



# Maintenance Budget and Forecasting

Concept and recommendations



LafargeHolcim

# What is a budget?

A budget is a financial plan that lists all probable expenses and income for a given period, usually a fiscal year.

It is a forecast of expenses, revenue and profit.

**Source:** <http://www.bocomobar.org>



**What we intend  
to achieve?**

**What we are  
going to do and how  
much will cost?**

**What we  
should get  
from?**

# Why would we want one?

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- Who wants to run out of money?!?
- It's all about control!
  - It will help to **prioritize** the spending, **grow** company income and avoid unpleasant surprises



Maintenance  
budget

# A “Zero based maintenance budgeting” is requested as start

## 2.1 Maintenance budget composition

In determining the composition of a maintenance budget, a department's maintenance funding needs should be split into the following cost components (as endorsed by the Cabinet Budget Review Committee):

- condition assessment costs
- statutory maintenance costs
- preventative maintenance costs
- condition-based maintenance costs
- unplanned maintenance costs
- agency<sup>3</sup> maintenance management costs

Maintenance Management Framework

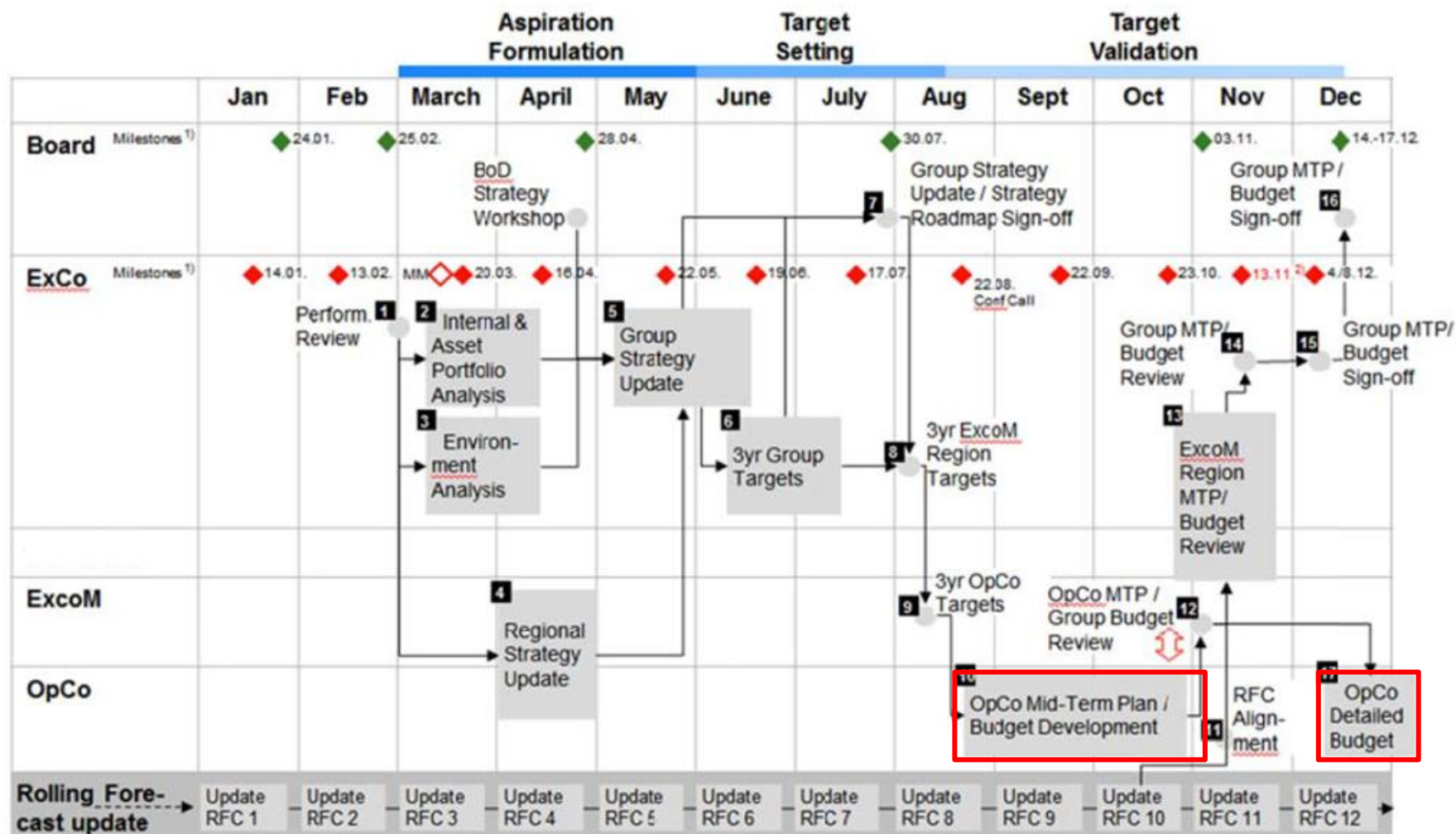
**Building Maintenance Budget**



**Table 1: Maintenance budget components**

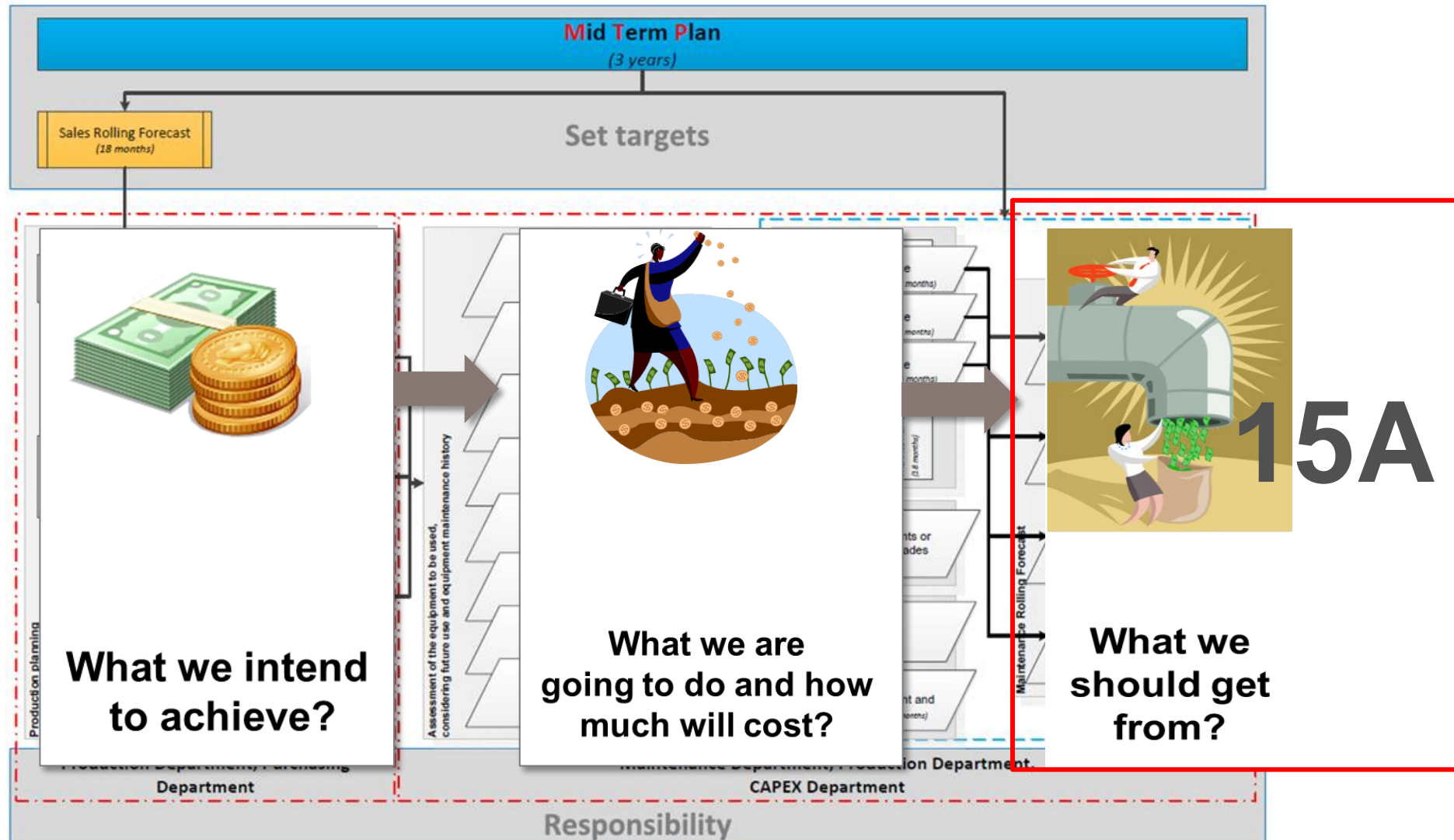
Cost component	Definition
Condition assessment cost	This is the cost of undertaking condition assessments in accordance with the MMF.
Statutory maintenance cost	This is the cost associated with undertaking maintenance to meet mandatory requirements of various regulations such as the servicing of fire protection systems.
Preventative maintenance cost	This is the cost associated with the periodic servicing of plant and equipment and preventative repairs to other building components to ensure reliable operation, comply with "duty of care" responsibilities and general good maintenance practice to preserve assets in a condition appropriate for service delivery.
Condition-based maintenance cost	Condition-based maintenance is maintenance undertaken as a result of deteriorated condition identified through condition assessments. In this regard, funding of this component is variable and less predictable.
Unplanned maintenance cost	Unplanned maintenance is reactive work undertaken as a result of breakdowns and routine failure of building components and services. Funding of this component of maintenance would fluctuate in varying degrees between agencies. However, historical data should provide guidance in terms of annual estimates of funding required.
Agency management cost <sup>*</sup>	This is the cost incurred by agencies in managing maintenance and includes the costs of management personnel, maintenance management systems, financial administration and other overhead costs. Activities to be costed include: general management; administration; maintenance planning; program formulation; program management; and contract management (if maintenance is outsourced).

# Maintenance budgeting is part of Lafarge Holcim business cycle



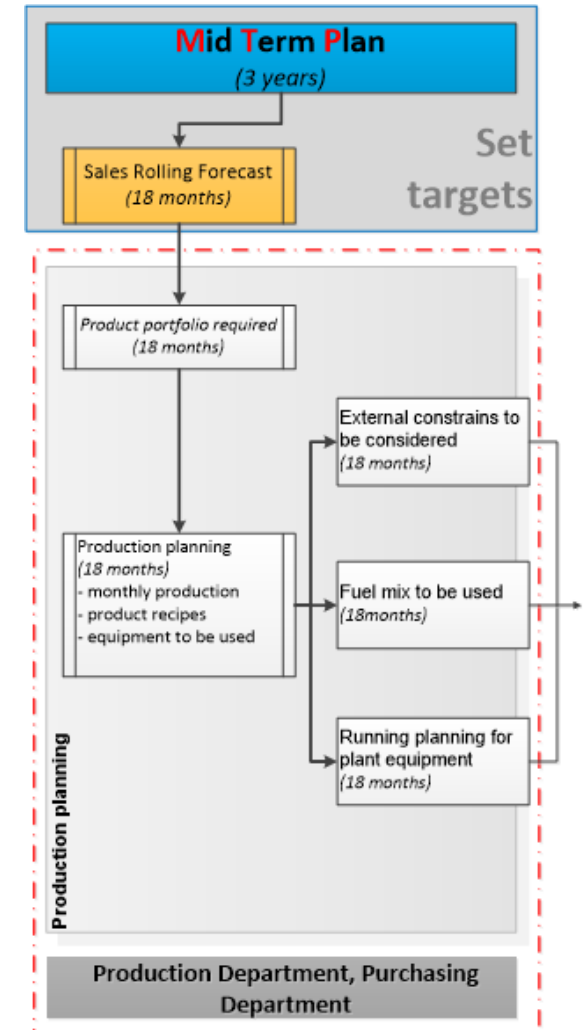


# Development of a Maintenance budgeting is a complex process involving detailed information to be processed



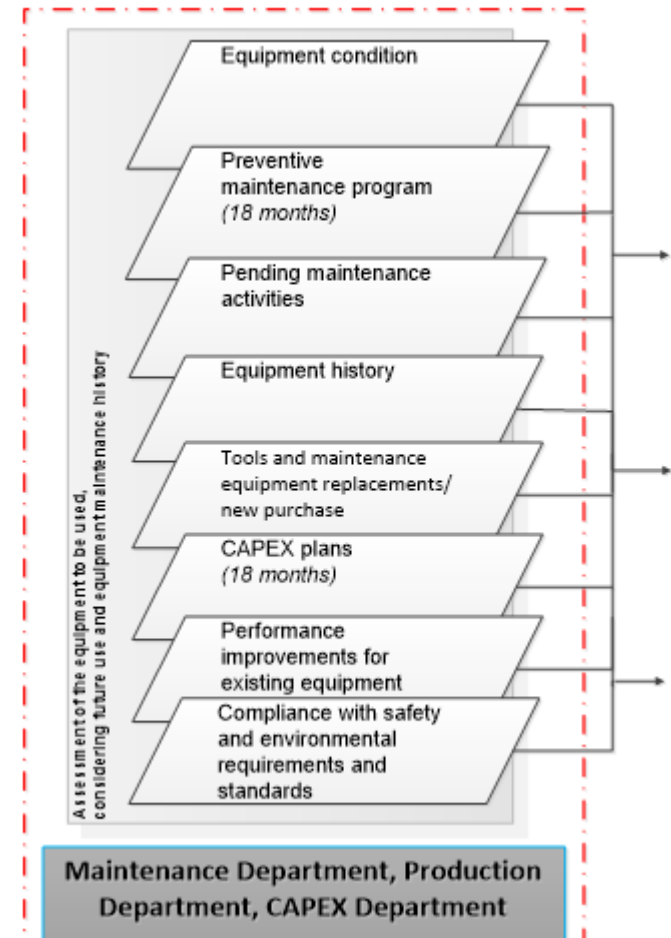
# The set company objectives are to be transposed in products and operational needs

- Sales budget
    - Quantities per product types
    - Deliveries schedule by months
- ↓
- Product portfolio required
    - Establishing the products recipes
- ↓
- Production planning with setup the
    - Monthly production required
    - Products recipes to be used
    - Equipment to be used (including power generation)



# All components of maintenance program must contribute on collecting the right info to build a reliable budget

- Zero based Budgeting concept will require full analysis of the needs
- Data collection from different sources regarding equipment condition, preventive and corrective maintenance needs, equipment history, plant development, safety and environmental conditions and needs

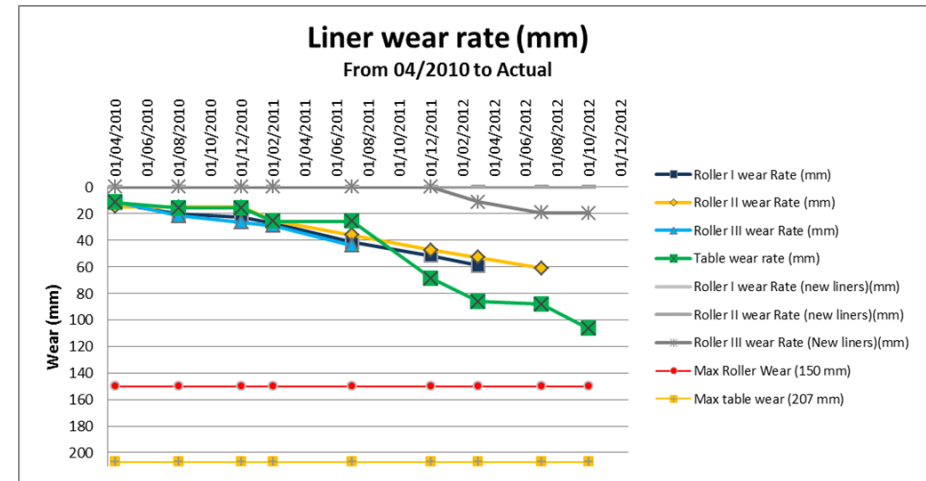




# As deep is the knowledge about equipment condition as accurate will maintenance needs estimation

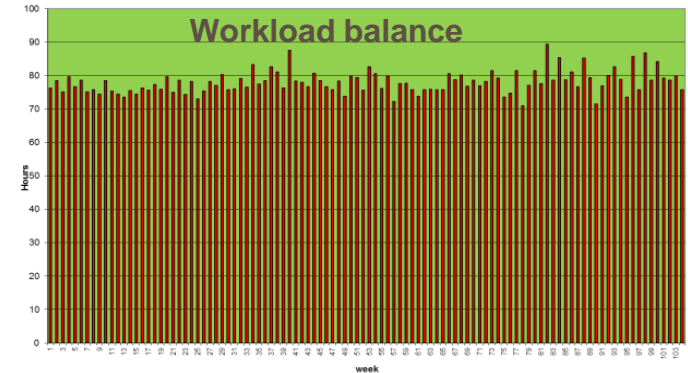
All potential source of information must be considered

- PMR's results
- Condition monitoring results
  - walk by inspections
  - vibration measurements,
  - non-destructive testing,
  - thermography measurements,
  - oil analysis,
  - wear measurements
- Evaluations during repairs and reconditioning



# Equipment type, utilization degree planned and criticality will be input to establish preventive maintenance program

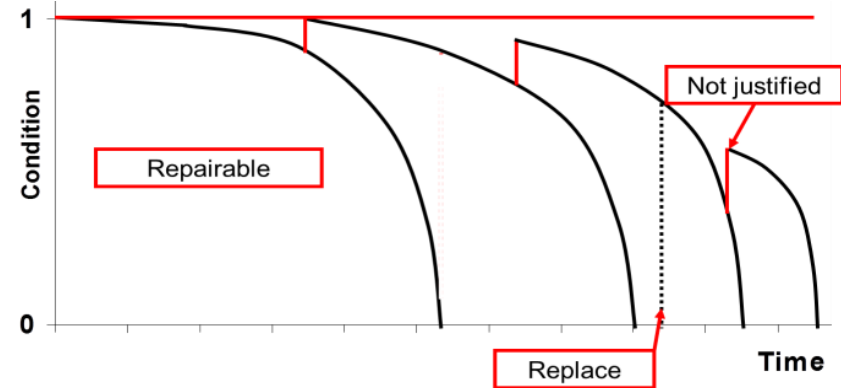
- Equipment utilization and annual maintenance schedule will influence the preventive maintenance activities
- Resources required must be estimated:
  - Manpower own and subcontracted
  - 3<sup>rd</sup> party services
  - Spares and materials
- Equipment to be commissioned during the budget year must be part of the needs analysis



# We can build our future by using history:

## Which works were necessary?

- Equipment replacement strategy
  - Electric motors
  - Reducers
  - Pumps, etc..
- Time based replacement of spares
  - Filter bags
  - Air slide canvas
  - Hydraulic hoses
  - Filters
- Known equipment issues not yet under control / solved



Description	Operation	Expected Delivery Date	Expected Replacement Date	Qty Available (in store)
481.BF155 Mech. Jet Pulse Filter	Replacement of filter bags (qty: 70) with new filter bags (CE1-2-10 SH+RL)		25/11/14	79
481.BF165 Mech. Jet Pulse Filter	Replacement of filter bags (qty: 70) with new filter bags (CE1-2-10 SH+RL)		25/11/14	79
481.BF175 Mech. Jet Pulse Filter	Replacement of filter bags (qty: 70) with new filter bags (CE1-2-10 SH+RL)		25/11/14	79
481.BF480 Mech. Jet Pulse Filter	Replacement of filter bags (qty: 56) with new filter bags (CE1-2-08 SH+RL)		26/11/12	5
481.BF540 Mech. Jet Pulse Filter	Replacement of filter bags (qty: 70) with new filter bags (CE1-2-10 SH+RL)		25/11/14	79
481.BF630 Mech. Jet Pulse Filter	Replacement of filter bags (qty: 112) with new filter bags (CE1-4-08 SH+RL)		27/12/14	24
481.BF650 Mech. Jet Pulse Filter	Replacement of filter bags (qty: 168) with new filter bags (CE1-6-12 SH+RL)		27/12/14	340

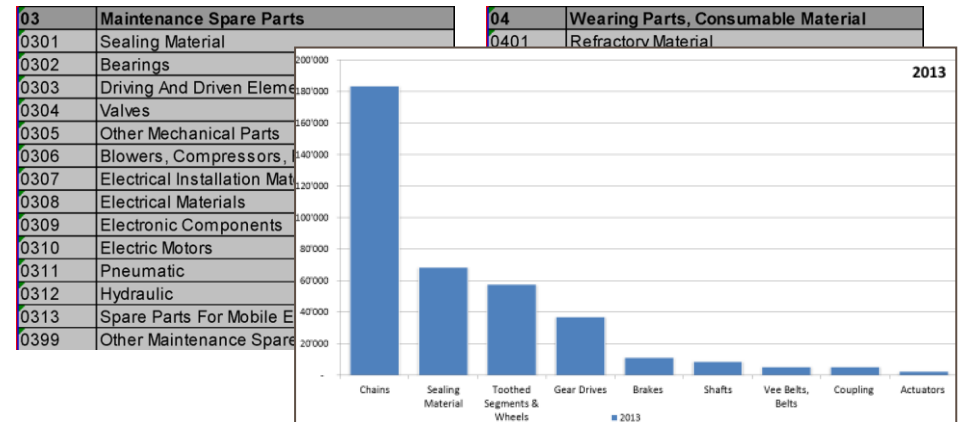


# We can build our future by using history:

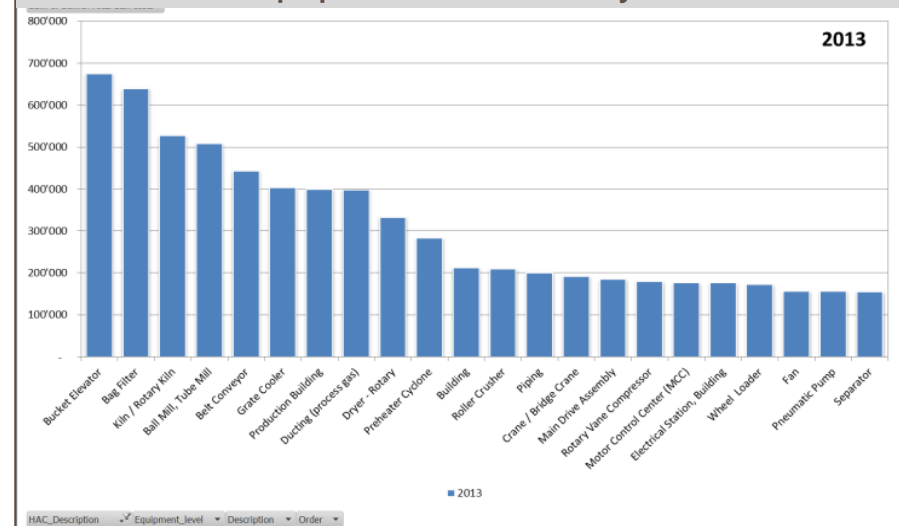
## What we need and how much it cost?

- Recurrent maintenance materials
  - Idlers replacement
  - Gaskets & seals
  - Gases and welding
  - Electric materials
  - etc.
- Recurrent maintenance services
  - Fabrication
  - Machining
  - Welding
  - etc.

### PCS code – material consumption analysis

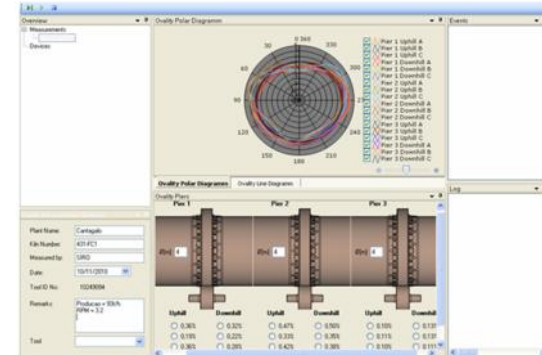


### Equipment cost analysis



# Time is passing machine get obsolete, new techniques are developed for maintenance. We need to be prepared!

- Replacement and new purchase
  - Tools
  - Welding and oxy-cut machines
  - etc.
- Introduction of new preventive maintenance practices and condition monitoring
  - Grease guns
  - Vibro-pen
  - Ultra-probe
  - Oil sampling and testing
  - etc.



# Plants are evolving - Old equipment need to be replaced, new types of equipment get in. We need to be prepared!

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- Ongoing CAPEX must be considered due to their influence in future maintenance needs
  - Additional preventive maintenance program to be implemented
  - Estimated resources and services might be required
  - Additional effort might be required to maintain some equipment due to expected effects due to changes in operating conditions
    - Mechanical and thermal load
    - Corrosion
    - Etc.



# Equipment improvements are necessary and must be kept in the maintenance activities to be performed

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# Where we are, where we would like to go!?



**Technical assessments**



**RCFA**  
**outcome**



**Safety compliance**



**Environmental requirements  
and standards**

# Resources are limited – risks analysis should be included to decide the activities to be budgeted

- When spending restrictions, performing risk analysis helps to determine the impact-consequence in case of failure

- What could happen if...?

Probability	A - Very high (once per day)				
	B - Moderate (once per Week.)				
	C - Occasional (once per month)				
	D - Remote (once per each 3 months)				
	E - Unlikely (once per each 6 months)				
	F - Impossible (once per each year.)				
		IV : Negligible	III : Moderate	II : High	I : Catastrophic
		Severity			
Operation loss From [days]:		0 < 16 h	> 16h -2 D	2-12 D	>12 D

Work Request	Equipment	Description	Author	Creation Date	Wor Order	Priority	Description	Profile	Probability	Severity
80114493	311BC3	Rubber lagging damaged	A Lopez	03.09.2012	240343479	1 - High	Pepair rubber lagging		D	II
80114496	321BM1	Girth gear with pitting	L Flores	09.11.2012	240343488	3 - Low	Repair tooth flank		C	IV
80114499	321LQ1	Oil in critical limits	E Pena	11.12.2012	240343497	1 - High	Change oil		B	III
80114502	471CC1	Air distribution plates worn out	J Nunes	05.06.2012	240343506	2 - Medium	Replace 40 wornout plates		E	II
80114505	491TK1	Chain worn out	J Marrel	01.12.2012	240343515	1 - High	Repair guides and replace chain		C	III
80114508	461LQ1	Oil in warning limits	R Schmid	11.12.2012	240343524	2 - Medium	Filter oil and replace filter		C	III
80114511	411AL1	Old fabric / canvas	F Cruz	08.06.2012	240343533	3 - Low	Inspect and evaluate condition		D	IV
80114514	461KL1	Small oil leakage roller 2, station 1	L Flores	05.06.2012	240343542	3 - Low	Retight/Replace oil seal		E	III
80114517	471CC1	Oil leakage from HP hose	E Pena	01.12.2012	240343551	1 - High	Replace HP hose		A	III

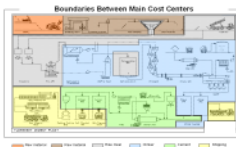
# Level of details will depend on cost level and activity type



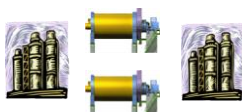
Controlling Area : EE00



Planning Plant: NP



Plant Section: 03



Location: Raw mill Line 1



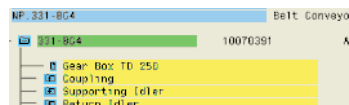
Functional Location: Ball mill



Equipment: Ball mill



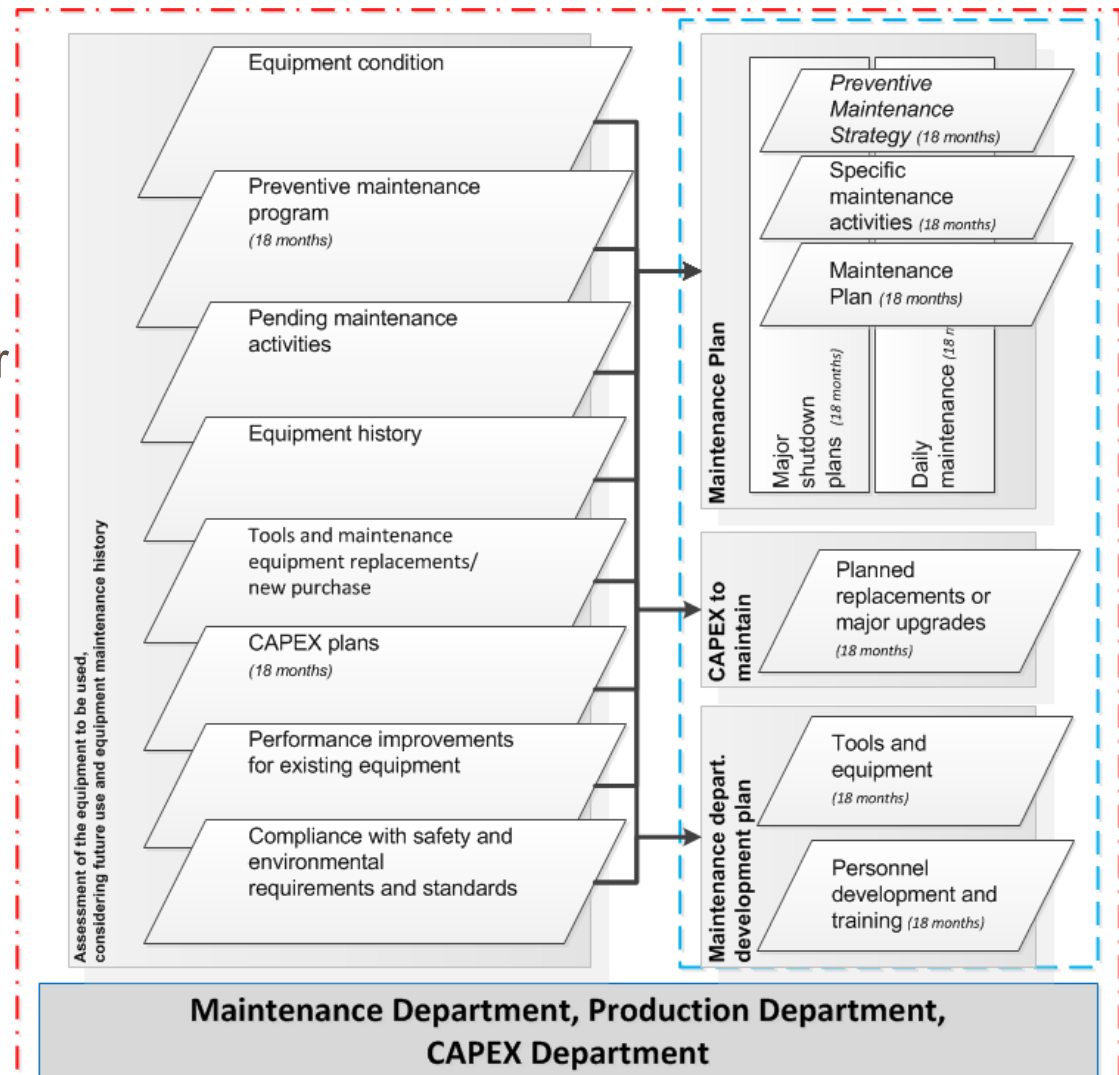
Equipment: Ball mill drive



Assembly

# The list of maintenance activity is the budget maintenance basis

- Maintenance Plan
  - Major shutdown plans
  - Daily maintenance
- CAPEX to maintain
  - Planned replacement or major upgrades qualifying for and approved as CAPEX
- Maintenance department development plan
  - Tools and equipment
  - Personnel development and training



# Activity list will contain estimations per cost elements

- Working hours for own and subcontracted personnel
- Third party services maintenance
- Wear parts – refractories, liners, grinding media, kiln chains, etc.
- Materials and spare parts

Maintenance activities list			Push this for refresh after changes								Total	6004 [K]	3268 [K]	19100 [CHF]	172652 [CHF]	678611 [CHF]	
N o.	Description	Area / Line / Function	Order type	Activity type	Work center	Responsible	Priority	Shutdown revision number	Activity group	Comments	Month	Maint. own [h]	Maint. sub [h]	Thrid parties services [CHF]	Maintenance materials [CHF]	Wear parts [CHF]	Considered for consolidati
1	Lubrication routines - area 5001	500	PM02	Z12 - Lubrication	Prev.	Lubrication team	1-High priority		Preventive maintenance strategy			120	384	-	4'000	-	Yes
2	Walk by inspection - area 500	500	PM02	Z27 - Condition Monitoring	Prev.	Area mechanical inspector	1-High priority		Preventive maintenance strategy		February	288	-	-	-	-	Yes
3	Vibration measurements - area 500	500	PM02	Z27 - Condition Monitoring	Prev.	Condition monitoring team	1-High priority		Preventive maintenance strategy			196	-	1'600	200	-	Yes
4	Yearly compressed air tanks inspection	10012012101	PM02	Z33 - Preventive Maintenance Routine	Utilities	Area electrical supervisors	1-High impact		Preventive maintenance strategy	Compulsory inspection for reauthorization	April	100	-	-	1'000	-	Yes
5	Reveling grinding elements of vertical roller mill	361-RM1	PM01	Z31 - Repair / Replacemen	Mech.	Area mechanical supervisor	1-High impact	SPS_1_2014	Specific Maintenance activities		February	192	-	-	50'000	-	Yes
6	Belt replacement - 150 m	531-BC7	PM01	Z31 - Repair / Replacemen	Mech.	Area mechanical supervisor	2-Medium impact	SPS_1_2014	Specific Maintenance activities		February	-	-	2'000	5'500	-	No
7	Separator refurbishment	531-BC9	PM06	Z31 - Repair / Replacemen	Mech.	Area mechanical inspector	1-High impact	SPS_1_2014	Specific Maintenance activities		February	1'000	-	50'000	10'000	10'000	No
8	NDT tests of mill trunion	561-BM1	PM02	Z27 -	Prev.	Condition	1-High		Preventive			16	8	2'500	500	-	Yes



# Maintenance budget it is the consolidation of the estimated costs by each cost element

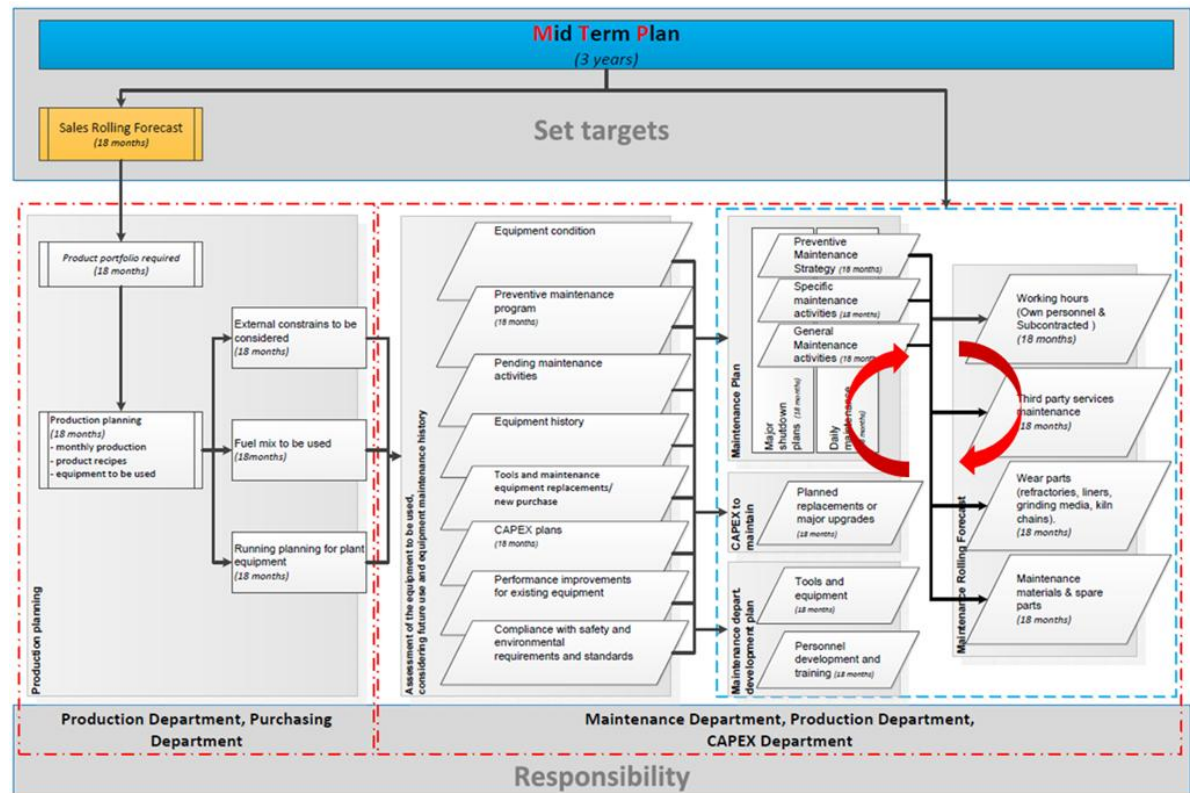
Budget consolidation value						
- in currency						
		2015	January	February	November	December
Unit						
Maintenance own - based load	[CHF]	118'643	10'000		12'500	14'500
Maintenance own - shutdown	[CHF]	24'357	-		-	-
<b>Maintenance own</b>	<b>[CHF]</b>	<b>143'000</b>	<b>10'000</b>		<b>12'500</b>	<b>14'500</b>
Maintenance subcontracted - based load	[CHF]	22'244	2'000		2'500	2'500
Maintenance subcontracted - shutdown	[CHF]	5'756	-		-	-
<b>Maintenance subcontracted</b>	<b>[CHF]</b>	<b>28'000</b>	<b>2'000</b>		<b>2'500</b>	<b>2'500</b>
Thrid parties services - based load	[CHF]	24'100	550		550	550
Thrid parties services - shutdown	[CHF]	65'000	-		-	-
<b>Thrid parties services</b>	<b>[CHF]</b>	<b>89'100</b>	<b>550</b>		<b>550</b>	<b>550</b>
Maintenance materials - based load	[CHF]	13'200	808		808	808
Maintenance materials - shutdown	[CHF]	98'500	-		-	-
<b>Maintenance materials</b>	<b>[CHF]</b>	<b>111'700</b>	<b>808</b>		<b>808</b>	<b>808</b>
Wear parts - based load	[CHF]	122'500	-		-	-
Wear parts - shutdown	[CHF]	546'111	-		-	-
<b>Wear parts</b>	<b>[CHF]</b>	<b>668'611</b>	<b>-</b>		<b>-</b>	<b>-</b>
Total Base load	[CHF]	300'687	13'358		16'358	18'358
Total Shutdown	[CHF]	739'724	-		-	-
<b>Total</b>	<b>[CHF]</b>	<b>1'040'411</b>	<b>13'358</b>		<b>16'358</b>	<b>18'358</b>

# Budget value is to be validated against Mid Term Plan targets

Cost level challenging is to be done on activities, their priority and results of the risk analysis to assure equipment desired reliability

Targets to be considered

- Group level indicators
  - EBIDTA
  - ROIC
- Maintenance reference value



# Forecasting is a live budgeting

- The list of maintenance activities is to be updated
  - current costs for activities performed
  - additional activities performed out of the initial budget
  - rescheduled activities from the prior months
  - cancelled activities from prior month and from further planned list
  - additional activities to be performed in the future months

Maintenance activities list											Total	6004 [k]	3268 [k]	19100 [CHF]	172652 [CHF]	678611 [CHF]	
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4	Yearly compressed air tanks inspection	10012012101	PM02	Z33 - Preventive Maintenance Routine	Utilities	Area electrical supervisors	1-High impact		Preventive maintenance strategy	Compulsory inspection for reauthorization	April	100	-	-	1000	-	Yes
5	Reveling grinding elements of vertical roller mill	361-RM1	PM01	Z31 - Repair / Replacemen	Mech.	Area mechanical supervisor	1-High impact	SPS_L2014	Specific Maintenance activities		February	192	-	-	50'000	-	Yes
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7	Separator refurbishment	531-BC9	PM06	Z31 - Repair / Replacemen	Mech.	Area mechanical inspector	1-High impact	SPS_L2014	Specific Maintenance activities		February	1000	-	50'000	10'000	10'000	No
8	NDT tests of mill trunion	561-BM1	PM02	Z27 -	Prev.	Condition	1-High		Preventive			16	8	2'500	500	-	Yes

# Early information about needs better prices for purchase

- When we involve procurement?
  - Potential suppliers are defined? Are they available? What about prices?
  - What spare parts will be necessary? Do you have them on stock? When do you need them? What is the lead time?

Maintenance activities list			Push this for refresh after changes							Total		6004 [h]	3268 [h]	19100 [CHF]	172652 [CHF]	678611 [CHF]	
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7	Separator refurbisment	531-BC9	PM06	Z31 - Repair / Replacement	Mech.	Area mechanical inspector	1- High impact	SPS_12014	Specific Maintenance activities		February	1'000	-	50'000	10'000	10'000	No
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# Hard job and complicated?

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- Yes but once it is in place year to year the process becomes easier
- Right decision requires accurate data
- Preventive maintenance programs must be accurate and well in place
- Maintenance planning and schedule must be up to date and efficient
- Accurate data recorded in work orders is essential to analyze your maintenance cost
- Identifying cost drivers can highlight opportunities to improve deficiencies



# Budgeting and forecasting are essential to assure company performance

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- An adequate budget process leads to:
  - Better planning and prioritization of the maintenance activities and expenses with high transparency
  - Increase the knowledge of the plant equipment condition and potential risks
  - Better understanding of the maintenance cost drivers and identify opportunities to improve the maintenance program
  - Better cost control by identifying the deviations and hence right prioritization

The budget shouldn't be:

- The maintenance cost of last year, proportional adjusted to the production volume of the next year, or
- The maintenance cost at last year reduced by a percentage





**LafargeHolcim**