



# CERN Consolidation program

CERN SCE / EPFL

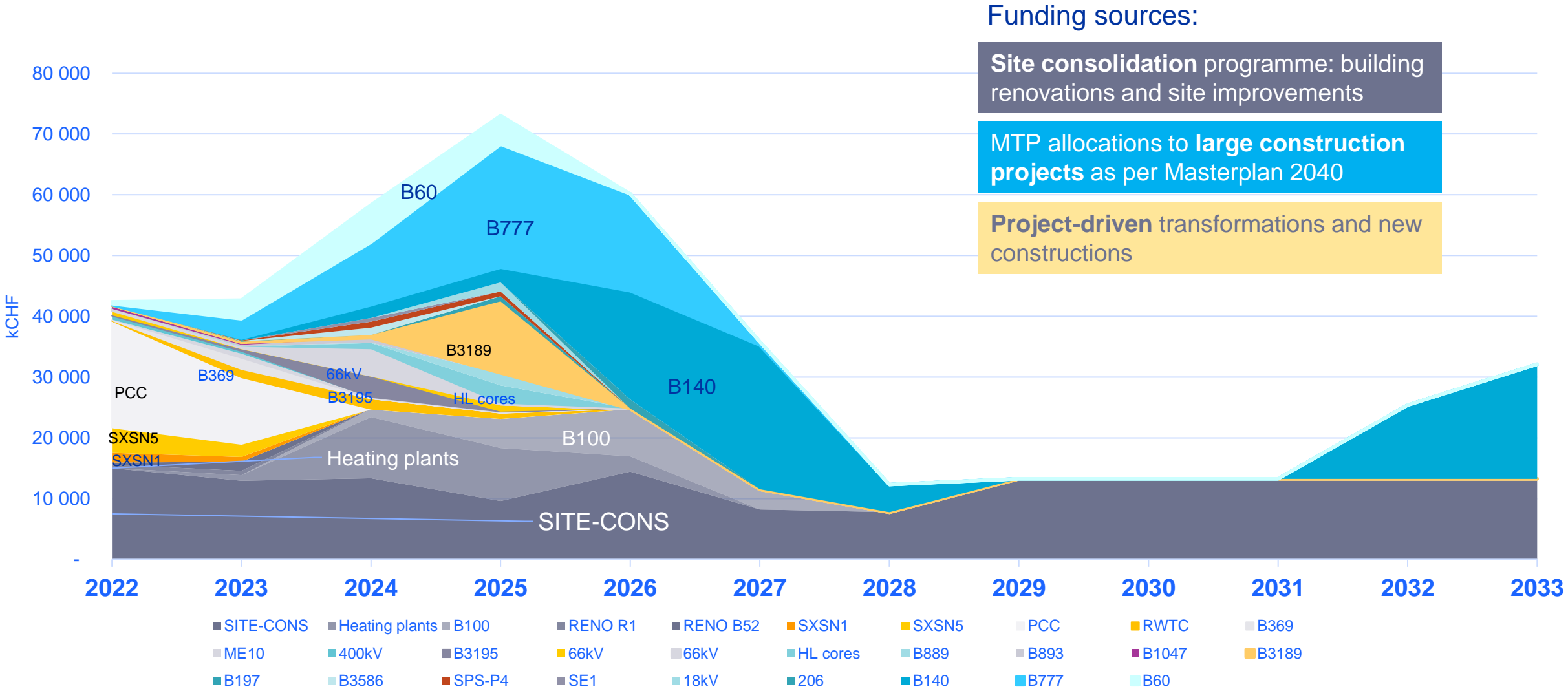
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10/11/2021

# Outline

- **Budget profile**
- **CONSOLIDATION programme organization**
- **Technical assessment – STRATUS tool**
- **Exemple B36 renovation**
- **Full CONSOLIDATION programme**
- **Questions**

# Budget Profile (confirmed projects)



# CERN site key figures

- 590 ha (220 fenced)
- 2 main sites and 15 satellite sites
- 670 building from 10 m<sup>2</sup> to 20.000 m<sup>2</sup>
- 65% built before the 70s
- 70 km tunnels and 80 caverns
- 30 km roads
- 1000 km technical galleries and trenches
- 9000 persons/daily
- 490 hostel rooms
- 8500 working places
- >5000 parking places
- 25000 daily movements to- and inter-sites
- Public transport links in CH, not in FR



# Site consolidation

## Mission & Priorities

**Plan** capital investments and carry out, in a rolling time window of 10 years, the **corrective and pre-emptive repairs and improvement of infrastructure** assets that are essential for CERN's scientific programme.

### PRIORITIES

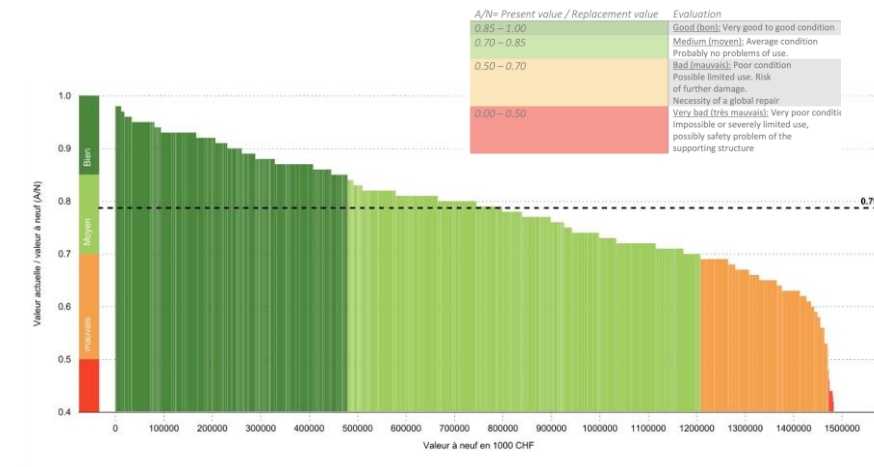
- Safety
- Strategic value with respect to scientific goals
- Sustainability: durability, environmental impact, energy performance

## Specifications

- Global renovations
- Regulations compliance
- Energy efficiency improvement: > 60%
- Monitoring heating, electrical and lighting consumption
- Operation of HVAC, Heating and lighting consumption according to the outdoor temperature, occupation of the premises, eco-mode
- Favor centralized networks

## Process

- Data-driven decisions



- Standardization of requirements definition according to Masterplan, IRP approval process for execution
- 5 and 10 year views

# Site consolidation

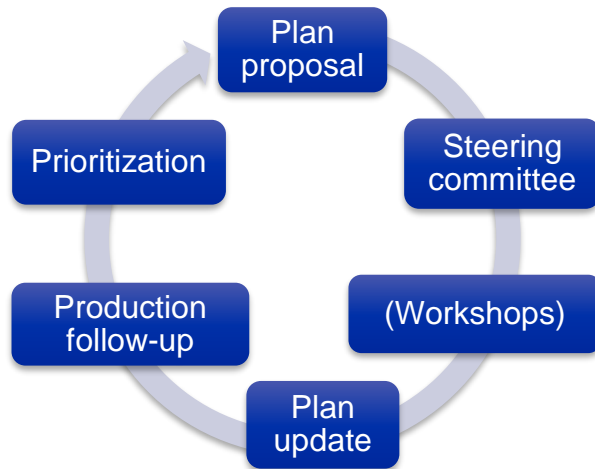
## Strategy

### Entry into the SITE CONS programme

Stratus outcome (<0.8) x 3S Factorization:

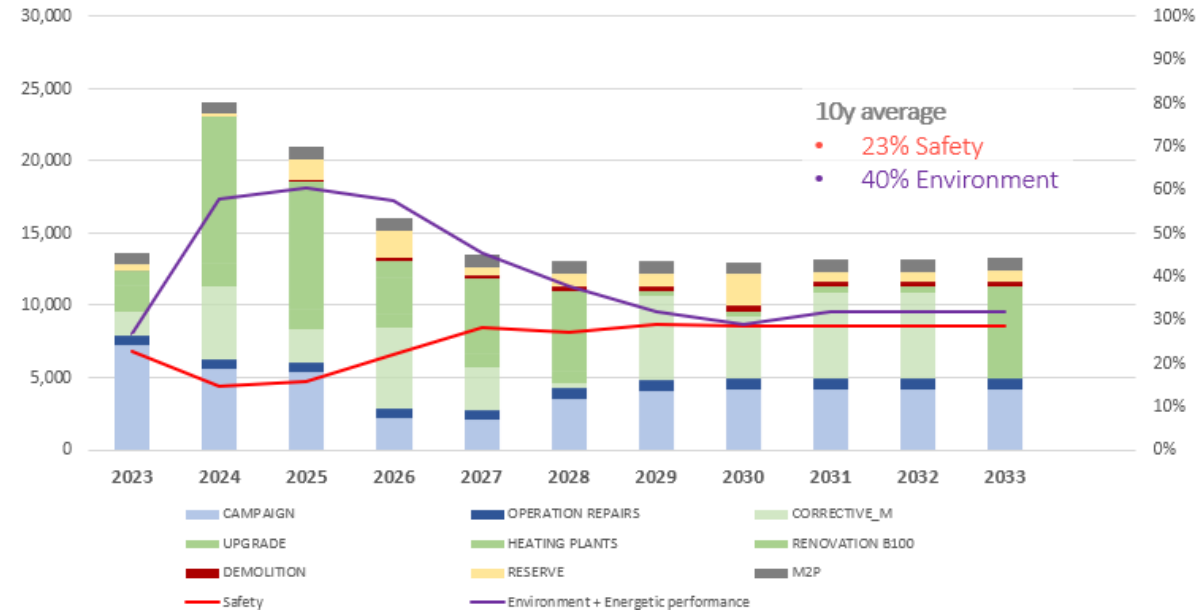
- Strategy
- Safety
- Sustainability

### Quarterly Steering committee – Decision gate



## Capital investment plan

SITE CONSOLIDATION: budget (kCHF) by year and category



- Nb of buildings renovated: 2/year
- Nb of fluo-tubes changed: 2000 u/year
- Nb of lights changed: 2500 m2/year
- Nb of WC changed: 20 u/year
- Nb of sink changed: 20 u/year
- Nb of urinals changed: 10 u/year
- Nb of WMC changed: 5 u/year
- Nb of heating sub-station: 2/year
- Nb of compressed air stations : 2/year
- Roof insulation: 3000 m2 /year

# Technical assessment – STRATUS tool

## STRATUS tool - input for each building

- Base data
- Quantities and cost-per-element evaluation sheet
- GIS-STRATUS data comparison (SCRIPT)
- STRATUS renovation costs compared to CERN past renovation costs - adjustment coefficient

# Technical assessment – STRATUS tool

## STRATUS tool - input for each building

Données de base	Eléments de construction		Images	historique	Stade de l'élaboration	Documentation
N° de bâtiment	2885				Désignation	Batiment pour experience
Identification	SX8				Rue/N°	Site de POINT 8 LHC/LEP
Manager d'objets	admin				NPA	01210
Manager de portefeuille	admin				Localité	Ferney-Voltaire
Année de construction		1988			Pays	France
Monnaie		CHF			Série d'éléments de construction	Halle de product.
			Année		Genre de bâtiment	03 Industrie
Valeur d'assurance	kCHF	3839	2022		Type de bâtiment	06 Halles industrielles
Facteur de correction		0.83			Departement	EP
Parties non ass. (+)	kCHF	0	0		Libre1	Machine
Propriété de tiers (-)	kCHF	0	0		Libre2	
Volume	m3 SIA	19231			Libre3	
Surface	m2	1553			Libre4	
Saisie effectuée par	Wolfgang Bastien				Mutation effectuée par	admin
Date de saisie	11.05.2021				Date de mutation	
		Depuis le début de l'année			Stratégie	Priorité moyenne
Ne pas recalculer	<input type="checkbox"/>		0			

Données de base	Eléments de construction		Images	historique	Stade de l'élaboration						
Nom élément	1.00	0.95	0.90	0.85	0.80	0.70	0.60	0.50	0.20		
Elément de construction	Descriptif		Année	A/N	Ant.	Sollicitation		Résistance			
Gr. oeuvre massif	Structure BA : radier		2021	0.95	8	+	-	+	-		
Gr. oeuvre autre	Structure metal		2021	0.93	18	+	-	+	-		
Toit en pente	Revêtement tole profile		2021	0.90	1	+	-	+	-		
Toit plat	Etanchéité bitumineuse + gravie Verrière endommagé		2021	0.85	6	+	-	+	-		
Façades	Cassette métallique ventilé + pe Partie polycarbonate en mauvai		2021	0.85	15	+	-	+	-		
Fenêtres	PVC d'origine double vitrage		2021	0.75	2	+	-	+	-		
Inst. électriques	Element usuel		2021	0.90	0	+	-	+	-		
Générateur de chaleur			2021	0.00	0	+	-	+	-		
Distribution de chaleur	Réseau de distribution 0.85		2021	0.85	0	+	-	+	-		
Sanitaires			2021	0.00	0	+	-	+	-		
Inst. techniques	Clim : monobloc d'origine 0.6		2021	0.60	0	+	-	+	-		
Aménag. int. substance	Cloison amovible + Faux planct		2021	0.83	10	+	-	+	-		



# Technical assessment – STRATUS tool

## STRATUS tool - input for each building

Estimation valeur constructive

CERN - Meyrin

Bâtiment n° 2885		Volume bâti (*1):	17,340 m3			
		Surface bâti (*2):	1,958 m2			
		Surface pl. brute (*2):	1,179 m2			
CFC	Descriptif	IGPC [%]	Unité	Prix / unité	Quantité	Prix [sFr., HT]
<b>1</b>	<b>Travaux préparatoires</b>	<b>3.5</b>				<b>123,732</b>
	- selon IGPC (*3)		bloc	123,732	1	123,732
<b>2</b>	<b>Bâtiment</b>	<b>74.5</b>				
<b>20</b>	<b>Excavation</b>	<b>1.5 (indicatif)</b>				<b>23,580</b>
	Excavation pour radier simple		m3	40	589.5	23,580
	Excavation pour sous-sol		m3	70		0
<b>21</b>	<b>Gros œuvre 1</b>	<b>36.3 (indicatif)</b>				<b>1,285,550</b>
	Inst. de chantier, échaf., grues, nacelles etc (*4)		bloc	107,059	1	107,059
	Radiers en BA		m3	700	412.65	288,855
	Murs en BA		m3	900	7.2	6,480
	Dalles en BA		m3	1,000		0
	Structure métallique (*5)					
	- Type A		m2	225	1,179	265,275
	- Type B		m2	254		0
	- Type C		m2	290		0
	- plancher mixte		m2	370		0
	- voie de roulement pour PR jusqu'à 50t		ml	1,560	101	157,560
	- voie de roulement pour PR jusqu'à 25t		ml	800		0
	Plus-value pour galeries et divers		bloc			0
	Façade opaque (*6)		m2	220	2579	567,380
<b>22</b>	<b>Gros œuvre 2</b>	<b>9.2 (indicatif)</b>				<b>352,415</b>
	Toiture (*7)		m2	235	1,179	277,065
	Fenêtres en PVC / alu (*8)		m2	550	137	75,350
	Fenêtres en métal (*9)		m2	660		0
<b>23</b>	<b>Installations électriques</b>	<b>8.8</b>				<b>311,098</b>
	- selon IGPC		bloc	311,098	1	311,098
<b>24</b>	<b>Chauffage, ventilation, conditionnement d'air</b>	<b>7.7</b>				<b>272,211</b>
	- selon IGPC		bloc	272,211	1	272,211
<b>25</b>	<b>Installations sanitaires</b>	<b>1.5</b>				<b>53,028</b>
	- selon IGPC		bloc	53,028	1	53,028
<b>26</b>	<b>Installations de transport</b>	<b>0</b>				<b>0</b>
	- custom		bloc			0
<b>29</b>	<b>Honoraires</b>	<b>0</b>				<b>322,330</b>
	- arch., ing. civil, ing. CVSE, spécialistes (*10)		bloc	322,330	1	322,330

<b>Bilan 2-26; 29 (sans aménagements intérieurs)</b>	<b>Total</b>	<b>2,620,212</b>
	<b>Prix / m3</b>	<b>151</b>
<b>27 Aménagements intérieurs 1</b>	<b>5.1</b>	<b>0</b>
- selon IGPC	bloc	180,295
<b>28 Aménagements intérieurs 2</b>	<b>4.4</b>	<b>0</b>
- selon IGPC	bloc	155,549
<b>27/28 Aménagements intérieurs 1,2 (custom)</b>		<b>925,420</b>
- salle blanche ( y c. CVSE, aménagements int.)	m3	300 1737
- cabanes bureaux ( y c. CVSE, amén. int.)	m3	200 1550
- sol en résine	m2	80 1,179
- pont roulant	bloc	
- divers	bloc	
<b>Bilan 2-29 (avec aménagements intérieurs)</b>	<b>Total</b>	<b>3,545,632</b>
	<b>Prix / m3</b>	<b>204</b>
<b>4 Aménagements extérieurs</b>	<b>4.4</b>	<b>155,549</b>
- selon IGPC	bloc	155,549 1
<b>5 Frais secondaires et comptes d'attente</b>	<b>17.5</b>	<b>618,660</b>
- selon IGPC	bloc	618,660 1
<b>Bilan 1-5</b>	<b>Total</b>	<b>4,443,573</b>
	<b>Prix / m3</b>	<b>256</b>
<b>Valeur constructive du bâtiment, retenu pour Stratus</b>	Bilan 2 - 29	3,545,632
	TVA 8%	283,651
	<b>Total 2-29, TTC (*11)</b>	<b>3,829,282</b>
	Prix TTC / m3	221

# Technical assessment – STRATUS tool

## STRATUS tool - input for each building

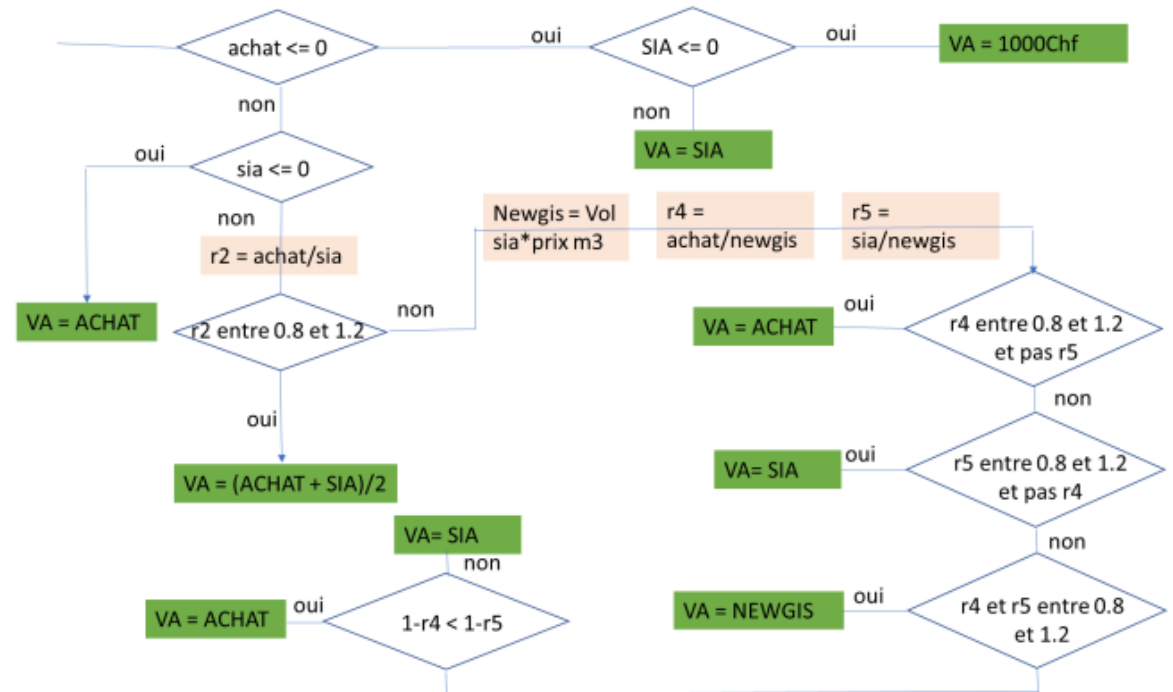
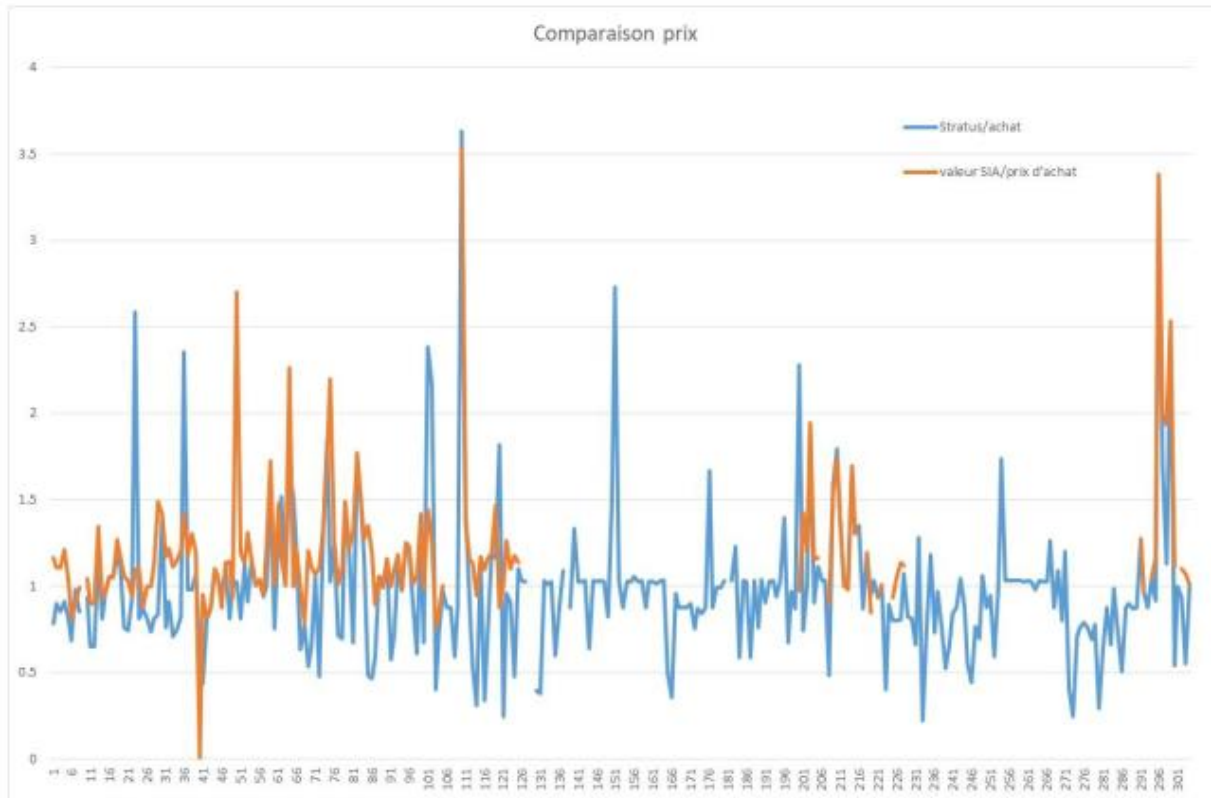
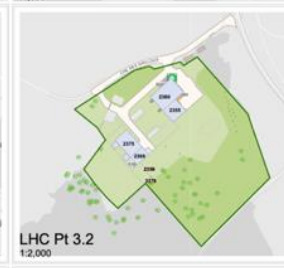
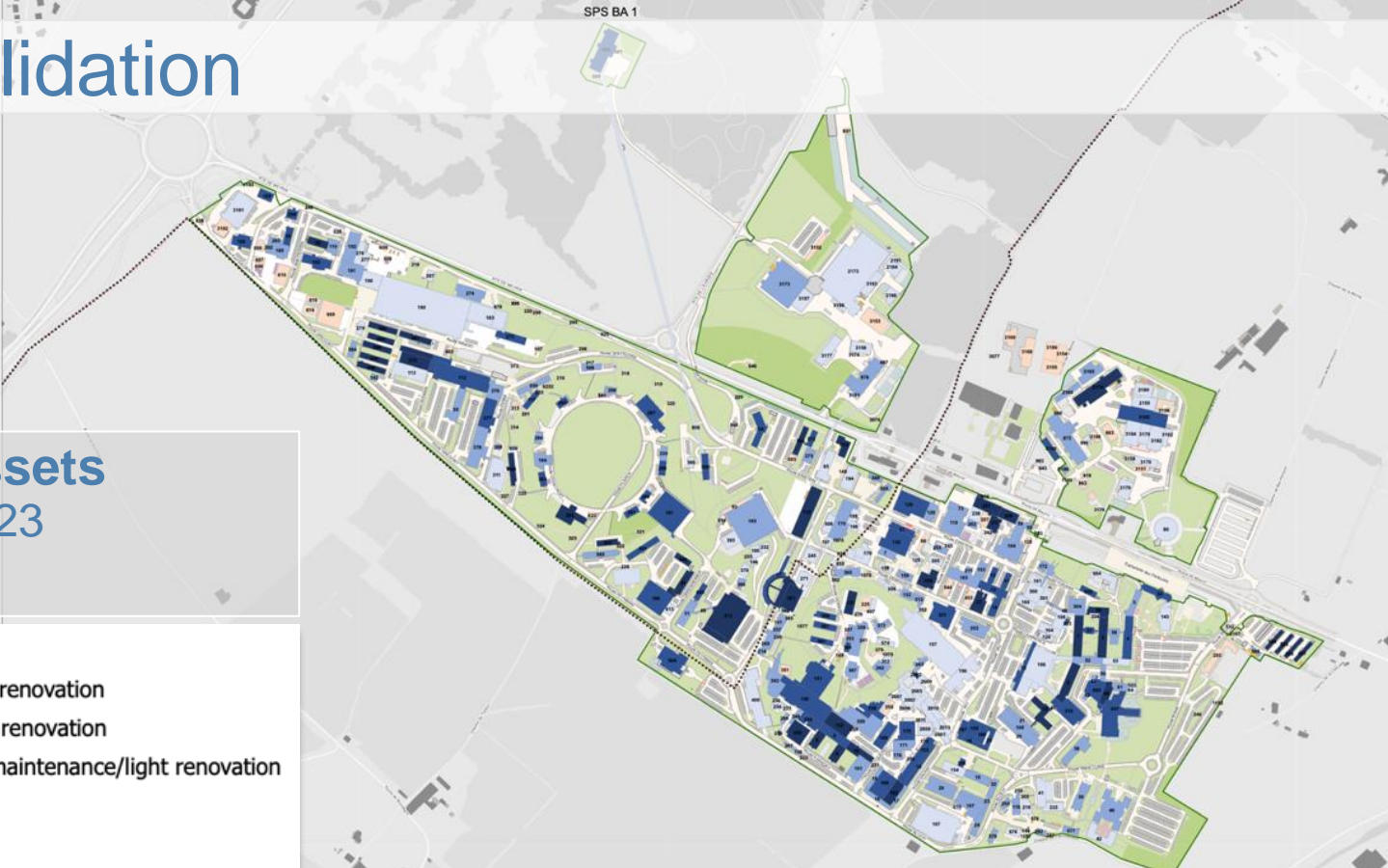


Figure 6 : Algorithme simplifié

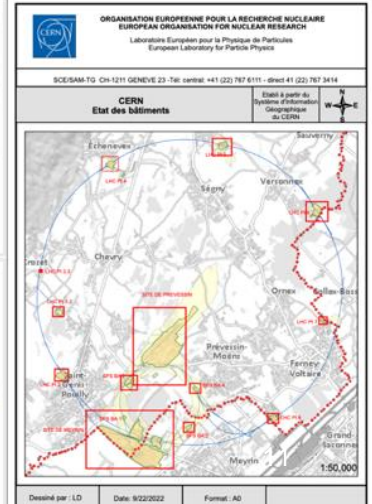
# Site Consolidation

## Condition of Assets Stratus Update 2023 451 buildings

- < 0.61 : Candidate to demolition
- 0.61 - 0.68 : Candidate to global renovation
- 0.69 - 0.76 : Candidate to partial renovation
- 0.77 - 0.84 : Candidate to deep maintenance/light renovation
- 0.85 - 1 : Good status
- Not classified

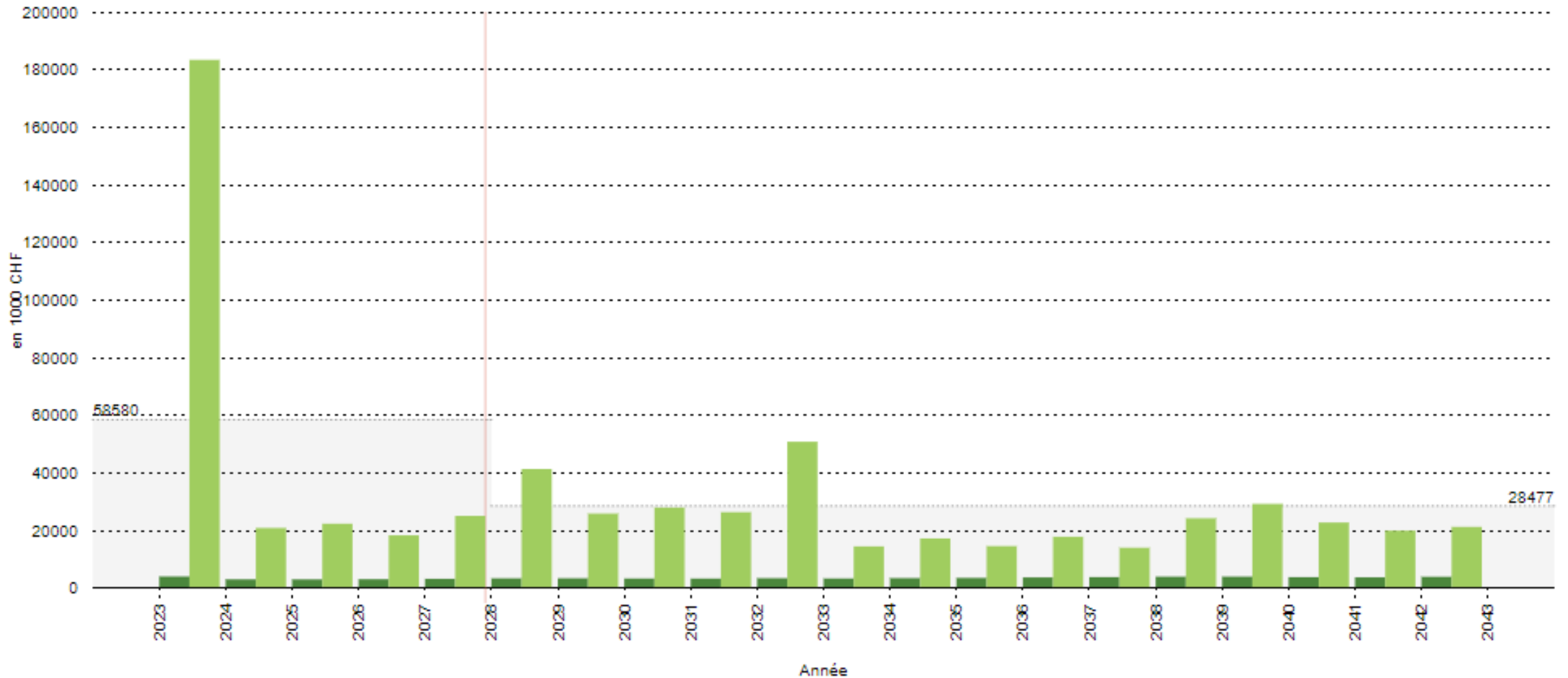


- Etat des bâtiments
- Renouvellement à prévoir
- Renouvellement important à prévoir
- Certains éléments requièrent renouvellement
- Pas de renouvellement requis
- Bâtiment non rénové



# Technical assessment – STRATUS tool

## STRATUS tool – outcome – investment needs



# Example B36 full renovation

DESCRIPTION	ESTIMATION IRP STUDY		ESTIMATION STRATUS	
Etudes techniques	360'000		0'000	
<b>Structure, enveloppe, second œuvre et finitions</b>	<b>2'371'000</b>		<b>2'727'000</b>	
Travaux préparatoires et démolition	209'000			
Désamiantage	130'000			
Toiture et couverture	34'000			
Façades et isolations	423'000		662'000	
Portes et fenêtres, protections solaires	641'000		837'000	
Ascenseur	120'000		116'000	
Travaux intérieures	814'000		1'112'000	
<b>Installations techniques</b>	<b>1'405'000</b>		<b>1'410'000</b>	
Installations électriques	495'000		752'000	
Telecom et détection incendie	175'000		116'000	
Chauffage et ventilation	605'000		376'000	
Installations sanitaires	130'000		166'000	
<b>Montant total estimatif (en CHF)</b>		<b>4'136'000</b>		<b>4'137'000</b>



Données de base	Eléments de construction		Image:
N° de bâtiment	36		
Identification	36		
Manager d'objets	admin		
Manager de portefeuille	admin		
Année de construction			1969
Monnaie	CHF		
		Année	
Valeur d'assurance	kCHF	5822	2022
Facteur de correction		1.10	
Parties non ass. (+)	kCHF	0	0
Propriété de tiers (-)	kCHF	0	0
Volume	m3 SIA	7300	
Surface	m2	2426	
Saisie effectuée par	Reto Hinden		
Date de saisie	20.11.2013		
		Depuis le début de l'année	
Ne pas recalculer	<input type="checkbox"/>		0

# Full consolidation plan

		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total
	{0016-Toilet Block}		80										80
	{0020-Toilet Block}	-2											-2
	{0030-Toilet Block}			100	300								400
	{0032-Toilet Block}		250	300									550
	{0035-Toilet Block}	181											181
	{0040-Toilet Block partial repairs}	86	80										166
	{0057 -Toilet Block 2nd floor}		20										20
	{0108-Toilet Block}	29											29
	{0150-Toilet Block}	-9											-9
	{0165-Toilet Block}		45										45
	{0181-Toilet Block}	89											89
	{0182-Toilet Block}		180										180
	{0183-Toilet Block}	84	116										200
	{0188-Toilet Block}				107	133							240
	{0272-Toilet Block}			75									75
	{0287-Toilet Block}			30									30
	{0298-Toilet Block}			140									140
	{0358-Toilet Block}			150									150
	{0361-Toilet Block}		100										100
	{0378-Toilet Block}	20	50										70
	{0864-Toilet Block}	270											270
	{0865-Toilet Block}						350						350
	{0866-Toilet Block}					350							350
	{0879-Toilet Block}							30					30
	{0917-Toilet Block}			42									42
	{Toilet Block (to be planned)}						240	520	590	660	660	660	3,330
76334 - Toilet block consolidation	<b>76334 - Toilet block consolidation Total</b>	748	921	837	407	483	590	550	590	660	660	660	7,106
	{0377-378-Facade}			1,350									1,350
76353 - B377-378 facade consolidation	<b>Total</b>			1,350									1,350
	{0200-201 envelope (facade + roof 300m2)}		200	920									1,120
76354 - B200-201 envelope	<b>76354 - B200-201 envelope Total</b>		200	920									1,120
	{0003-Roof (partial)}		70										70
	{0015-Roof (slope part)}	4											4
	{0016-17-18-Roof}	379											379
	{0029-Roof}					160							160
	{0030-Roof}			150									150
	{0033-Glass dome}	130											130
	{0167-Roof}		400										400
	{0190-Roof rainwater downpipes connection}	0											0
	{0222-Roof}	52											52
	{0272-Roof}	220											220
	{0356-Roof}				50								50
	{0359-Roof}	70	100	250									420
	{0501-Roof}	123			160								283
	{0872-Roof}			300									300
	{2175-Roof}	48											48
	{2555-Roof}				70								70
	{3153-163-Roof}					200							200
	{Roof (to be planned)}						851	1,000	1,000	1,000	1,000	1,000	5,851
	{Roofs securing}	80	50	50	50	50	50	50	50	50	50	50	580
76360 - Roofs consolidation	<b>76360 - Roofs consolidation Total</b>	1,106	620	750	330	410	901	1,050	1,050	1,050	1,050	1,050	9,367

# Full consolidation plan

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total
{0003-West facade}		95										95
{0004-0005-stores Saleve side (partial)}	28											28
{0004-Windows (Saleve side)}	190											190
{0005-Windows 5th floor Saleve side}		50										50
{0015-High windows}	12											12
{0024-Staircase windows replacement + solar protection}	50											50
{0030-Windows (7th floor)}			100									100
{0032-272-28-Carbonation (securing)}	20											20
{0054-Windows replacement (staircase)}	3	37										40
{0057-Staircase windows/doors replacement + solar protection}	34											34
{0101-Facade}		620										620
{0188-Stores (partial)}	15											15
{0188-Windows (partial)}	15											15
{0201-Material door}	38											38
{0285-Facade}		385										385
{0361-Carbonation}	11											11
{0361-Facade}	20											20
{0501-Facade insulation + Windows replacement (Jura)}	60	50										110
{BA1/BA5/LHC4/LHC2-Carbonation}	1											1
{Carbonation (to be planned)}	42		40		50	50	50	50	50	50	50	432
{Windows replacement on Swiss side according to regulation}				100	100	100	100	100	100	100	100	800
<b>76361 - Facades consolidation Total</b>	<b>539</b>	<b>1,237</b>	<b>140</b>	<b>100</b>	<b>150</b>	<b>150</b>	<b>150</b>	<b>150</b>	<b>150</b>	<b>150</b>	<b>150</b>	<b>3,066</b>
{0040-Parking consolidation}	3											3
{0040-Terrace}	21											21
{0073-Removal septic tank}	105											105
{0193-Road drainage system}	20											20
{0508-Parking consolidation}	-11											-11
{Crossroads Route Gregory Zeeman}	-33											-33
{EU/EP Meyrin East}	60											60
{EU/EP Meyrin North-West}	-7											-7
{EU/EP in front of B500 South entrance}	64											64
{Meyrin bulk storage area}	119											119
{Oil separators consolidation}		50	50									100
{Prevessin bulk storage area}	108											108
{Prevessin storage area}	20											20
{Removal septic tanks}			100			100	100	100	100	100	100	700
{Road (to be planned)}		85	350	137	91	450	550	615	750	750	750	4,528
{Route Arago (230 m) + B180 septic tank removal}	563											563
{Route Bohr (92 m)}		200										200
{Route Dirac (230 m)}			220									220
{Route Gregory (150 m) and Feynman (125 m) (incl studies)}							260	260				520
{Route Marie Curie (int Route Scherrer)}	174											174
{Route Rutherford - PS hill}	682											682
{Upgrade of accident-prone road areas (Intersection entrance B)}				50								50
{Upgrade of accident-prone road areas (Intersection routes Bell/Scherrer)}						50						50
{Upgrade of accident-prone road areas}	22	20	50		50		50	50	50	50	50	392
<b>Total</b>	<b>1,910</b>	<b>355</b>	<b>770</b>	<b>187</b>	<b>141</b>	<b>600</b>	<b>960</b>	<b>1,025</b>	<b>900</b>	<b>900</b>	<b>900</b>	<b>8,648</b>
<b>76362 - Road and sewage consolidation</b>												

# Full consolidation plan

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total
{HREF-0153-162-169-Refrigeration system}	1,077	880										1,957
<b>76608 - Cooling network in cluster 153-162-169 Total</b>	<b>1,077</b>	<b>880</b>										<b>1,957</b>
76608 - Cooling network in cluster 153-162-169												
{0501 - Domestic hot water R1}		100										100
{Boiler 2 - Access consolidation}		50										50
{HAIR (to be planned)}			25	25	50	50	50	50	50	50	50	400
{HAIR-0023/167-Compressed air}	29											29
{HAIR-0112-Compressed air}			25									25
{HAIR-0169-Compressed air}		25										25
{HAIR-0864-Compressed air}			25									25
{HAIR-0865-Compressed air}	29											29
{HAIR-0892-Compressed air}		25										25
{HEAT (to be planned)}						200	200	200	200	200	200	1,200
{HEAT-0013-0014-Reno heating substations}	30											30
{HEAT-0040-Reno heating substations}	179											179
{HEAT-0101-Network modification}	34											34
{HEAT-0118-216-676- Reno heating substations}	112											112
{HEAT-0220-Dismantling obsolete heating plant}	12											12
{HEAT-0301/0304-Reno heating substations}			200									200
{HEAT-0860-fuel burner}	87											87
{HEAT-0892-Heating substations}				200								200
{HEAT-0926-927-Heating substations}					200							200
{HREF (to be planned)}	0		50		100	100	100	100	100	100	100	750
{HREF-0040-Refrigeration system}	600											600
{HVAC (to be planned)}		150			250	250	250	250	250	250	250	1,900
{HVAC-0186-Laboratoire TIF}	15											15
{HVAC-0501-Refrigeration system (laverie)}	-126											-126
{HVAC-0904-Welding workshop}	237											237
{HVAC-Renovation existing installations linked to safety}	116	84	100	100	100	100	100	100	100	100	100	1,100
{Urgent Works}	1											1
<b>76614 - CVC - consolidation Total</b>	<b>1,355</b>	<b>434</b>	<b>425</b>	<b>325</b>	<b>700</b>	<b>700</b>	<b>700</b>	<b>700</b>	<b>700</b>	<b>700</b>	<b>700</b>	<b>7,439</b>



# Full consolidation plan

		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total	
CAM	{ELIG-0103-Lighting installations}				25								25	
	{ELIG-0118-Lighting installations}		70										70	
	{ELIG-0119-Lighting installations (halls)}	12											12	
	{ELIG-0133-Lighting installations}		100										100	
	{ELIG-0181-Reno lightings installations}			200									200	
	{ELIG-0275-Reno lightings installations}				25								25	
	{ELIG-0287-Lighting installations (1st floor)}	70											70	
	{ELIG-0865-Lighting installations (Aisle B ground floor)}	54											54	
	{ELIG-0866-Lighting installations (Aisle B ground floor)}	52											52	
	{ELIG-0879-Lighting installations (005)}	87			150								150	
	{ELIG-Lighting installations (to be planned)}					200	200	200	200	200	200	200	200	1,400
	{EOUT-Outdoor lighting (to be planned)}						400	100	500	500	500	500		2,500
	{EOUT-Outdoor lighting Bohr/Marie Curie}		260											260
	{EOUT-Outdoor lighting Meyrin site: Routes Bakker, Marie Curie and B40 parking}	320												320
	{EOUT-Outdoor lighting Meyrin site: entrance A to B.40 area}			400										400
	{EOUT-Outdoor lighting Meyrin site: entrance B to centre anneau area}	0			400									400
	{EOUT-Outdoor lighting Meyrin site: parking 100 to B.102}							400						400
	{EOUT-Outdoor lighting parking B864/865}		140											140
	76624 - Elec Consolidation	<b>76624 - Elec Consolidation Total</b>	595	570	600	600	200	600	700	700	700	700	700	6,665
		<b>CAM Total</b>	7,330	5,217	5,792	1,949	2,084	3,541	4,110	4,215	4,160	4,160	4,160	46,718
CORR	{0180-0183-Minor works}	1											1	
	76358 - B180 Consolidation	<b>76358 - B180 Consolidation Total</b>	1										1	
	{0904-926-927-Roof (incl study)}	866											866	
	76359 - B904-926-927 roof consolidation	<b>Total</b>	866										866	
	{Route Tuschek (426 m) and parkings B.864 and B.865 (incl studies)}	50	1,530	450									2,030	
	76366 - B864-865 parking consolidation	<b>76366 - B864-865 parking consolidation Total</b>	50	1,530	450								2,030	
	{0251-Enveloppe (incl design)}	580											580	
	76390 - B251 consolidation	<b>76390 - B251 consolidation Total</b>	580										580	
	{0036-Consolidation}	60	3,440	918									4,418	
	76420 - B36 consolidation	<b>76420 - B36 consolidation Total</b>	60	3,440	918								4,418	
	{Boiler 2 replacement}	28											28	
	76609 - Boiler 2 replacement	<b>76609 - Boiler 2 replacement Total</b>	28										28	
	{0001-Consolidation}									6,000				6,000
	{0002-Consolidation}										6,000			6,000
	{0151-150-PS complex consolidation}		100	915	5,570	2,898	400	5,770	4,245					19,898
{0864-Consolidation}												6,000	6,000	
76646 - Future consolidation projects	<b>76646 - Future consolidation projects Total</b>		100	915	5,570	2,898	400	5,770	4,245	6,000	6,000	6,000	37,898	
{0108-164-Electricity relamping}	1												1	
76651 - B108-164 interior works	<b>76651 - B108-164 interior works Total</b>	1											1	
	<b>CORR Total</b>	1,586	5,070	2,283	5,570	2,898	400	5,770	4,245	6,000	6,000	6,000	45,822	



# Full consolidation plan

		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total	
DEM		{3150-Demolition}		40									40	
		{Demolition (to be planned)}			100	145	200	250	300	350	400	400	400	2,545
	76352 - Demolition	<b>76352 - Demolition Total</b>		40	100	145	200	250	300	350	400	400	2,585	
		{0102-Diagnostics and demolition}	1											1
	76369 - B102 Diagnostics and demolition	<b>Total</b>	1										1	
		<b>DEM Total</b>	1	40	100	145	200	250	300	350	400	400	2,586	
M2P		Kaymak Adem	117										117	
	76334 - Toilet block consolidation	<b>76334 - Toilet block consolidation Total</b>	117										117	
		Tarry Duncan Andrew	20	81	61									163
		[Needed] Lecoufle Marion	18	108	90									216
		[Needed] Quest 1 - SAM-IN			99	108	108	108	108	108	108	108	108	964
		[Needed] Quest 2 - PPM				90	108	108	108	108	108	108	108	847
		[Needed] Quest 3 - SAM-CE				27	108	108	108	108	108	108	108	892
		[Needed] Quest 4 - SAM-TG (65%)				12	70	70	70	70	70	70	70	574
		[Open Post] 9703941	12	70	59									141
	76364 - Design, consultancy and manpower	<b>76364 - Design, consultancy and manpower Total</b>	50	260	347	376	395	395	395	395	395	395	395	3,795
		Lagioia Michela	107	107	9									224
		{HDAT-Consolidation Hvac data}	120	100	100	100	100	100	100	100	100	100	100	1,120
	76614 - CVC - consolidation	<b>76614 - CVC - consolidation Total</b>	227	207	109	100	100	100	100	100	100	100	100	1,344
		{EDAT-Consolidation Elec data}	200	200	200	200	200	200	200	200	200	200	200	2,200
76624 - Elec Consolidation	<b>76624 - Elec Consolidation Total</b>	200	200	200	200	200	200	200	200	200	200	200	2,200	
	{ECTR-Controls and verification (ex-EPRE)}	200	160	160	160	160	160	160	160	160	160	160	1,800	
76626 - Elec consolidation - safety	<b>76626 - Elec consolidation - safety Total</b>	200	160	160	160	160	160	160	160	160	160	160	1,800	
	<b>M2P Total</b>	795	827	817	836	855	855	855	855	855	855	855	9,257	
OPE		{Natural Smoke extraction}	15	30	30	30	30	30	30	30	30	30	30	315
	76365 - Site consolidation: safety	<b>76365 - Site consolidation: safety Total</b>	15	30	30	30	30	30	30	30	30	30	30	315
		{HCTR-Controls and verification (ex-HPRE)}	580	460	520	520	520	520	520	520	520	520	520	5,720
	76616 - HVAC consolidation - safety	<b>76616 - HVAC consolidation - safety Total</b>	580	460	520	520	520	520	520	520	520	520	520	5,720
		{SCTR-Controls and verification (ex-SPRE)}	165	150	150	150	150	150	200	200	200	200	200	1,915
76636 - Sanitary consolidation - safety	<b>Total</b>	165	150	150	150	150	150	200	200	200	200	200	1,915	
	<b>OPE Total</b>	760	640	700	700	700	700	750	750	750	750	750	7,950	
RES		{Heating Plants - Reserve}			1,000	1,500								2,500
		{Repair to technical infrastructure}		0	139	100	200	566	581	1,851	301	301	371	4,410
	70003 - Repairs of technical infrastructure	<b>70003 - Repairs of technical infrastructure Total</b>		0	1,139	1,600	200	566	581	1,851	301	301	371	6,910
		{Design and consultancy}	83	35	90	90	90	90	90	90	90	90	90	928
		{SW licences - BASL02 - Stratus}	10	10	10	10	10	10	10	10	10	10	10	110
	76364 - Design, consultancy and manpower	<b>76364 - Design, consultancy and manpower Total</b>	93	45	100	100	100	100	100	100	100	100	100	1,038
		{0863-False floor}	90											90
		{Urgent works - B774}	68											68
		{Urgent works}	162	150	250	227	250	250	250	250	250	250	250	2,539
	76370 - Site consolidation urgent repairs	<b>76370 - Site consolidation urgent repairs Total</b>	320	150	250	227	250	250	250	250	250	250	250	2,697
	<b>RES Total</b>	413	195	1,489	1,927	550	916	931	2,201	651	651	721	10,645	



# Full consolidation plan

		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total
	{CERN Welcome Centre}	120	480										600
	<b>76363 - Interior renovation Total</b>	120	480										600
	{0030-112-Upgrade fire safety}	54											54
	{0033-5-4-Upgrade fire safety}		10										10
	{0227-Water tower (stairs)}			220									220
	{0501-Upgrade fire safety}	51											51
	{0504-Upgrade fire safety}	9											9
	{Asbestos removal (Safety)}	463	337	350	140	140	140	140	140	140	140	140	2,270
	{Upgrade fire safety}		170	170	170	170	170	170	170	170	170	170	1,700
	<b>76365 - Site consolidation: safety Total</b>	577	517	740	310	310	310	310	310	310	310	310	4,314
	{0501-Replacement of ventilation system}	30											30
	{HPLC-Automatic central remote monitoring (incl. energy consumption)}	73	70	70	70	70	70	70	70	70	70	70	773
	<b>76614 - CVC - consolidation Total</b>	103	70	70	70	70	70	70	70	70	70	70	803
	{ELED-LED lamps replacement}	743	600	600	600	600	507						3,650
	<b>76624 - Elec Consolidation Total</b>	743	600	600	600	600	507						3,650
	{ISR septic tank studies}	18											18
	{ISR septic tanks removal}	316											316
	<b>76950 - ISR removal of septic tanks Total</b>	334											334
UPG	<b>UPG Total</b>	1,877	1,667	1,410	980	980	887	380	380	380	380	380	9,701
	<b>Grand Total</b>	12,762	13,656	12,591	12,107	8,267	7,549	13,096	12,996	13,196	13,196	13,266	132,679

# Questions?

- When you were about to start a renovation project, what was the cost estimate given by STRATUS, for the elements you decided to renovate, and what was the actual renovation cost?
- Are there elements in STRATUS that were really off when you actually made the renovations, which ones, and could you see why ?
- How did you set the renovation cut-off years in order to make your financial plans? For example did you change all the windows when the STRATUS value was still 0.6 and budgeted based on a total change (STRATUS grade=0)?
- Did you add any margin for additional transformation (and not just renovation 1:1)? And if so, was that for a change in planned use, or for other upgrades?
- In your experience, does STRATUS also cover the cost of the studies that preceded your renovations?





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