yr; **def** ('Total Profits'+'Last Year Profits'+'Two Years Ago Profits')/3}
Auxiliary	Purchased Amount Wood Pulp {**autotype** Real; **autounit** tn/yr; **def** (1-'% Wood Pulp Production')*'Wood Pulp Requirement'}
Auxiliary	Raw Material Requirement {**autotype** Real; **autounit** tn/yr; **def** 'P&B Sales Forecast'*('Raw Material Need'-'% Non-Fibrous Material')}
Auxiliary	Recovered P&B Rate {**autotype** Real; **autounit** tn/yr; **def** MIN(('% Recovered P&B'*'Raw Material Requirement'),'NL Recovered P&B Rate')}
Auxiliary	Recycling P&B Capacity Threshold for Divestment {**autotype** Real; **def** 0.2}
Auxiliary	Recycling P&B Capacity Threshold for Investment {**autotype** Real; **def** 0.9}
Auxiliary	Recycling P&B Capacity to Labour {**autotype** Real; **unit** tn/(p*yr); **def** 10000}
Auxiliary	Recycling P&B Depreciation {**autotype** Real; **autounit** EUR/yr; **def** 'Recycling P&B Capital Stock'/'Depreciation Period'}

Element Type	Element Information
Auxiliary	Recycling P&B Divestment Multiplier {**autotype** Real; **def** IF('Current Recycling P&B Capacity Utilisation'<'Recycling P&B Capacity Threshold for Divestment' AND 'P&B Sales Change'<0<<tn/yr>>,1,0,0)}
Auxiliary	Recycling P&B Expected Capacity Utilisation {**autotype** Real; **def** 'DP&BI Recycling P&B'/'Expected Recycling P&B Capacity'}
Auxiliary	Recycling P&B Investment {**autotype** Real; **autounit** EUR/yr; **def** 'Recycling P&B Investment Multiplier'*'Recycling P&B Investment Requirement'/1<<yr>>}
Auxiliary	Recycling P&B Investment Consumption {**autotype** Real; **autounit** EUR/yr; **def** 'Recycling P&B Investment Budget'/'Investment Period'}
Auxiliary	Recycling P&B Investment Delay {**autotype** Real; **autounit** EUR/yr; **def** DELAYPPL('Recycling P&B Investment','Investment Delay')}
Auxiliary	Recycling P&B Investment Multiplier {**autotype** Real; **def** IF('Reserve for Investments'>'Reserve Threshold' AND 'Recycling P&B Expected Capacity Utilisation'>'Recycling P&B Capacity Threshold for Investment' AND 'Profits Moving Average'>0<<EUR/yr>> AND 'P&B Sales Change'>0<<tn/yr>>,1,0,0)}
Auxiliary	Recycling P&B Investment to Capacity {**autotype** Real; **unit** tn/(yr*EUR); **def** 0.004}
Auxiliary	Total Cost {**autotype** Real; **autounit** EUR/yr; **def** 'Annual Divestment Cost'+'Annual Energy Cost'+'Annual Maintenance Cost'+'Annual Other Cost'+'Annual Raw Material Cost'+'Annual Labour Cost'+'Processing Pulp Depreciation'+'Recycling P&B Depreciation'+'Wood Pulp Depreciation'}
Auxiliary	Total Profits {**autotype** Real; **autounit** EUR/yr; **def** 'Total Revenues'-'Total Cost'}
Auxiliary	Total Revenues {**autotype** Real; **autounit** EUR/yr; **def** 'Average Price per ton of P&B'*('P&B NL Sales'+'P&B International Sales')}
Auxiliary	Two Years Ago Profits {**autotype** Real; **autounit** EUR/yr; **def** DELAYPPL('Total Profits',2<<yr>>)}
Auxiliary	Variation in P&B Consumption Forecast {**autotype** Real; **unit** tn/yr^2; **def** ('NL Consumption'-'P&B Consumption Forecast')/14<<yr>>}
Auxiliary	Variation of % NL Wood Pulp Production {**autotype** Real; **autounit** yr^-1; **def** IF('% Wood Pulp Production'>0,-0.0067<<1/yr>>,0<<1/yr>>,0<<1/yr>>)}
Auxiliary	Variation of Non-Fibrous Material {**autotype** Real; **autounit** yr^-1; **def** IF('% Non-Fibrous Material'>0,-0.0037<<1/yr>>,0<<1/yr>>,0<<1/yr>>)}
Auxiliary	Variation of Price per ton of P&B {**autotype** Real; **autounit** EUR/(yr*tn); **def** 10<<EUR/(tn*yr)>>+2.5<<EUR/(tn*yr)>>*COSWAVE(25,5<<yr>>,3.5<<yr>>)}
Auxiliary	Waste {**autotype** Real; **autounit** tn/yr; **def** '% Waste'*'Processing Pulp'}
Auxiliary	Wood Pulp Capacity Threshold for Divestment {**autotype** Real; **def** 0.2}
Auxiliary	Wood Pulp Capacity Threshold for Investment {**autotype** Real; **def** 0.9}
Auxiliary	Wood Pulp Capacity to Labour {**autotype** Real; **unit** tn/(p*yr); **def** 10000}
Auxiliary	Wood Pulp Depreciation {**autotype** Real; **autounit** EUR/yr; **def** 'Wood Pulp Capital Stock'/'Depreciation Period'}
Auxiliary	Wood Pulp Divestment Multiplier {**autotype** Real; **def** IF('Current Wood Pulp Capacity Utilisation'<'Wood Pulp Capacity Threshold for Divestment',1,0,0)}
Auxiliary	Wood Pulp Expansion {**autotype** Real; **autounit** tn/yr²; **def** ('Expected Wood Pulp Capacity'-'Current Wood Pulp Capacity')/'Investment Period'}
Auxiliary	Wood Pulp Expected Capacity Utilisation {**autotype** Real; **def** 'Wood Pulp Production'/'Expected Wood Pulp Capacity'}
Auxiliary	Wood Pulp Investment {**autotype** Real; **autounit** EUR/yr; **def** 'Wood Pulp Investment Multiplier'*'Wood Pulp Investment Requirement'/1<<yr>>}
Auxiliary	Wood Pulp Investment Consumption {**autotype** Real; **autounit** EUR/yr; **def** 'Wood Pulp Investment Budget'/'Investment Period'}
Auxiliary	Wood Pulp Investment Delay {**autotype** Real; **autounit** EUR/yr; **def** DELAYPPL('Wood Pulp Investment',1<<yr>>)}
Auxiliary	Wood Pulp Investment Multiplier {**autotype** Real; **def** IF('Reserve for Investments'>'Reserve Threshold' AND 'Wood Pulp Expected Capacity Utilisation'>'Wood Pulp Capacity Threshold for Investment' AND 'Profits Moving Average'>0<<EUR/yr>> AND 'P&B Sales Change'>0<<tn/yr>>, 1,0,0)}
Auxiliary	Wood Pulp Investment to Capacity {**autotype** Real; **unit** tn/(yr*EUR); **def** 0.005}
Auxiliary	Wood Pulp Production {**autotype** Real; **autounit** tn/yr; **def** MIN('% Wood Pulp Production'*'Wood Pulp Requirement', 'Current Wood Pulp Capacity')}
Auxiliary	Wood Pulp Requirement {**autotype** Real; **autounit** tn/yr; **def** (1-'% Recovered P&B')*'Raw Material Requirement'}
Constant	% Reserve {**autotype** Real; **init** 0.1}
Constant	Processing P&B Investment Requirement {**autotype** Real; **unit** EUR; **init** 300000000; }
Constant	Recycling P&B Investment Requirement {**autotype** Real; **unit** EUR; **init** 310000000}
Constant	Reserve Threshold {**autotype** Real; **unit** EUR; **init** 500000000}
Constant	Wood Pulp Investment Requirement {**autotype** Real; **unit** EUR; **init** 400000000}
Level	% Non-Fibrous Material {**autotype** Real; **init** 0.1178; **inflow** { **autodef** 'Variation of Non-Fibrous Material' }}
Level	% Waste {**autotype** Real; **init** 0.0344; **inflow** { **autodef** 'Increase of % Waste' }}

Element Type	Element Information
Level	% Wood Pulp Production {**autotype** Real; **init** 0.2165; **inflow** { **autodef** 'Variation of % NL Wood Pulp Production' }}
Level	Average Price per ton of P&B {**autotype** Real; **unit** EUR/tn; **init** 600; **inflow** { **autodef** 'Variation of Price per ton of P&B' }}
Level	Current Processing Pulp Capacity {**autotype** Real; **unit** tn/yr; **init** 5000000; **inflow** { **autodef** 'Processing Pulp Expansion' }; **outflow** { **autodef** 'Current Processing Pulp Reduction' }}
Level	Current Recycling P&B Capacity {**autotype** Real; **unit** tn/yr; **init** 3500000; **inflow** { **autodef** 'Current Recycling P&B Expansion' }; **outflow** { **autodef** 'Current Recycling P&B Reduction' }}
Level	Current Wood Pulp Capacity {**autotype** Real; **unit** tn/yr; **init** 160000; **inflow** { **autodef** 'Wood Pulp Expansion' }; **outflow** { **autodef** 'Current Wood Pulp Reduction' }}
Level	Employees {**autotype** Real; **unit** p; **init** 6300; **outflow** { **autodef** Layoffs }; **inflow** { **autodef** Hirings }}
Level	Expected Processing Pulp Capacity {**autotype** Real; **unit** tn/yr; **init** 5000000; **inflow** { **autodef** 'Expected Processing Pulp Expansion' }; **outflow** { **autodef** 'Expected Processing Pulp Reduction' }}
Level	Expected Recycling P&B Capacity {**autotype** Real; **unit** tn/yr; **init** 3500000; **inflow** { **autodef** 'Expected Recycling P&B Expansion' }; **outflow** { **autodef** 'Expected Recycling P&B Reduction' }}
Level	Expected Wood Pulp Capacity {**autotype** Real; **unit** tn/yr; **init** 160000; **inflow** { **autodef** 'Expected Wood Pulp Expansion' }; **outflow** { **autodef** 'Expected Wood Pulp Reduction' }}
Level	Foreign % Collection {**autotype** Real; **init** 0.3824; **inflow** { **autodef** 'Increase in Foreign % Collection' }}
Level	Foreign Average Consumption per Capita {**autotype** Real; **unit** tn/(yr*p); **init** 0.1342; **inflow** { **autodef** 'Increase in Foreign Consumption per Capita' }}
Level	Foreign Paper Accumulation {**autotype** Real; **unit** tn; **init** 7128600; **inflow** { **autodef** 'Foreign Consumption Rate' }; **outflow** { **autodef** 'Foreign P&B Collection Rate' }; **outflow** { **autodef** 'Foreign Disposal Rate' }}
Level	Foreign Population {**autotype** Real; **unit** p; **init** 427306192.3; **inflow** { **autodef** 'Foreign Growth' }}
Level	NL % Collection {**autotype** Real; **init** 0.5718; **inflow** { **autodef** 'Increase in NL % Collection' }}
Level	NL Average Consumption per Capita {**autotype** Real; **unit** tn/(yr*p); **init** 0.21; **inflow** { **autodef** 'Increase in NL Consumption per Capita' }}
Level	NL Converted P&B {**autotype** Real; **unit** tn; **init** 10000000; **outflow** { **autodef** 'Processed P&B for NL Consumption' }; **inflow** { **autodef** 'Imported P&B' }; **inflow** { **autodef** 'P&B NL Sales' }}
Level	NL P&B Accumulation {**autotype** Real; **unit** tn; **init** 250000; **inflow** { **autodef** 'Processed P&B for NL Consumption' }; **outflow** { **autodef** 'Disposal Rate' }; **outflow** { **autodef** 'P&B Collection Rate' }}
Level	NL P&B Collection {**autotype** Real; **unit** tn; **init** 1746000; **outflow** { **autodef** 'NL Recovered P&B Rate' }; **outflow** { **autodef** 'NL Collected P&B Export Rate' }; **inflow** { **autodef** 'P&B Collection Rate' }}
Level	NL Population {**autotype** Real; **unit** p; **init** 15010000; **outflow** { **autodef** Decline }; **inflow** { **autodef** Growth }}
Level	NL Stock Wood Pulp {**autotype** Real; **unit** tn; **init** 6000000; **inflow** { **autodef** 'Purchased Amount Wood Pulp' }; **outflow** { **autodef** 'Processing Pulp' }; **outflow** { **autodef** Waste }; **inflow** { **autodef** 'DP&BI Recycling P&B' }; **inflow** { **autodef** 'Wood Pulp Production' }}
Level	P&B Consumption Forecast {**autotype** Real; **unit** tn/yr; **init** 2778538.462; **inflow** { **autodef** 'Variation in P&B Consumption Forecast' }}
Level	Persons in Compensation {**autotype** Real; **unit** p; **init** 0; **inflow** { **autodef** Layoffs }; **outflow** { **autodef** 'End of Compensation' }}
Level	Processing P&B Capital Stock {**autotype** Real; **unit** EUR; **init** 7500000000; **inflow** { **autodef** 'Processing Pulp Investment Budget Consumption' }; **outflow** { **autodef** 'Processing Pulp Depreciation' }}
Level	Processing Pulp Investment Budget {**autotype** Real; **unit** EUR; **init** 0; **outflow** { **autodef** 'Processing Pulp Investment Budget Consumption' }; **inflow** { **autodef** 'Processing Pulp Investment' }}
Level	Raw Material Need {**autotype** Real; **init** 1.0341; **inflow** { **autodef** 'Increase of Raw Material' }}
Level	Recovered P&B Stock {**autotype** Real; **unit** tn; **init** 96000; **inflow** { **autodef** 'Recovered P&B Rate' }; **outflow** { **autodef** 'DP&BI Recycling P&B' }; **inflow** { **autodef** 'Foreign Recovered P&B Rate' }}
Level	Recycling P&B Capital Stock {**autotype** Real; **unit** EUR; **init** 1550000000; **inflow** { **autodef** 'Recycling P&B Investment Consumption' }; **outflow** { **autodef** 'Recycling P&B Depreciation' }}
Level	Recycling P&B Investment Budget {**autotype** Real; **unit** EUR; **init** 0; **outflow** { **autodef** 'Recycling P&B Investment Consumption' }; **inflow** { **autodef** 'Recycling P&B Investment' }}
Level	Reserve for Investments {**autotype** Real; **unit** EUR; **init** 500000000; **inflow** { **autodef** 'Net Inflow for Reserve' }; **outflow** { **autodef** 'Recycling P&B Investment' }; **outflow** { **autodef** 'Processing Pulp Investment' }; **outflow** { **autodef** 'Wood Pulp Investment' }}
Level	Stock P&B {**autotype** Real; **unit** tn; **init** 54500; **inflow** { **autodef** 'Processing Pulp' }; **outflow** { **autodef** 'P&B International Sales' }; **outflow** { **autodef** 'P&B NL Sales' }}
Level	Unitary Maintenance Cost {**autotype** Real; **unit** EUR/tn; **init** 10; **inflow** { **autodef** 'Increase Unitary Maintenance Cost' }}
Level	Wood Pulp Capital Stock {**autotype** Real; **unit** EUR; **init** 1600000; **inflow** { **autodef** 'Wood Pulp Investment Consumption' }; **outflow** { **autodef** 'Wood Pulp Depreciation' }}
Level	Wood Pulp Investment Budget {**autotype** Real; **unit** EUR; **init** 0; **outflow** { **autodef** 'Wood Pulp Investment Consumption' }; **inflow** { **autodef** 'Wood Pulp Investment' }

2. Specification of New Facilities

This section presents the design of the five set-ups for a new facility, i.e. a recycling P&B pulp plant, a wood pulp plant, a P&B plant using wood pulp; a P&B plant using recycled fibres, a P&B plant using wood pulp and a P&B plant using wood pulp and recycled fibres.

Figure SM1 portrays the graphical representation in the simulation model for the case of a new facility with one production function, i.e. the production of pulp from recycled fibres.
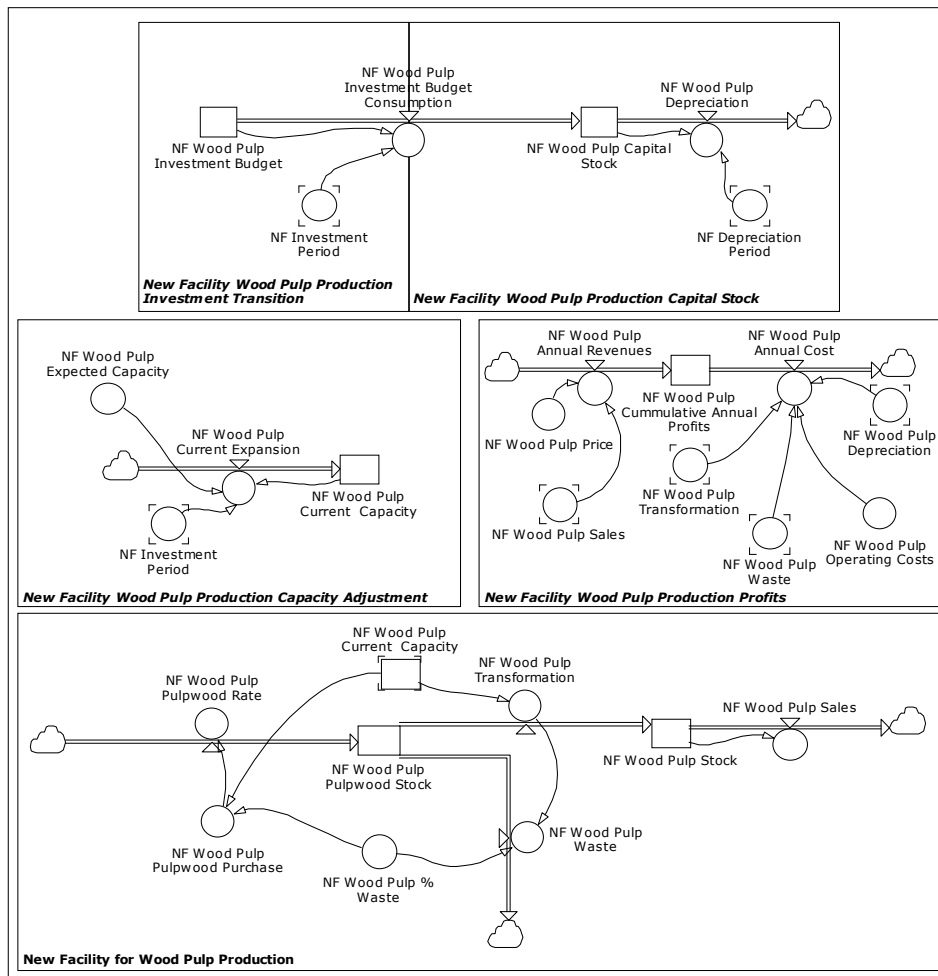
Once an investment budget is available, it will reduce in a delay construction that depends on the investment period. This flow will feed the capital stock, which will reduce in a delay construction that takes into account the depreciation period.
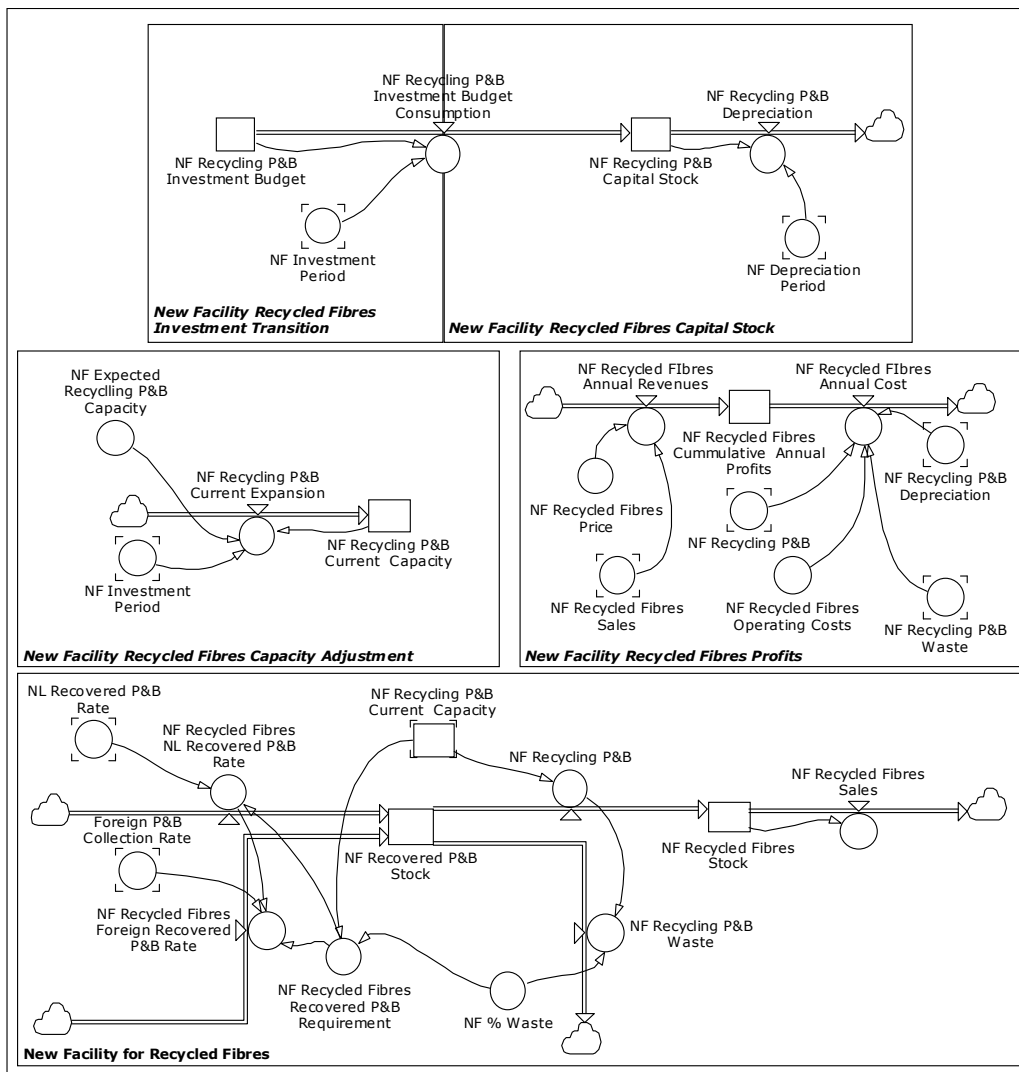
Figure SM1: New Facility for Recycling Pulp Production

At the same time, the current capacity will start to build up in a goal-seeking construction that combines the expected capacity, the current capacity and the investment period.

After the investment period has passed, the new facility starts buying raw material for the production process; in this case, it is recovered P&B. The raw material (recovered P&B) is transformed at the current capacity and at the same time waste is produced in relation with the production rate. Afterwards, the final product is ready for sales.

The sales of recycled fibres and the price serve to calculate the revenues. The costs depend on the production function, the produced waste, the operation costs and the depreciation. The revenues and costs provide the cumulative profits of the new facility.

Figure SM2 portrays the graphical representation in the simulation model for the case of a new facility with one production function, i.e. the production of wood pulp.
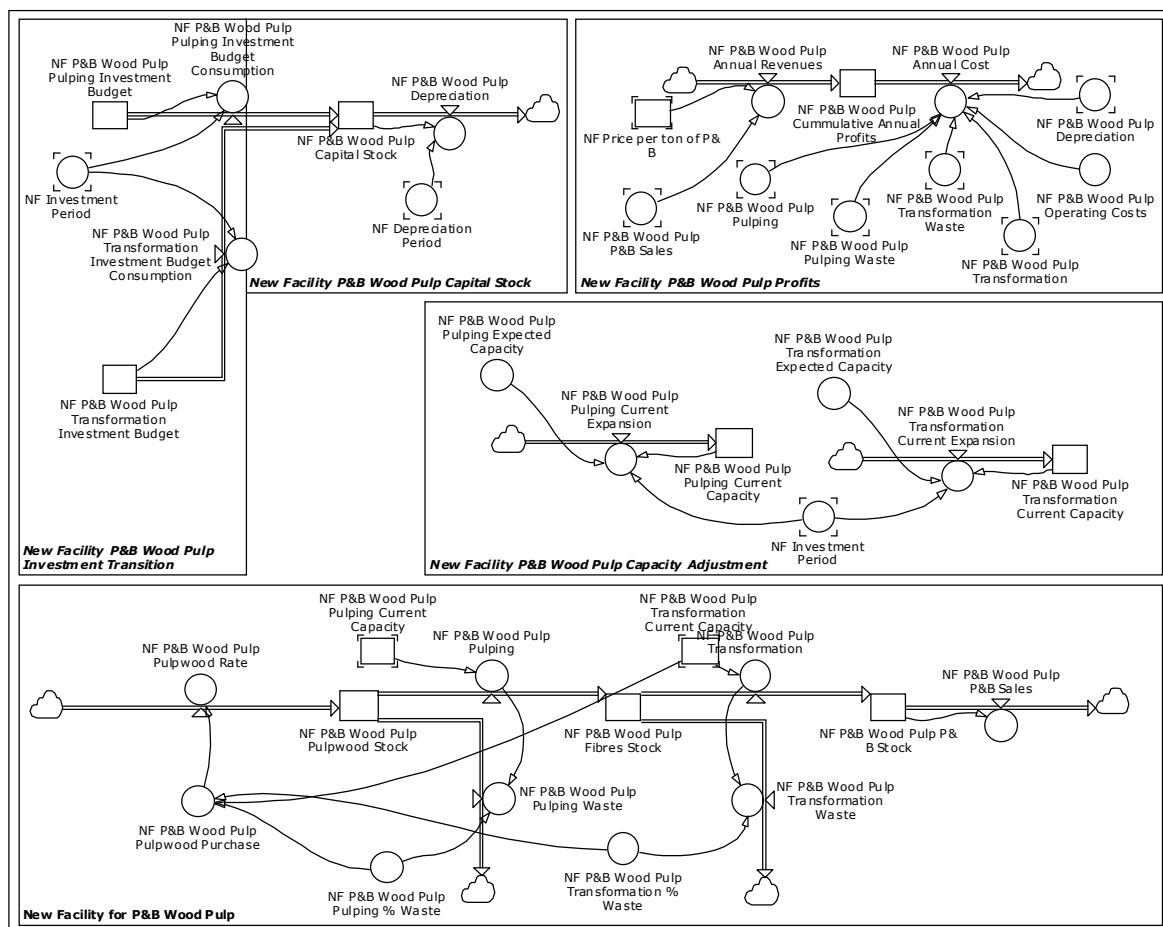

Figure SM2: New Facility for Wood Pulp Production

Once an investment budget for the wood pulp production is available, it will reduce in a delay construction that depends on the investment period. This flow will feed the capital stock, which will reduce in a delay construction that takes into account the depreciation period.

At the same time, the current capacity of the wood pulp production function will start to build up in a goal-seeking construction that combines the expected capacity, the current capacity and the investment period.

After the investment period has passed, the new facility starts buying raw material for the production process; in this case, it is pulpwood. The calculation of the raw material purchase depends on the capacity of the production function and the % waste. The pulpwood is transformed at the current capacity and at the same time waste is produced in relation with the production rate. Afterwards, the final product is ready for sales.

The sales of new wood fibres and the price serve to calculate the revenues. The costs depend on the produced amount of new wood fibres, the produced waste, the operation costs and the depreciation. The revenues and costs provide the cumulative profits of this new facility.

Figure SM3 presents the graphical representation in the simulation model for the case of a new facility with two production functions, i.e. the production of wood pulp and P&B.
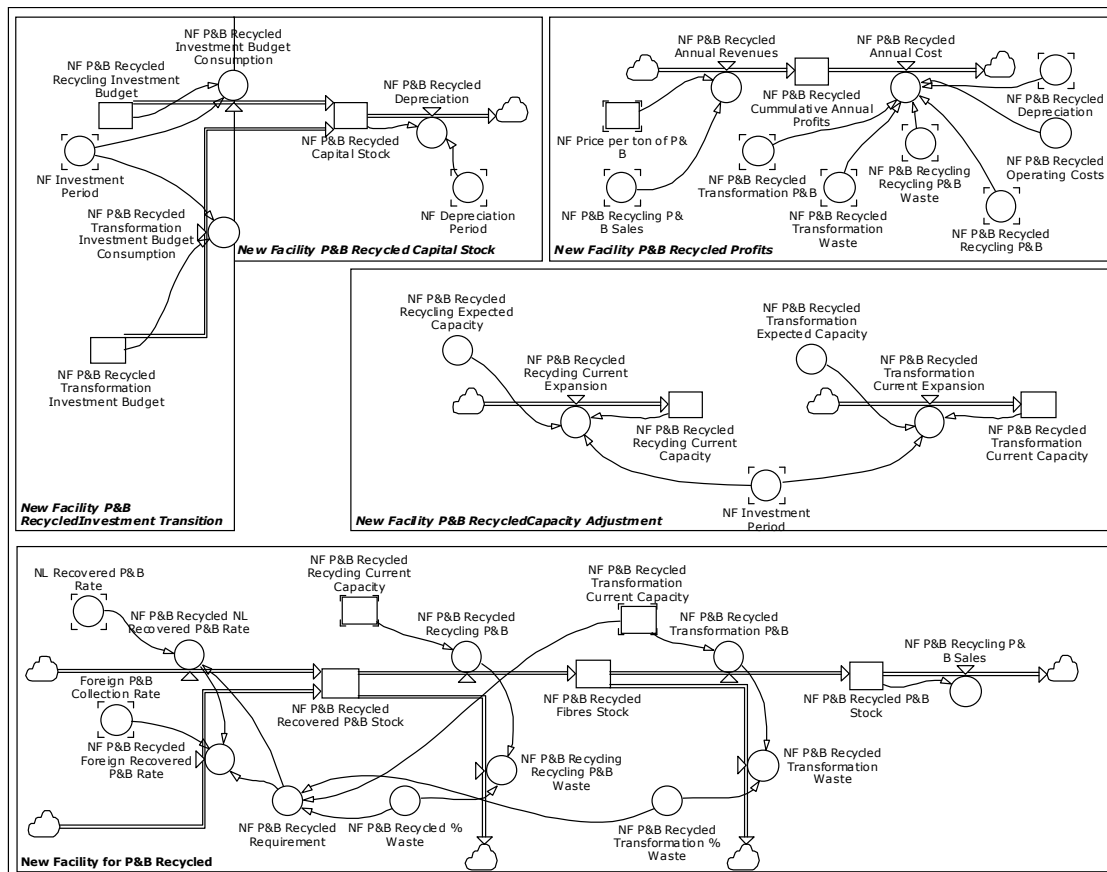

Figure SM3: New Facility for Wood Pulp and P&B

Once an investment budget for the wood pulp production and the P&B transformation are available, they will reduce in a delay construction that depends on the investment period. This flow will feed the capital stock, which will reduce in a delay construction that takes into account the depreciation period.

At the same time, the current capacity of the wood pulp and the P&B transformation production functions will start to build up in a goal-seeking construction that combines the expected capacity, the current capacity and the investment period.

After the investment period has passed, the new facility starts buying raw material for the production process; in this case, it is pulpwood. The calculation of the raw material purchase depends on the capacity of each production function and the % waste of each production. The pulpwood is transformed at the current capacity and at the same time waste is produced in relation with the production rate. Once the new wood fibres are available, they become P&B products at the current capacity and at the same time waste is produced in relation with the production rate. Afterwards, the final product is ready for sales.

The sales of P&B products made from new wood fibres and the price serve to calculate the revenues. The costs depend on the produced amount of new wood fibres, the produced amount of P&B, the produced waste in each production function, the operation costs and the depreciation. The revenues and costs provide the cumulative profits of this new facility.

Figure SM4 shows the graphical representation in the simulation model for the case of a new facility with two production functions, i.e. the production of recycled fibres and P&B.

Figure SM4: New Facility for Recycled Fibres and P&B

Once an investment budget for the recycled fibres production and the P&B transformation are available, they will reduce in a delay construction that depends on the investment period. This flow will feed the capital stock, which will reduce in a delay construction that takes into account the depreciation period.

At the same time, the current capacity of the recycled fibres and the P&B transformation production functions will start to build up in a goal-seeking construction that combines the expected capacity, the current capacity and the investment period.

After the investment period has passed, the new facility starts buying raw material for the production process; in this case, it is recovered P&B. The calculation of the raw material purchase depends on the capacity of each production function and the % waste of each production. The recovered P&B is transformed at the current capacity and at the same time waste is produced in relation with the production rate. Once the recycled fibres are available, they become P&B products at the current capacity and at the same time waste is produced in relation with the production rate. Afterwards, the final product is ready for sales.

The sales of P&B products made from recycled fibres and the price serve to calculate the revenues. The costs depend on the produced amount of recycled fibres, the produced amount of P&B, the produced waste in each production function, the operation costs and the depreciation. The revenues and costs provide the cumulative profits of this new facility.

Figure SM5 presents the graphical representation in the simulation model for the case of a new facility with three production functions, i.e. the production of wood pulp, recycled fibres and P&B.

Once an investment budget for the wood pulp production, recycled fibres production and the P&B transformation are available, they will reduce in a delay construction that depends on the investment period. This flow will feed the capital stock, which will reduce in a delay construction that takes into account the depreciation period.

At the same time, the current capacity of the wood pulp, recycled fibres and the P&B transformation production functions will start to build up in a goal-seeking construction that combines the expected capacity, the current capacity and the investment period.

After the investment period has passed, the new facility starts buying raw material for the production process; in this case, it is pulpwood and recovered P&B. The calculation of the raw material purchase depends on the capacity of each production function and the % waste of each production. The pulpwood and the recovered P&B are transformed at the current capacity and at the same time waste is produced in relation with each production rate. Once the new and recycled fibres are available, they become P&B products at the current capacity producing at the same time waste in relation with the production rate. Afterwards, the final product is ready for sales.

The sales of P&B products made from mixed fibres and the price serve to calculate the revenues. The costs depend on the produced amount of new wood fibres, the produced amount of recycled fibres, the produced amount of P&B, the produced waste in each production function, the operation costs and the depreciation. The revenues and costs provide the cumulative profits of this new facility.

When the new facility produces P&B, the prices behave with a similar volatility of the Dutch P&BI. However, the prices are lower to compete with the products of the Dutch P&BI as explained in section 2.1.1: Production Process. The assumption is that the new facility has a more efficient production process than the Dutch P&BI.
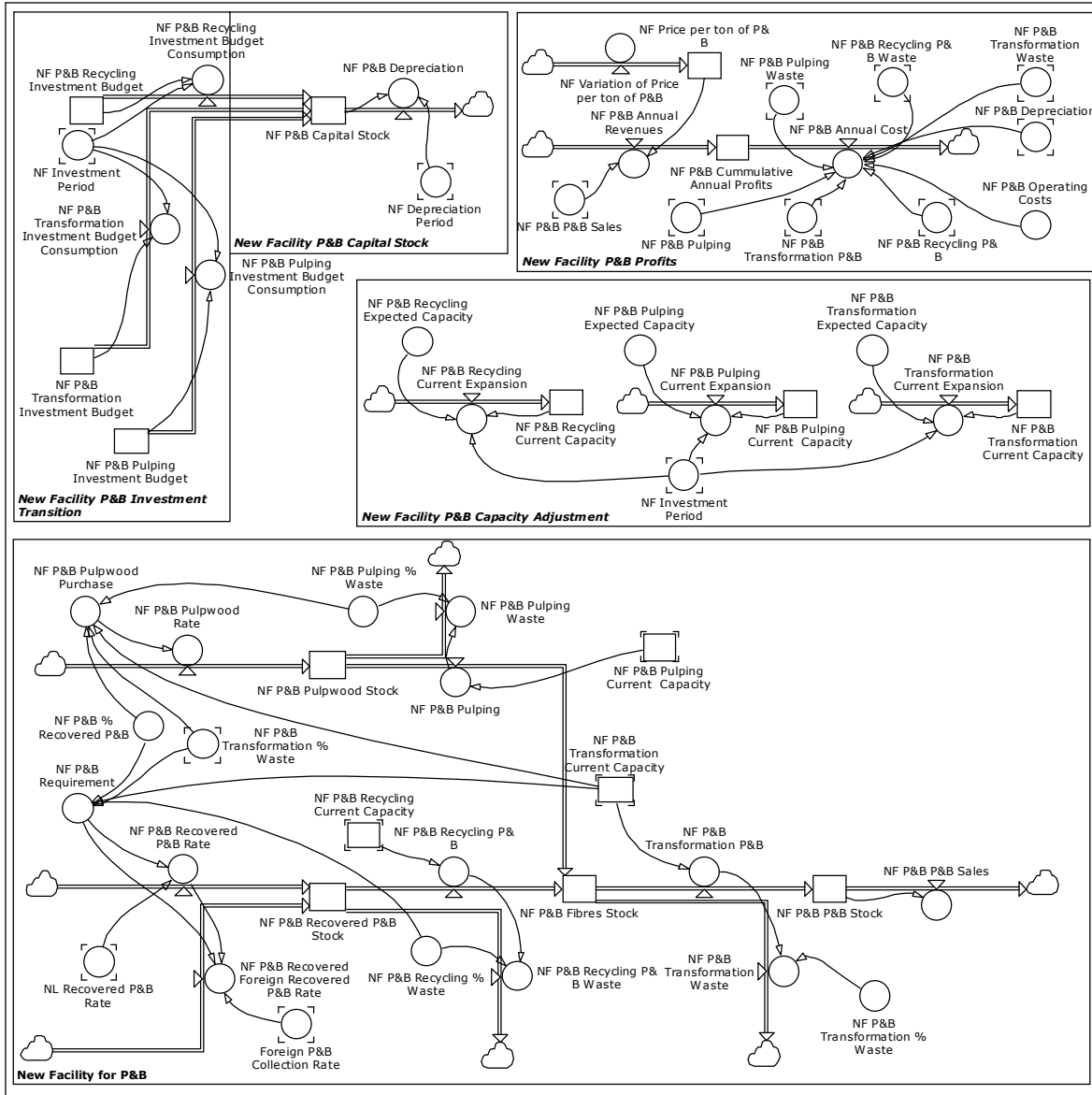
Figure SM5: New Facility for Wood Pulp, Recycled Fibres and P&B

Table SM3 presents the model equations of the quantitative model of the new facilities, ordered by element type.

Table SM3: Model equations of the new facilities

Element Type	Element Information
Auxiliary	NF P&B Depreciation {**autotype** Real; **autounit** EUR/yr; **def** STEP('NF P&B Capital Stock'/'NF Depreciation Period',STARTTIME+20<<yr>>)}
Auxiliary	NF P&B Operating Costs {**autotype** Real; **unit** EUR/tn; **def** 285}
Auxiliary	NF P&B P&B Sales {**autotype** Real; **autounit** tn/yr; **def** 0*'NF P&B P&B Stock'/1<<yr>>}
Auxiliary	NF P&B Pulping % Waste {; **autotype** Real; **def** 0.25}
Auxiliary	NF P&B Pulping {**autotype** Real; **autounit** tn/yr; **def** STEP('NF P&B Pulping Current Capacity',STARTTIME+20<<yr>>)}
Auxiliary	NF P&B Pulping Current Expansion {**autotype** Real; **autounit** tn/yr²; **def** STEP(('NF P&B Pulping Expected Capacity'-'NF P&B Pulping Current Capacity')/'NF Investment Period',STARTTIME+16<<yr>>)}
Auxiliary	NF P&B Pulping Expected Capacity {**autotype** Real; **unit** tn/yr; **def** 35256}

Element Type	Element Information
Auxiliary	NF P&B Pulping Investment Budget Consumption {**autotype** Real; **autounit** EUR/yr; **def** STEP(IF('NF P&B Pulping Investment Budget'>0<<EUR>>,'NF P&B Pulping Investment Budget'/'NF Investment Period',0<<EUR/yr>>),STARTTIME+16<<yr>>)}
Auxiliary	NF P&B Pulping Waste {**autotype** Real; **autounit** tn/yr; **def** STEP('NF P&B Pulping'*'NF P&B Pulping % Waste'/(1-'NF P&B Pulping % Waste'), STARTTIME+20<<yr>>)}
Auxiliary	NF P&B Pulpwood Purchase {**autotype** Real; **unit** tn/yr; **def** STEP(((1-'NF P&B % Recovered P&B')*('NF P&B Transformation Current Capacity'/(1-'NF P&B Transformation % Waste')))/'NF P&B Pulping % Waste',STARTTIME+20<<yr>>)}
Auxiliary	NF P&B Pulpwood Rate {**autotype** Real; **autounit** tn/yr; **def** 'NF P&B Pulpwood Purchase'}
Auxiliary	NF P&B Recovered Foreign Recovered P&B Rate {**autotype** Real; **unit** tn/yr; **def** MIN(IF(('NF P&B Requirement'-'NF P&B Recovered P&B Rate')<0<<tn/yr>>,0<<tn/yr>>,('NF P&B Requirement'-'NF P&B Recovered P&B Rate')),'Foreign P&B Collection Rate')}
Auxiliary	NF P&B Recovered P&B Rate {**autotype** Real; **autounit** tn/yr; **def** MIN('NF P&B Requirement','NL Recovered P&B Rate')}
Auxiliary	NF P&B Recycled % Waste {**autotype** Real; **def** 0.3; }
Auxiliary	NF P&B Recycled Annual Cost {**autotype** Real; **autounit** EUR/yr; **def** STEP(('NF P&B Recycled Operating Costs'*('NF P&B Recycled Transformation P&B'+'NF P&B Recycled Recycling P&B'+'NF P&B Recycled Transformation Waste'+'NF P&B Recycling Recycling P&B Waste'))+'NF P&B Recycled Depreciation',STARTTIME+20<<yr>>)}
Auxiliary	NF P&B Recycled Annual Revenues {**autotype** Real; **autounit** EUR/yr; **def** STEP('NF Price per ton of P&B'*'NF P&B Recycling P&B Sales',STARTTIME+20<<yr>>)}
Auxiliary	NF P&B Recycled Depreciation {**autotype** Real; **autounit** EUR/yr; **def** STEP('NF P&B Recycled Capital Stock'/'NF Depreciation Period',STARTTIME+20<<yr>>)}
Auxiliary	NF P&B Recycled Foreign Recovered P&B Rate {**autotype** Real; **unit** tn/yr; **def** MIN(IF(('NF P&B Recycled Requirement'-'NF P&B Recycled NL Recovered P&B Rate')<0<<tn/yr>>,0<<tn/yr>>,('NF P&B Recycled Requirement'-'NF P&B Recycled NL Recovered P&B Rate')),'Foreign P&B Collection Rate')}
Auxiliary	NF P&B Recycled Investment Budget Consumption {**autotype** Real; **autounit** EUR/yr; **def** STEP(IF('NF P&B Recycled Recycling Investment Budget'>0<<EUR>>,'NF P&B; Recycled Recycling Investment Budget'/'NF Investment Period',0<<EUR/yr>>),STARTTIME+16<<yr>>)}
Auxiliary	NF P&B Recycled NL Recovered P&B Rate {**autotype** Real; **autounit** tn/yr; **def** MIN('NF P&B Recycled Requirement', 'NL Recovered P&B Rate')}
Auxiliary	NF P&B Recycled Operating Costs {**autotype** Real; **unit** EUR/tn; **def** 285}
Auxiliary	NF P&B Recycled Recycling Current Expansion {**autotype** Real; **autounit** tn/yr²; **def** STEP(('NF P&B Recycled Recycling Expected Capacity'-'NF P&B Recycled Recycling Current Capacity')/'NF Investment Period',STARTTIME+16<<yr>>)}
Auxiliary	NF P&B Recycled Recycling Expected Capacity {**autotype** Real; **unit** tn/yr; **def** 150376}
Auxiliary	NF P&B Recycled Recycling P&B {**autotype** Real; **autounit** tn/yr; **def** STEP('NF P&B Recycled Recycling Current Capacity',STARTTIME+20<<yr>>)}
Auxiliary	NF P&B Recycled Requirement {**autotype** Real; **unit** tn/yr; **def** STEP(('NF P&B Recycled Transformation Current Capacity'/((1-'NF P&B Recycled % Waste')*(1-'NF P&B Recycled Transformation % Waste'))),STARTTIME+20<<yr>>)}
Auxiliary	NF P&B Recycled Transformation % Waste {**autotype** Real; **def** 0.05}
Auxiliary	NF P&B Recycled Transformation Current Expansion {**autotype** Real; **autounit** tn/yr²; **def** STEP(('NF P&B Recycled Transformation Expected Capacity'-'NF P&B Recycled Transformation Current Capacity')/'NF Investment Period',STARTTIME+16<<yr>>)}
Auxiliary	NF P&B Recycled Transformation Expected Capacity {**autotype** Real; **unit** tn/yr; **def** 100000}
Auxiliary	NF P&B Recycled Transformation Investment Budget Consumption {**autotype** Real; **autounit** EUR/yr; **def** STEP(IF('NF P&B Recycled Transformation Investment Budget'>0<<EUR>>,'NF P&B Recycled Transformation Investment Budget'/'NF Investment Period',0<<EUR/yr>>),STARTTIME+16<<yr>>)}
Auxiliary	NF P&B Recycled Transformation P&B {**autotype** Real; **autounit** tn/yr; **def** STEP('NF P&B Recycled Transformation Current Capacity',STARTTIME+20<<yr>>)}
Auxiliary	NF P&B Recycled Transformation Waste {**autotype** Real; **autounit** tn/yr; **def** STEP('NF P&B Recycled Transformation P&B'*'NF P&B Recycled Transformation % Waste'/(1-'NF P&B Recycled Transformation % Waste'),STARTTIME+20<<yr>>)}
Auxiliary	NF P&B Recycling % Waste {**autotype** Real; **def** 0.3}
Auxiliary	NF P&B Recycling Current Expansion {**autotype** Real; **autounit** tn/yr²; **def** STEP(('NF P&B Recycling Expected Capacity'-'NF P&B Recycling Current Capacity')/'NF Investment Period',STARTTIME+16<<yr>>)}
Auxiliary	NF P&B Recycling Expected Capacity {**autotype** Real; **unit** tn/yr; **def** 112602}

Element Type	Element Information
Auxiliary	NF P&B Recycling Investment Budget Consumption {**autotype** Real; **autounit** EUR/yr; **def** STEP(IF('NF P&B Recycling Investment Budget'>0<<EUR>>,'NF P&B Recycling Investment Budget'/'NF Investment Period',0<<EUR/yr>>),STARTTIME+16<<yr>>)}
Auxiliary	NF P&B Recycling P&B {**autotype** Real; **autounit** tn/yr; **def** STEP('NF P&B Recycling Current Capacity',STARTTIME+20<<yr>>)}
Auxiliary	NF P&B Recycling P&B Sales {**autotype** Real; **autounit** tn/yr; **def** 0*'NF P&B Recycled P&B Stock'/1<<yr>>}
Auxiliary	NF P&B Recycling P&B Waste {**autotype** Real; **autounit** tn/yr; **def** STEP('NF P&B Recycling P&B'*'NF P&B Recycling % Waste'/(1-'NF P&B Recycling % Waste'),STARTTIME+20<<yr>>)}
Auxiliary	NF P&B Recycling Recycling P&B Waste {**autotype** Real; **autounit** tn/yr; **def** STEP('NF P&B Recycled Recycling P&B'*'NF P&B Recycled % Waste'/(1-'NF P&B Recycled % Waste'),STARTTIME+20<<yr>>)}
Auxiliary	NF P&B Requirement {**autotype** Real; **unit** tn/yr; **def** STEP(('NF P&B % Recovered P&B'*('NF P&B Transformation Current Capacity'/(1-'NF P&B Transformation % Waste')))/'NF P&B Recycling % Waste',STARTTIME+20<<yr>>)}
Auxiliary	NF P&B Transformation % Waste {**autotype** Real; **def** 0.05}
Auxiliary	NF P&B Transformation Current Expansion {**autotype** Real; **autounit** tn/yr²; **def** STEP(('NF P&B Transformation Expected Capacity'-'NF P&B Transformation Current Capacity')/'NF Investment Period',STARTTIME+16<<yr>>)}
Auxiliary	NF P&B Transformation Expected Capacity {**autotype** Real; **unit** tn/yr; **def** 100000 }
Auxiliary	NF P&B Transformation Investment Budget Consumption {**autotype** Real; **autounit** EUR/yr; **def** STEP(IF('NF P&B Transformation Investment Budget'>0<<EUR>>,'NF P&B Transformation Investment Budget'/'NF Investment Period',0<<EUR/yr>>), STARTTIME+16<<yr>>)}
Auxiliary	NF P&B Transformation P&B {**autotype** Real; **autounit** tn/yr; **def** 'NF P&B Transformation Current Capacity'}
Auxiliary	NF P&B Transformation Waste {**autotype** Real; **autounit** tn/yr; **def** STEP('NF P&B Transformation P&B'*'NF P&B Transformation % Waste'/(1-'NF P&B Transformation % Waste'),STARTTIME+20<<yr>>)}
Auxiliary	NF P&B Wood Pulp Annual Cost {**autotype** Real; **autounit** EUR/yr; **def** STEP(('NF P&B Wood Pulp Operating Costs'*('NF P&B Wood Pulp Transformation'+'NF P&B Wood Pulp Pulping'+'NF P&B Wood Pulp Pulping Waste'+'NF P&B Wood Pulp Transformation Waste'))+'NF P&B Wood Pulp Depreciation',STARTTIME+20<<yr>>)}
Auxiliary	NF P&B Wood Pulp Annual Revenues {**autotype** Real; **autounit** EUR/yr; **def** STEP('NF Price per ton of P&B'*'NF P&B Wood Pulp P&B Sales',STARTTIME+20<<yr>>)}
Auxiliary	NF P&B Wood Pulp Depreciation {**autotype** Real; **autounit** EUR/yr; **def** STEP('NF P&B Wood Pulp Capital Stock'/'NF Depreciation Period',STARTTIME+20<<yr>>)}
Auxiliary	NF P&B Wood Pulp Operating Costs {**autotype** Real; **unit** EUR/tn; **def** 285}
Auxiliary	NF P&B Wood Pulp P&B Sales {**autotype** Real; **autounit** tn/yr; **def** 0*'NF P&B Wood Pulp P&B Stock'/1<<yr>>}
Auxiliary	NF P&B Wood Pulp Pulping % Waste {**autotype** Real; **def** 0.25}
Auxiliary	NF P&B Wood Pulp Pulping {**autotype** Real; **autounit** tn/yr; **def** STEP('NF P&B Wood Pulp Pulping Current Capacity',STARTTIME+20<<yr>>)}
Auxiliary	NF P&B Wood Pulp Pulping Current Expansion {**autotype** Real; **autounit** tn/yr²; **def** STEP(('NF P&B Wood Pulp Pulping Expected Capacity'-'NF P&B Wood Pulp Pulping Current Capacity')/'NF Investment Period',STARTTIME+16<<yr>>)}
Auxiliary	NF P&B Wood Pulp Pulping Expected Capacity {**autotype** Real; **unit** tn/yr; **def** 140351}
Auxiliary	NF P&B Wood Pulp Pulping Investment Budget Consumption {**autotype** Real; **autounit** EUR/yr; **def** STEP('NF P&B Wood Pulp Pulping Investment Budget'/'NF Investment Period',STARTTIME+20<<yr>>)}
Auxiliary	NF P&B Wood Pulp Pulping Waste {**autotype** Real; **autounit** tn/yr; **def** STEP('NF P&B Wood Pulp Pulping'*'NF P&B Wood Pulp Pulping % Waste'/(1-'NF P&B Wood Pulp Pulping % Waste'),STARTTIME+20<<yr>>)}
Auxiliary	NF P&B Wood Pulp Pulpwood Purchase {**autotype** Real; **unit** tn/yr; **def** STEP('NF P&B Wood Pulp Transformation Current Capacity'/((1-'NF P&B Wood Pulp Pulping % Waste')*(1-'NF P&B Wood Pulp Transformation % Waste'))),STARTTIME+20<<yr>>)}
Auxiliary	NF P&B Wood Pulp Pulpwood Rate {**autotype** Real; **autounit** tn/yr; **def** STEP('NF P&B Wood Pulp Pulpwood Purchase',STARTTIME+20<<yr>>)}
Auxiliary	NF P&B Wood Pulp Transformation % Waste {**autotype** Real; **def** 0.05}
Auxiliary	NF P&B Wood Pulp Transformation {**autotype** Real; **autounit** tn/yr; **def** STEP('NF P&B Wood Pulp Transformation Current Capacity',STARTTIME+20<<yr>>)}
Auxiliary	NF P&B Wood Pulp Transformation Current Expansion {**autotype** Real; **autounit** tn/yr²; **def** STEP(('NF P&B Wood Pulp Transformation Expected Capacity'-'NF P&B Wood Pulp}

Element Type	Element Information
Auxiliary	NF P&B Wood Pulp Transformation Expected Capacity {**autotype** Real; **unit** tn/yr; **def** 100000}
Auxiliary	NF P&B Wood Pulp Transformation Investment Budget Consumption {**autotype** Real; **autounit** EUR/yr; **def** STEP(IF('NF P&B Wood Pulp Transformation Investment Budget'>0<<EUR>>,'NF P&B Wood Pulp Transformation Investment Budget'/'NF Investment Period',0<<EUR/yr>>),STARTTIME+16<<yr>>)}
Auxiliary	NF P&B Wood Pulp Transformation Waste {**autotype** Real; **autounit** tn/yr; **def** STEP('NF P&B Wood Pulp Transformation'*'NF P&B Wood Pulp Transformation % Waste'/(1-'NF P&B Wood Pulp Transformation % Waste'),STARTTIME+20<<yr>>)}
Auxiliary	NF Recycled % Waste {**autotype** Real; **def** 0.3}
Auxiliary	NF Recycled FIbres Annual Cost {**autotype** Real; **autounit** EUR/yr; **def** STEP(('NF Recycled Fibres Operating Costs'*('NF Recycling P&B'+'NF Recycling P&B Waste'))+'NF Recycling P&B Depreciation',STARTTIME+20<<yr>>)}
Auxiliary	NF Recycled Fibres Annual Revenues {**autotype** Real; **autounit** EUR/yr; **def** STEP('NF Recycled Fibres Price'*'NF Recycled Fibres Sales',STARTTIME+20<<yr>>}
Auxiliary	NF Recycled Fibres Foreign Recovered P&B Rate {**autotype** Real; **unit** tn/yr; **def** MIN(IF(('NF Recycled Fibres Recovered P&B Requirement'-'NF Recycled Fibres NL Recovered P&B Rate')<0<<tn/yr>>,0<<tn/yr>>, ('NF Recycled Fibres Recovered P&B Requirement'-'NF Recycled Fibres NL Recovered P&B Rate')),'Foreign P&B Collection Rate')}
Auxiliary	NF Recycled Fibres NL Recovered P&B Rate {**autotype** Real; **autounit** tn/yr; **def** MIN('NF Recycled Fibres Recovered P&B Requirement', 'NL Recovered P&B Rate')}
Auxiliary	NF Recycled Fibres Operating Costs {**autotype** Real; **unit** EUR/tn; **def** 285}
Auxiliary	NF Recycled Fibres Price {**autotype** Real; **unit** EUR/tn; **def** 380}
Auxiliary	NF Recycled Fibres Recovered P&B Requirement {**autotype** Real; **unit** tn/yr; **def** STEP(('NF Recycling P&B Current Capacity'/(1-'NF Recycled % Waste')), STARTTIME+20<<yr>>)}
Auxiliary	NF Recycled Fibres Sales {**autotype** Real; **autounit** tn/yr; **def** 0*'NF Recycled Fibres Stock'/1<<yr>>}
Auxiliary	NF Recycling P&B {**autotype** Real; **autounit** tn/yr; **def** STEP('NF Recycling P&B Current Capacity',STARTTIME+20<<yr>>)}
Auxiliary	NF Recycling P&B Current Expansion {**autotype** Real; **autounit** tn/yr²; **def** STEP(('NF Recycling P&B Expected Capacity'-'NF Recycling P&B Current Capacity')/'NF Investment Period',STARTTIME+16<<yr>>)}
Auxiliary	NF Recycling P&B Depreciation {**autotype** Real; **autounit** EUR/yr; **def** STEP('NF Recycling P&B Capital Stock'/'NF Depreciation Period',STARTTIME+20<<yr>>)}
Auxiliary	NF Recycling P&B Expected Capacity {**autotype** Real; **unit** tn/yr; **def** 350000; }
Auxiliary	NF Recycling P&B Investment Budget Consumption {**autotype** Real; **autounit** EUR/yr; **def** STEP(IF('NF Recycling P&B Investment Budget'>0<<EUR>>,'NF Recycling P&B Investment Budget'/'NF Investment Period',0<<EUR/yr>>),STARTTIME+16<<yr>>)}
Auxiliary	NF Recycling P&B Waste {**autotype** Real; **autounit** tn/yr; **def** STEP('NF Recycling P&B'*'NF Recycled % Waste'/(1-'NF Recycled % Waste'), STARTTIME+20<<yr>>)}
Auxiliary	NF Variation of Price per ton of P&B {**autotype** Real; **autounit** EUR/(yr*tn); **def** STEP(10<<EUR/(tn*yr)>>+2.5<<EUR/(tn*yr)>>*COSWAVE(25,5<<yr>>,3.5<<yr>>), STARTTIME+20<<yr>>)}
Auxiliary	NF Wood Pulp % Waste {**autotype** Real; **def** 0.25}
Auxiliary	NF Wood Pulp Annual Cost {**autotype** Real; **autounit** EUR/yr; **def** STEP(('NF Wood Pulp Operating Costs'*('NF Wood Pulp Transformation'+'NF Wood Pulp Waste'))+'NF Wood Pulp Depreciation',STARTTIME+20<<yr>>)}
Auxiliary	NF Wood Pulp Annual Revenues {**autotype** Real; **autounit** EUR/yr; **def** STEP('NF Wood Pulp Price'*'NF Wood Pulp Sales',STARTTIME+20<<yr>>)}
Auxiliary	NF Wood Pulp Current Expansion {**autotype** Real; **autounit** tn/yr²; **def** STEP(('NF Wood Pulp Expected Capacity'-'NF Wood Pulp Current Capacity')/'NF Investment Period',STARTTIME+16<<yr>>)}
Auxiliary	NF Wood Pulp Depreciation {**autotype** Real; **autounit** EUR/yr; **def** STEP('NF Wood Pulp Capital Stock'/'NF Depreciation Period',STARTTIME+20<<yr>>)}
Auxiliary	NF Wood Pulp Expected Capacity {**autotype** Real; **unit** tn/yr; **def** 350000}
Auxiliary	NF Wood Pulp Investment Budget Consumption {**autotype** Real; **autounit** EUR/yr; **def** STEP('NF Wood Pulp Investment Budget'/'NF Investment Period',STARTTIME+16<<yr>>)}
Auxiliary	NF Wood Pulp Operating Costs {**autotype** Real; **unit** EUR/tn; **def** 285}
Auxiliary	NF Wood Pulp Price {**autotype** Real; **unit** EUR/tn; **def** 500}
Auxiliary	NF Wood Pulp Pulpwood Purchase {**autotype** Real; **unit** tn/yr; **def** STEP(('NF Wood Pulp Current Capacity'/(1-'NF Wood Pulp % Waste')),STARTTIME+20<<yr>>)}

Element Type	Element Information
Auxiliary	NF Wood Pulp Pulpwood Rate {**autotype** Real; **autounit** tn/yr; **def** STEP('NF Wood Pulp Pulpwood Purchase',STARTTIME+20<<yr>>)}
Auxiliary	NF Wood Pulp Sales {**autotype** Real; **autounit** tn/yr; **def** STEP('NF Wood Pulp Stock'/0.04<<yr>>,STARTTIME+20.01<<yr>>)}
Auxiliary	NF Wood Pulp Transformation {**autotype** Real; **autounit** tn/yr; **def** STEP('NF Wood Pulp Current Capacity',STARTTIME+20<<yr>>)}
Auxiliary	NF Depreciation Period {**autotype** Real; **unit** yr; **def** 25}
Auxiliary	NF Investment Period {**autotype** Real; **unit** yr; **def** 4}
Auxiliary	NF P&B % Recovered P&B {**autotype** Real; **def** 0.7488}
Auxiliary	NF P&B Annual Cost {**autotype** Real; **autounit** EUR/yr; **def** STEP(('NF P&B Operating Costs'*('NF P&B Transformation P&B'+'NF P&B Pulping'+'NF P&B Recycling P&B'+'NF P&B Pulping Waste'+'NF P&B Recycling P&B Waste'+'NF P&B Transformation Waste'))+'NF P&B Depreciation',STARTTIME+20<<yr>>}
Auxiliary	NF P&B Annual Revenues {**autotype** Real; **autounit** EUR/yr; **def** STEP('NF Price per ton of P&B'*'NF P&B P&B Sales',STARTTIME+20<<yr>>)}
Level	NF P&B Recycling Current Capacity {**autotype** Real; **unit** tn/yr; **init** 0; **inflow** { **autodef** 'NF P&B Recycling Current Expansion' }}
Level	NF P&B Transformation Current Capacity {**autotype** Real; **unit** tn/yr; **init** 0; **inflow** { **autodef** 'NF P&B Transformation Current Expansion' }}
Level	NF P&B Capital Stock {**autotype** Real; **unit** EUR; **init** 0; **inflow** { **autodef** 'NF P&B Recycling Investment Budget Consumption' }; **outflow** { **autodef** 'NF P&B Depreciation' }; **inflow** { **autodef** 'NF P&B Transformation Investment Budget Consumption' }; **inflow** { **autodef** 'NF P&B Pulping Investment Budget Consumption' }}
Level	NF P&B Cumulative Annual Profits {**autotype** Real; **unit** EUR; **init** 0; **inflow** { **autodef** 'NF P&B Annual Revenues' }; **outflow** { **autodef** 'NF P&B Annual Cost' }}
Level	NF P&B Fibres Stock {**autotype** Real; **unit** tn; **init** 0; **inflow** { **autodef** 'NF P&B Recycling P&B' }; **outflow** { **autodef** 'NF P&B Transformation P&B' }; **outflow** { **autodef** 'NF P&B Transformation Waste' }; **inflow** { **autodef** 'NF P&B Pulping' }}
Level	NF P&B P&B Stock {; **autotype** Real; **unit** tn; **init** 0; **outflow** { **autodef** 'NF P&B P&B Sales' }; **inflow** { **autodef** 'NF P&B Transformation P&B' }}
Level	NF P&B Pulping Current Capacity {**autotype** Real; **unit** tn/yr; **init** 0; **inflow** { **autodef** 'NF P&B Pulping Current Expansion' }}
Level	NF P&B Pulping Investment Budget {**autotype** Real; **unit** EUR; **init** 57338835; **outflow** { **autodef** 'NF P&B Pulping Investment Budget Consumption' }}
Level	NF P&B Pulpwood Stock {**autotype** Real; **unit** tn; **init** 0; **inflow** { **autodef** 'NF P&B Pulpwood Rate' }; **outflow** { **autodef** 'NF P&B Pulping' }; **outflow** { **autodef** 'NF P&B Pulping Waste' }}
Level	NF P&B Recovered P&B Stock {**autotype** Real; **unit** tn; **init** 0; **inflow** { **autodef** 'NF P&B Recovered P&B Rate' }; **outflow** { **autodef** 'NF P&B Recycling P&B' }; **inflow** { **autodef** 'NF P&B Recovered Foreign Recovered P&B Rate' }; **outflow** { **autodef** 'NF P&B Recycling P&B Waste' }}
Level	NF P&B Recycled Capital Stock {**autotype** Real; **unit** EUR; **init** 0; **inflow** { **autodef** 'NF P&B Recycled Investment Budget Consumption' }; **outflow** { **autodef** 'NF P&B Recycled Depreciation' }; **inflow** { **autodef** 'NF P&B Recycled Transformation Investment Budget Consumption'}}
Level	NF P&B Recycled Cumulative Annual Profits {**autotype** Real; **unit** EUR; **init** 0; **inflow** { **autodef** 'NF P&B Recycled Annual Revenues' }; **outflow** { **autodef** 'NF P&B Recycled Annual Cost' }}
Level	NF P&B Recycled Fibres Stock {**autotype** Real; **unit** tn; **init** 0; **inflow** { **autodef** 'NF P&B Recycled Recycling P&B' }; **outflow** { **autodef** 'NF P&B Recycled Transformation P&B' }; **outflow** { **autodef** 'NF P&B Recycled Transformation Waste' }}
Level	NF P&B Recycled P&B Stock {**autotype** Real; **unit** tn; **init** 0; **outflow** { **autodef** 'NF P&B Recycling P&B Sales' }; **inflow** { **autodef** 'NF P&B Recycled Transformation P&B' }}
Level	NF P&B Recycled Recovered P&B Stock {**autotype** Real; **unit** tn; **init** 0; **inflow** { **autodef** 'NF P&B Recycled NL Recovered P&B Rate' }; **outflow** { **autodef** 'NF P&B Recycled Recycling P&B' }; **inflow** { **autodef** 'NF P&B Recycled Foreign Recovered P&B Rate' }; **outflow** { **autodef** 'NF P&B Recycling Recycling P&B Waste' }}
Level	NF P&B Recycled Recycling Current Capacity {**autotype** Real; **unit** tn/yr; **init** 0; **inflow** { **autodef** 'NF P&B Recycled Recycling Current Expansion' }}
Level	NF P&B Recycled Recycling Investment Budget {**autotype** Real; **unit** EUR; **init** 114081152; **outflow** { **autodef** 'NF P&B Recycled Investment Budget Consumption' }}
Level	NF P&B Recycled Transformation Current Capacity {**autotype** Real; **unit** tn/yr; **init** 0; **inflow** { **autodef** 'NF P&B Recycled Transformation Current Expansion' }}

Element Type	Element Information
Level	NF P&B Recycled Transformation Investment Budget {**autotype** Real; **unit** EUR; **init** 191184094; **outflow** { **autodef** 'NF P&B Recycled Transformation Investment Budget Consumption' }}
Level	NF P&B Recycling Investment Budget {**autotype** Real; **unit** EUR; **init** 94526089; **outflow** { **autodef** 'NF P&B Recycling Investment Budget Consumption' }}
Level	NF P&B Transformation Investment Budget {**autotype** Real; **unit** EUR; **init** 191184094; **outflow** { **autodef** 'NF P&B Transformation Investment Budget Consumption' }}
Level	NF P&B Wood Pulp Capital Stock {**autotype** Real; **unit** EUR; **init** 0; **inflow** { **autodef** 'NF P&B Wood Pulp Pulping Investment Budget Consumption' }; **outflow** { **autodef** 'NF P&B Wood Pulp Depreciation' }; **inflow** { **autodef** 'NF P&B Wood Pulp Transformation Investment Budget Consumption' }}
Level	NF P&B Wood Pulp Cumulative Annual Profits {**autotype** Real; **unit** EUR; **init** 0; **inflow** { **autodef** 'NF P&B Wood Pulp Annual Revenues' }; **outflow** { **autodef** 'NF P&B Wood Pulp Annual Cost' }}
Level	NF P&B Wood Pulp Fibres Stock {**autotype** Real; **unit** tn; **init** 0; **inflow** { **autodef** 'NF P&B Wood Pulp Pulping' }; **outflow** { **autodef** 'NF P&B Wood Pulp Transformation' }; **outflow** { **autodef** 'NF P&B Wood Pulp Transformation Waste' }}
Level	NF P&B Wood Pulp P&B Stock {**autotype** Real; **unit** tn; **init** 0; **outflow** { **autodef** 'NF P&B Wood Pulp P&B Sales' }; **inflow** { **autodef** 'NF P&B Wood Pulp Transformation' }}
Level	NF P&B Wood Pulp Pulping Current Capacity {**autotype** Real; **unit** tn/yr; **init** 0; **inflow** { **autodef** 'NF P&B Wood Pulp Pulping Current Expansion' }}
Level	NF P&B Wood Pulp Pulping Investment Budget {**autotype** Real; **unit** EUR; **init** 140746013; **outflow** { **autodef** 'NF P&B Wood Pulp Pulping Investment Budget Consumption' }}
Level	NF P&B Wood Pulp Pulpwood Stock {**autotype** Real; **unit** tn; **init** 0; **inflow** { **autodef** 'NF P&B Wood Pulp Pulpwood Rate' }; **outflow** { **autodef** 'NF P&B Wood Pulp Pulping' }; **outflow** { **autodef** 'NF P&B Wood Pulp Pulping Waste' }}
Level	NF P&B Wood Pulp Transformation Current Capacity {**autotype** Real; **unit** tn/yr; **init** 0; **inflow** { **autodef** 'NF P&B Wood Pulp Transformation Current Expansion' }}
Level	NF P&B Wood Pulp Transformation Investment Budget {**autotype** Real; **unit** EUR; **init** 191184094; **outflow** { **autodef** 'NF P&B Wood Pulp Transformation Investment Budget Consumption' }}
Level	NF Price per ton of P&B {**autotype** Real; **unit** EUR/tn; **init** 550; **inflow** { **autodef** 'NF Variation of Price per ton of P&B' }}
Level	NF Recovered P&B Stock {**autotype** Real; **unit** tn; **init** 96000; **inflow** { **autodef** 'NF Recycled Fibres NL Recovered P&B Rate' }; **outflow** { **autodef** 'NF Recycling P&B' }; **inflow** { **autodef** 'NF Recycled Fibres Foreign Recovered P&B Rate' }; **outflow** { **autodef** 'NF Recycling P&B Waste' }}
Level	NF Recycled Fibres Cumulative Annual Profits {**autotype** Real; **unit** EUR; **init** 0; **inflow** { **autodef** 'NF Recycled Fibres Annual Revenues' }; **outflow** { **autodef** 'NF Recycled Fibres Annual Cost' }}
Level	NF Recycled Fibres Stock {**autotype** Real; **unit** tn; **init** 0; **inflow** { **autodef** 'NF Recycling P&B' }; **outflow** { **autodef** 'NF Recycled Fibres Sales' }}
Level	NF Recycling P&B Capital Stock {**autotype** Real; **unit** EUR; **init** 0; **inflow** { **autodef** 'NF Recycling P&B Investment Budget Consumption' }; **outflow** { **autodef** 'NF Recycling P&B Depreciation' }}
Level	NF Recycling P&B Current Capacity {**autotype** Real; **unit** tn/yr; **init** 0; **inflow** { **autodef** 'NF Recycling P&B Current Expansion' }}
Level	NF Recycling P&B Investment Budget {**autotype** Real; **unit** EUR; **init** 197556897; **outflow** { **autodef** 'NF Recycling P&B Investment Budget Consumption' }}
Level	NF Wood Pulp Capital Stock {**autotype** Real; **unit** EUR; **init** 0; **inflow** { **autodef** 'NF Wood Pulp Investment Budget Consumption' }; **outflow** { **autodef** 'NF Wood Pulp Depreciation' }}
Level	NF Wood Pulp Cumulative Annual Profits {**autotype** Real; **unit** EUR; **init** 0; **inflow** { **autodef** 'NF Wood Pulp Annual Revenues' }; **outflow** { **autodef** 'NF Wood Pulp Annual Cost' }}
Level	NF Wood Pulp Current Capacity {**autotype** Real; **unit** tn/yr; **init** 0; **inflow** { **autodef** 'NF Wood Pulp Current Expansion' }}
Level	NF Wood Pulp Investment Budget {**autotype** Real; **unit** EUR; **init** 254912125; **outflow** { **autodef** 'NF Wood Pulp Investment Budget Consumption' }}
Level	NF Wood Pulp Pulpwood Stock {**autotype** Real; **unit** tn; **init** 96000; **inflow** { **autodef** 'NF Wood Pulp Pulpwood Rate' }; **outflow** { **autodef** 'NF Wood Pulp Transformation' }; **outflow** { **autodef** 'NF Wood Pulp Waste' }}
Level	NF Wood Pulp Stock {**autotype** Real; **unit** tn; **init** 0; **inflow** { **autodef** 'NF Wood Pulp Transformation' }; **outflow** { **autodef** 'NF Wood Pulp Sales' }}