Technical-economic study of a PV solar-hydrogen system with cogeneration for re-electrification in hotels

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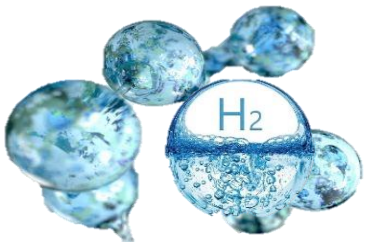

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ENERGY BALANCE OF THE BUILDING STUDIED

The hotel's Heating Ventilation and Air Conditioning (HVAC)

a) HVAC consumption

Description	Consumption ((KWh/year)
Heating pump	20000
Electric heater	20000
air conditioner	50400
Air renewal	162000
Kitchen extractor	5600
Hot water	61000
Hot water	372000

b) Expenditure in 10 years

FE(gCO2e/KWh)	Pc(€/year)	Energy cost (€/year)	Cost (€/10 years)
49	98	4318	707170.6
49	98	4318	
59	297.36	10881.36	
59	955.8	34975.5	
75	42	1209.04	
58	353.8	13169.9	
443	16479.6	25854	423336

ENERGY BALANCE OF THE BUILDING STUDIED

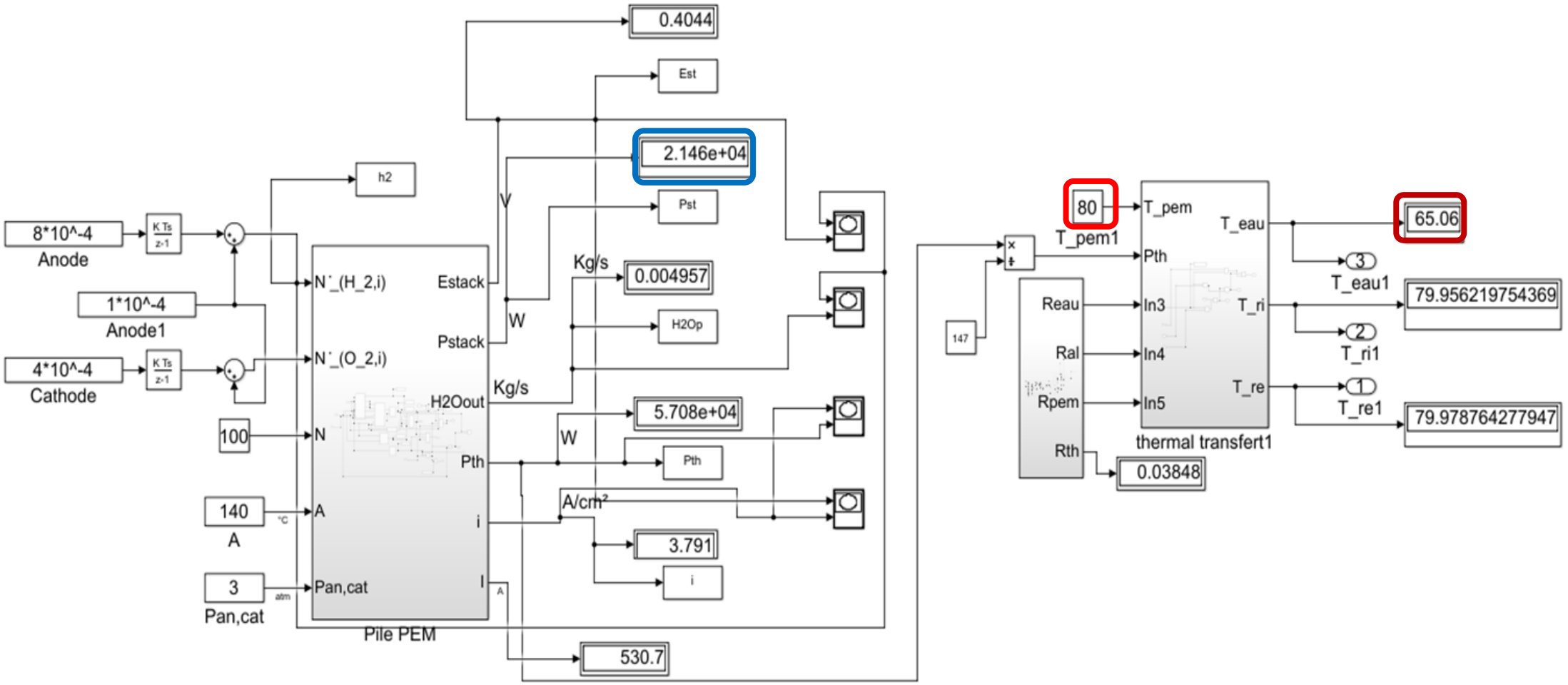
Solar dimensioning for supplying electrical consumers

Principaux paramètres système	Type de système	**Système isolé avec batteries**		
Orientation plan capteurs	inclinaison	32°	azimut	0°
Modules PV	GG1H-300 Bifacial PERC 60 cells - Double Glass		Pnom	300 Wc
Champ PV	Nombre de modules	726	Pnom total	**218 kWc**
Batterie	Modèle	3 TU 6E Plus	Technologie	Pb-acide, ouverte, tubulai
Pack de batteries	Nombre d'unités	1480	Tension / Capacité	**240 V / 16650 Ah**
Besoins de l'utilisateur	Charge constante fixée	35.3 kW	Global	309 MWh/an

Principaux résultats de la simulation				
Production du système	**Energie disponible**	**386551 kWh/an**	Productible	1775 kWh/kWc/an
	Energie utilisée	306582 kWh/an	En excès (inutilisée)	66492 kWh/an
	Indice de performance (PR)	67.26 %	Fraction solaire (SF)	99.12 %
Besoins non satisfaits	Fraction du temps	0.9 %	Energie manquante	2720 kWh/an
Vieillissement batterie (Etat d'usure (SOW))	SOW cyclage	96.0%	SOW statique	90.0%

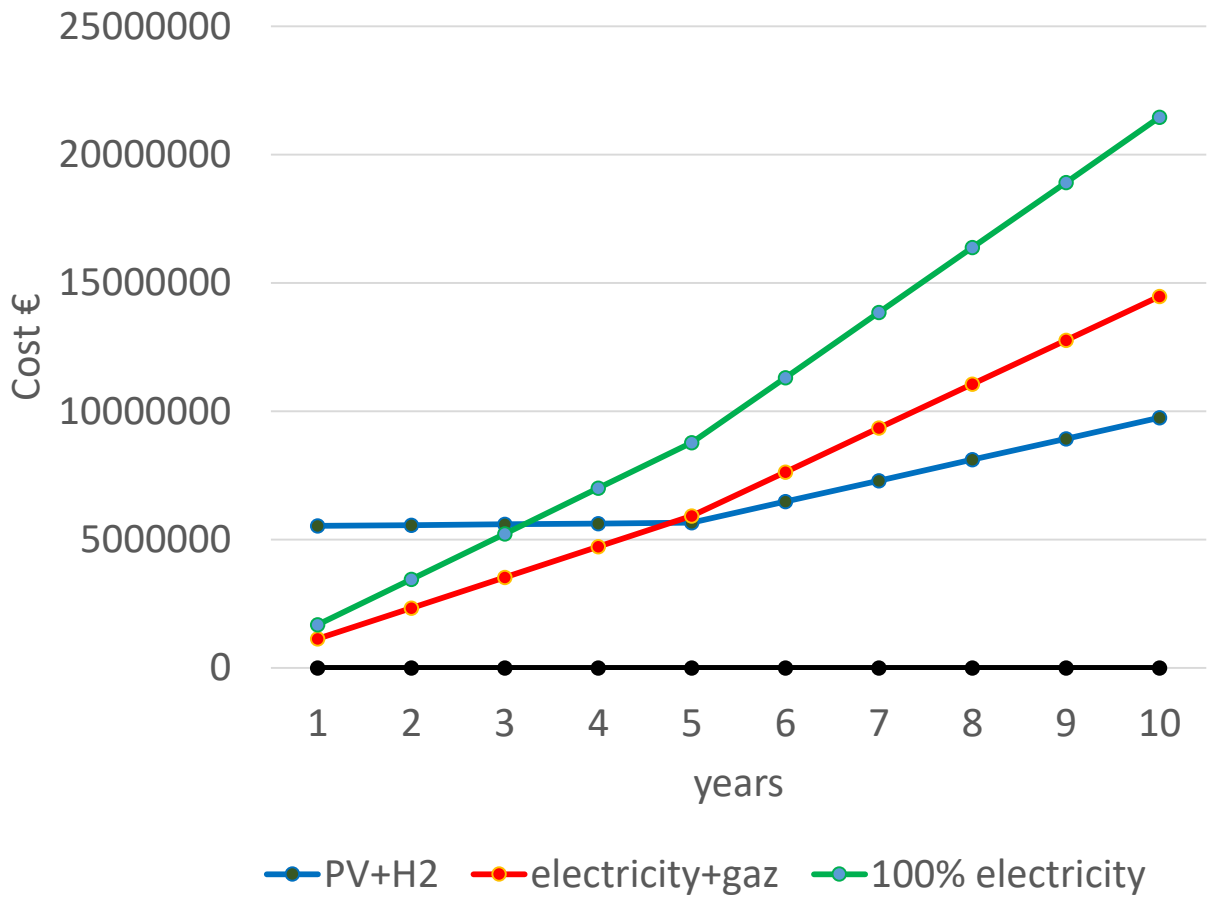
ENERGY BALANCE OF THE BUILDING STUDIED

Mathematical modeling of the Hydrogen to simulate the power to be supplied by the PEM electrolysis system



RESULTS AND CONCLUSION

Description	Energy cost (Kwh/year)	System cost (€)
Energy H_2 PEM	210240	5 247 240
Energy PV	1918440	284700



- Case1: A return on investment in 3 years spending 55% less over 10 years.
- Case2 : For the second case, the return on investment is done in 5 years and we spend 33% less over 10 years.
- As a result, the solar panel solution with hydrogen storage coupled with a cogeneration system is a more profitable solution in the medium term for the residential-tertiary sector than the combination of electricity-natural gas or 100% electricity.


THANK YOU FOR
YOUR
ATTENTION
H2
HYDROGEN
ENERGY STORAGE