

Computing network at InSTEC (Havana University)

**Higher Institute of
Technologies and
Applied Science**



<https://www.instec.cu/>



<https://www.facebook.com/InSTEC.Universidad>



https://twitter.com/instec_cuba

Head of Department of Nuclear Physics: Dr. Cesar Garcia Trapaga

Cel: (+537 59995836

correo: Cesar.Garcia@instec.cu

A brief explanation of who we are

Higher Institute of Technologies and Applied Science **InSTEC**

1. Small institute belonging to the Havana University
2. 4 Academic Program(Career)
 - Nuclear Physics
 - Radiochemistry
 - Engineering in Nuclear and Energy Facilities
 - Meteorology
3. 100 postgraduate students (Diplomas, Masters, Doctorates)
4. Collaboration with 15 countries (20 Academic Institutions)

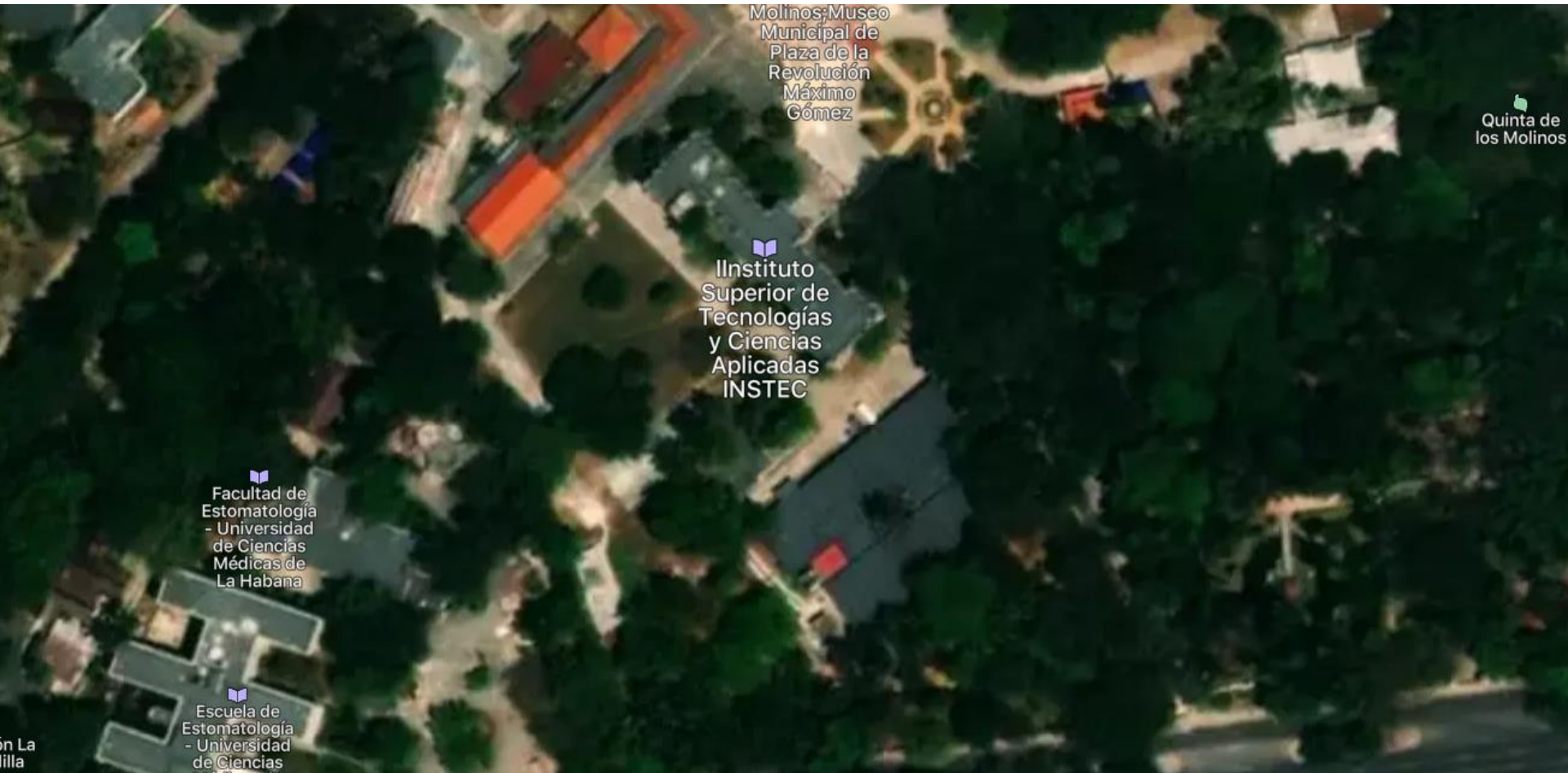
Collaboration with Germany

1.  DESY(4.+3 postgraduates Phd program)
2. |
3.  GSI(2 postgraduates Phd program)
4. We have participated in the **8 editions** of the DESY Summer Schools (10 postgraduates)
5. We have an official **collaboration project** between UH-InSTEC and DESY since 2018

¿Where are we located?



Computing network at InSTEC



Map of InSTEC
3 principal Building

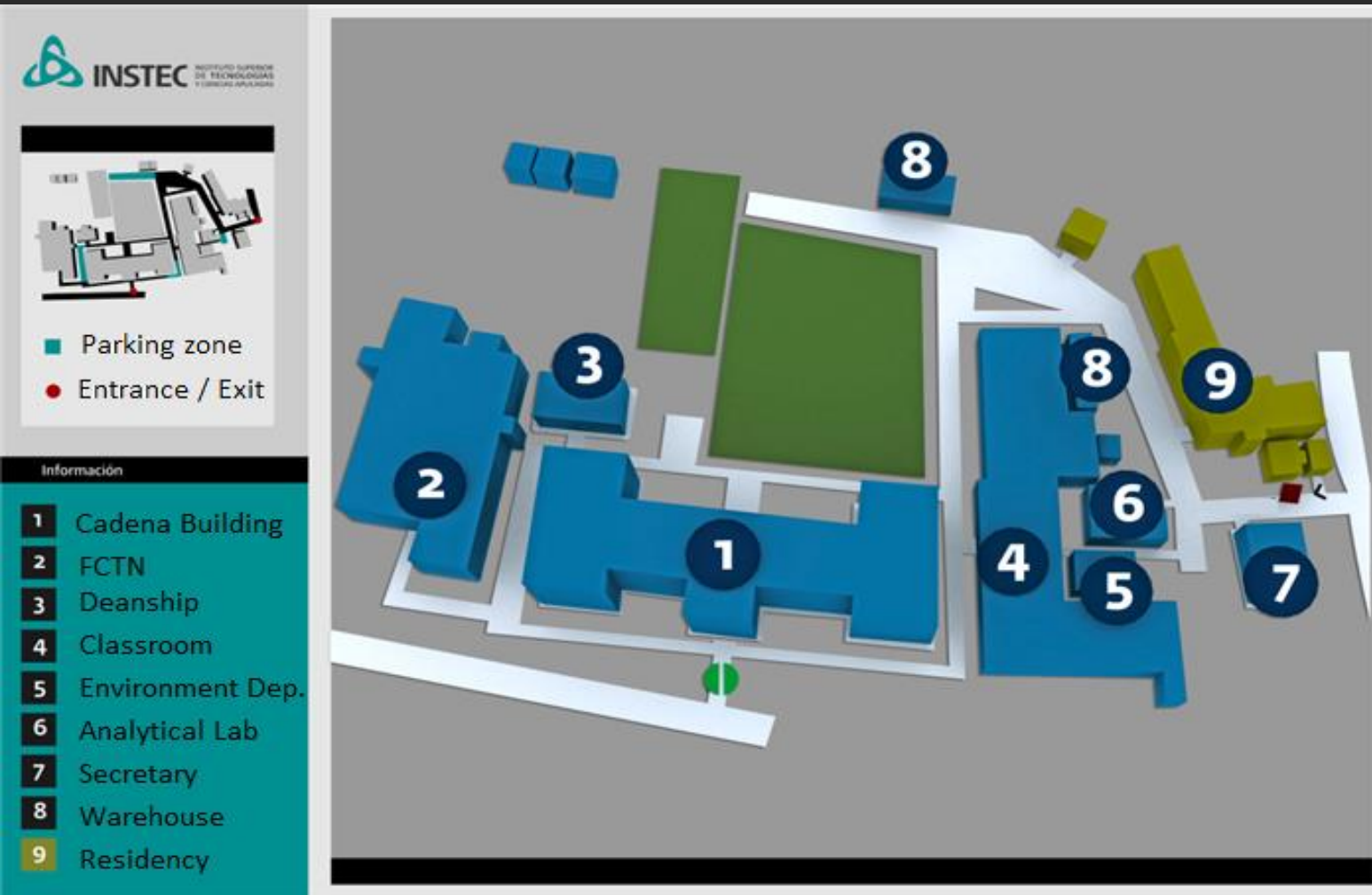
Computing network at InSTEC



Map of InSTEC

- 3 Main Building

Computing network at InSTEC



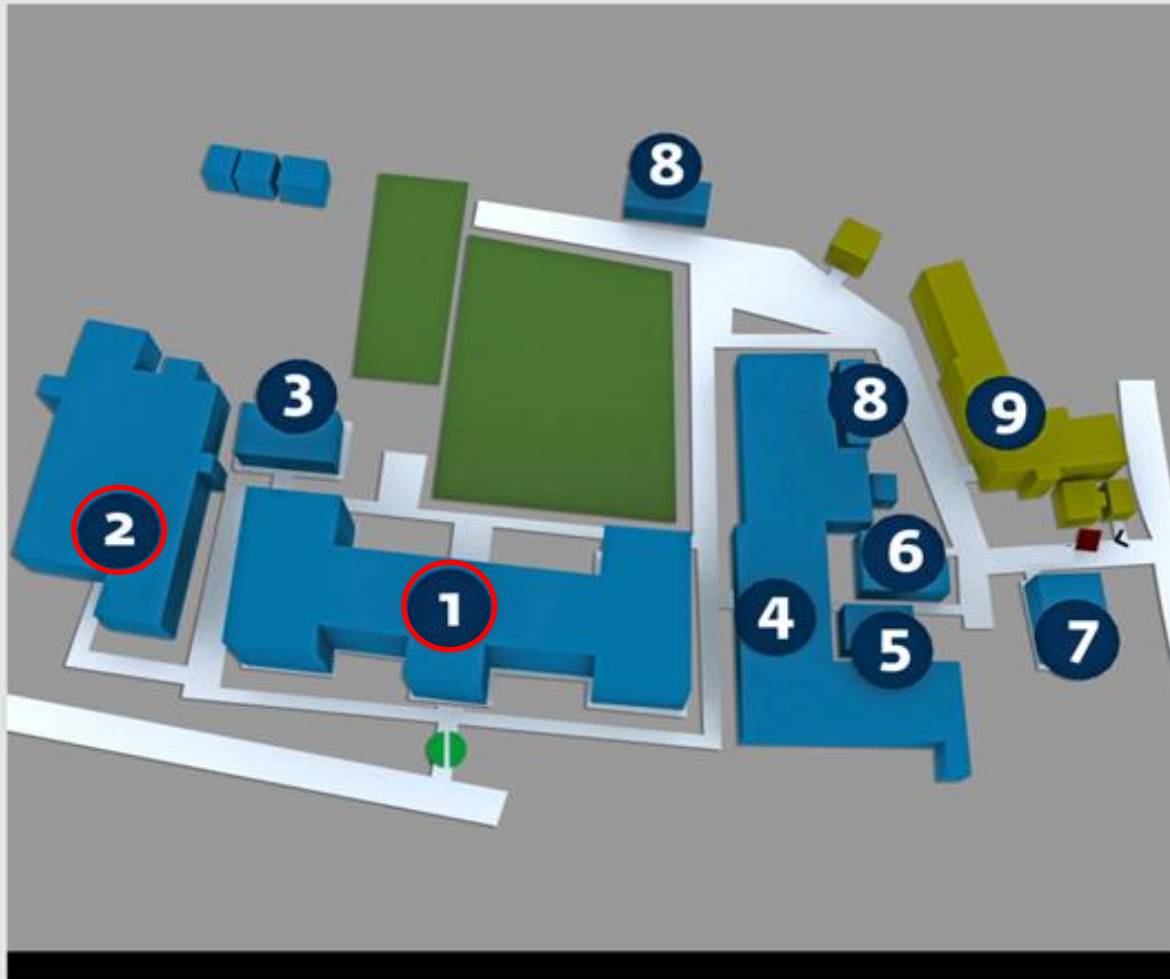
Computing network at InSTEC



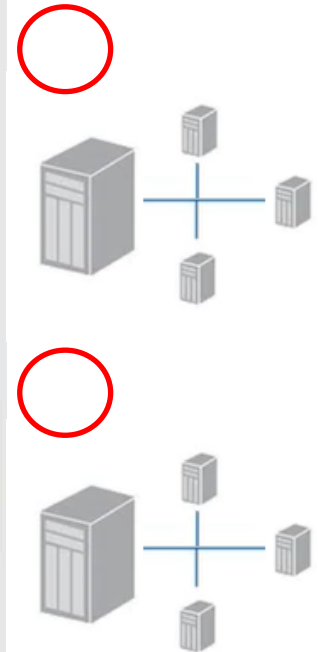
- Parking zone
- Entrance / Exit

Información

- 1** Cadena Building
- 2** FCTN
- 3** Deanship
- 4** Classroom
- 5** Environment Dep.
- 6** Analytical Lab
- 7** Secretary
- 8** Warehouse
- 9** Residency

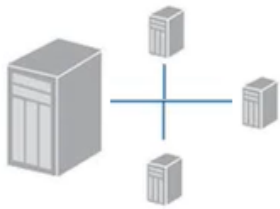


2 Small Cluster



Computing network at InSTEC

At InSTEC we have two small computing clusters.



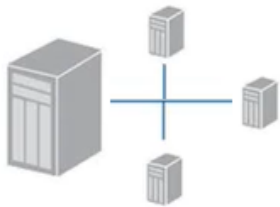
Cluster 1

Features

- 8 compute nodes
- 1 Master [distribute the tasks]

Computing network at InSTEC

At InSTEC we have two small computing clusters.



Cluster 1

Features

- 8 compute nodes

	Compute Nodes				Total
Type	Core i3	Core-i5	Corei7	Xeon	
Cantidad	1	4	2	1	8
Core	2	16	8	16	52
Velocity (GHz)	3,3	3,2	3,6	1,6	
RAM (GB)	8	4	8	24	64
HDD (GB)	500	1000	1000	4000	10500

- 1 Master [distribute the tasks]

Computing network at InSTEC

At InSTEC we have two small computing clusters.



Cluster 1

Features

- 8 compute nodes
- 1 Master [distribute the tasks]

	Total
Type	Quad Core
Cantidad	1
Core	4
Velocity (GHz)	2.4
RAM (GB)	4
HDD (GB)	500
LAN (Mbps)	100

S.O Rock Cluster 6.2
+ Linux CentOS 6.0

Computing network at InSTEC

At InSTEC we have two small computing clusters.



Features

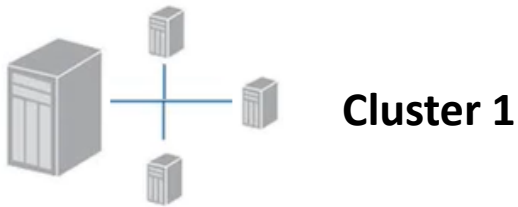
- 8 compute nodes
- 1 Master [distribute the tasks]

Software (Installed programs)

SIESTA, QMEXPRESSO, INTEL PARALLEL STUDIO 2015, DFTB+, MERCURY, GFORTRAN, GCC, SERPENT, ROOT, GEANT4, GROMACS, NewtonX, Anaconda3, MAMBA, GAMESS, WRF, CASCADE, PYTHIA

Computing network at InSTEC

At InSTEC we have two small computing clusters.



Features

- 8 compute nodes
- 1 Master [distribute the tasks]

What is this cluster doing?

Modeling, Simulation and Data Analysis in:

Particle Physics

Molecular Dynamics

Nanomaterials

Climate

Computing network at InSTEC

At InSTEC we have two small computing clusters.



Features

- 8 compute nodes
- 1 Master [distribute the tasks]

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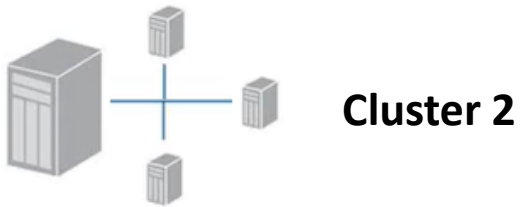


What results have we obtained?

Since July 2018, **10** articles have been obtained, **30** graduation theses, **6** postgraduate theses (Master and Doctorate)

Computing network at InSTEC

At InSTEC we have two small computing clusters.

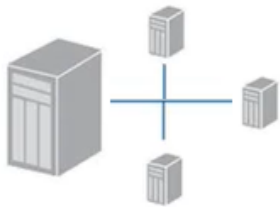


Features

- 5 compute nodes
- 1 Master [distribute the tasks]

Computing network at InSTEC

At InSTEC we have two small computing clusters.



Cluster 2

Features

- 5 compute nodes

	Compute Nodes				Total
Type	Core i3	Core-i5	Corei7	Xeon	
Cantidad	1	1	2	1	5
Core	2	4	4	12	26
Velocity (GHz)	3,3	3,2	3,6	2,4	
RAM (GB)	8	8	8	16	48
HDD (GB)	500	1000	1000	2000	5500

- 1 Master [distribute the tasks]

Computing network at InSTEC

At InSTEC we have two small computing clusters.



Cluster 2

Features

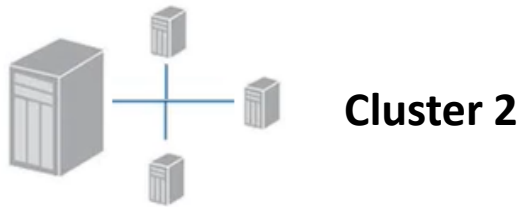
- 5 compute nodes
- 1 Master [distribute the tasks]

	Total
Type	Core I3
Cantidad	1
Core	4
Velocity (GHz)	2.4
RAM (GB)	4
HDD (GB)	750
LAN (Mbps)	100

S.O Rock Cluster 6.2
+ Linux CentOS 6.0

Computing network at InSTEC

At InSTEC we have two small computing clusters.



Features

- 5 compute nodes
- 1 Master [distribute the tasks]

Software (Installed programs)

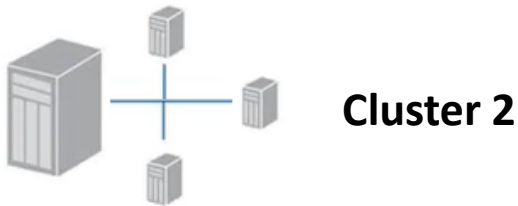
Cascade 2.2.4 ,FastJet 3.4.1,HepMC 3.2.6,HepMC 2.07.11,LHAPDF 6.5.4

Rivet 3.1.6,TMDLib 2.2.0,Yoda 1.9.7,Pythia 6.428,Phytia 8.310,Geant4 11.1.2

GATE 9.2,Root 2.28

Computing network at InSTEC

At InSTEC we have two small computing clusters.



Features

- 5 compute nodes
- 1 Master [distribute the tasks]

What is this cluster doing?

Modeling, Simulation and Data Analysis in:

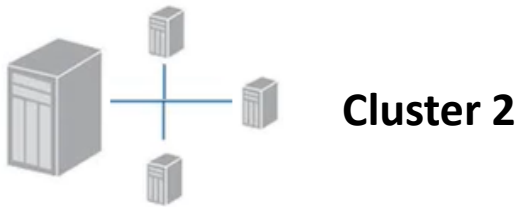
Particle Physics, Detectors Simulation

Nanomaterials, DFTB

Medical Physics(Image processing)

Computing network at InSTEC

At InSTEC we have two small computing clusters.



Features

- 5 compute nodes
- 1 Master [distribute the tasks]

What is this cluster doing?

Modeling, Simulation and Data Analysis in:

Particle Physics, Detectors Simulation

Nanomaterials

Medical Physics(Image processing)

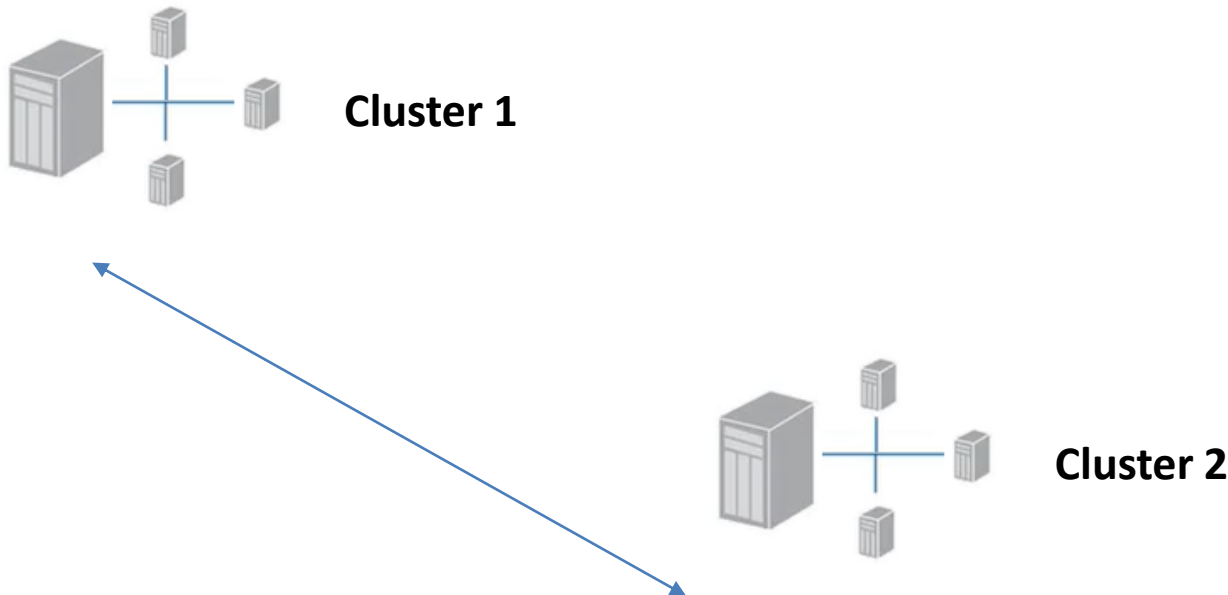


What results have we obtained?

Since July 2018, **6** articles have been obtained, **20** graduation theses, **2** postgraduate theses (Master)

Computing network at InSTEC

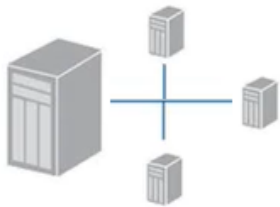
The connection between the two Clusters.



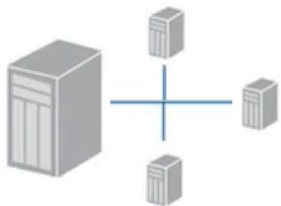
The connection between the two Clusters is made through
a Fiber Optic+switch at **1000 Mbps**

Computing network at InSTEC

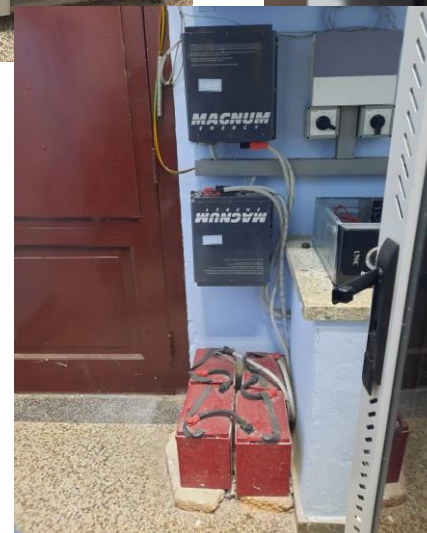
Some Images of the cluster



Cluster 1



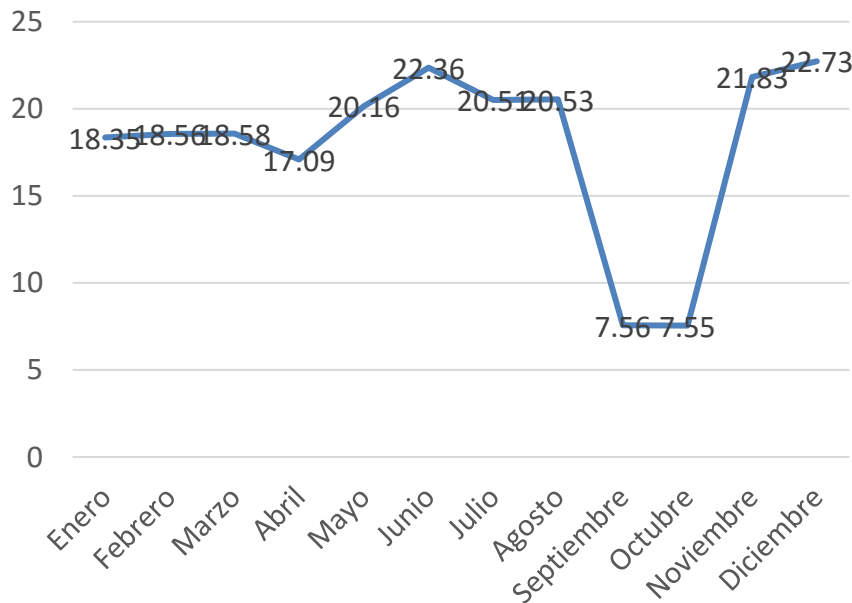
Cluster 2



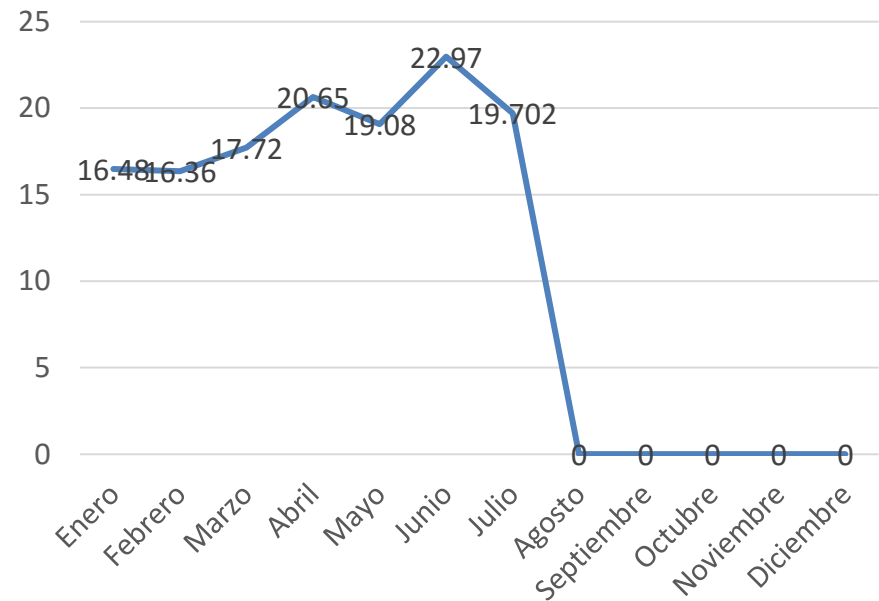
Support and electrical supply

Electric consumption (Mwh) InSTEC

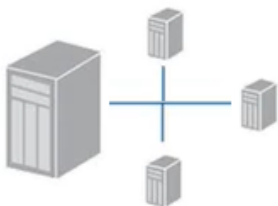
2022



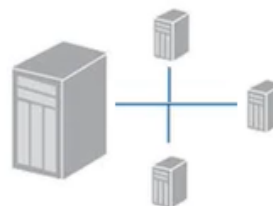
2023



There are no significant variations from one year to the next.



Cluster 1-- 20 Kwh

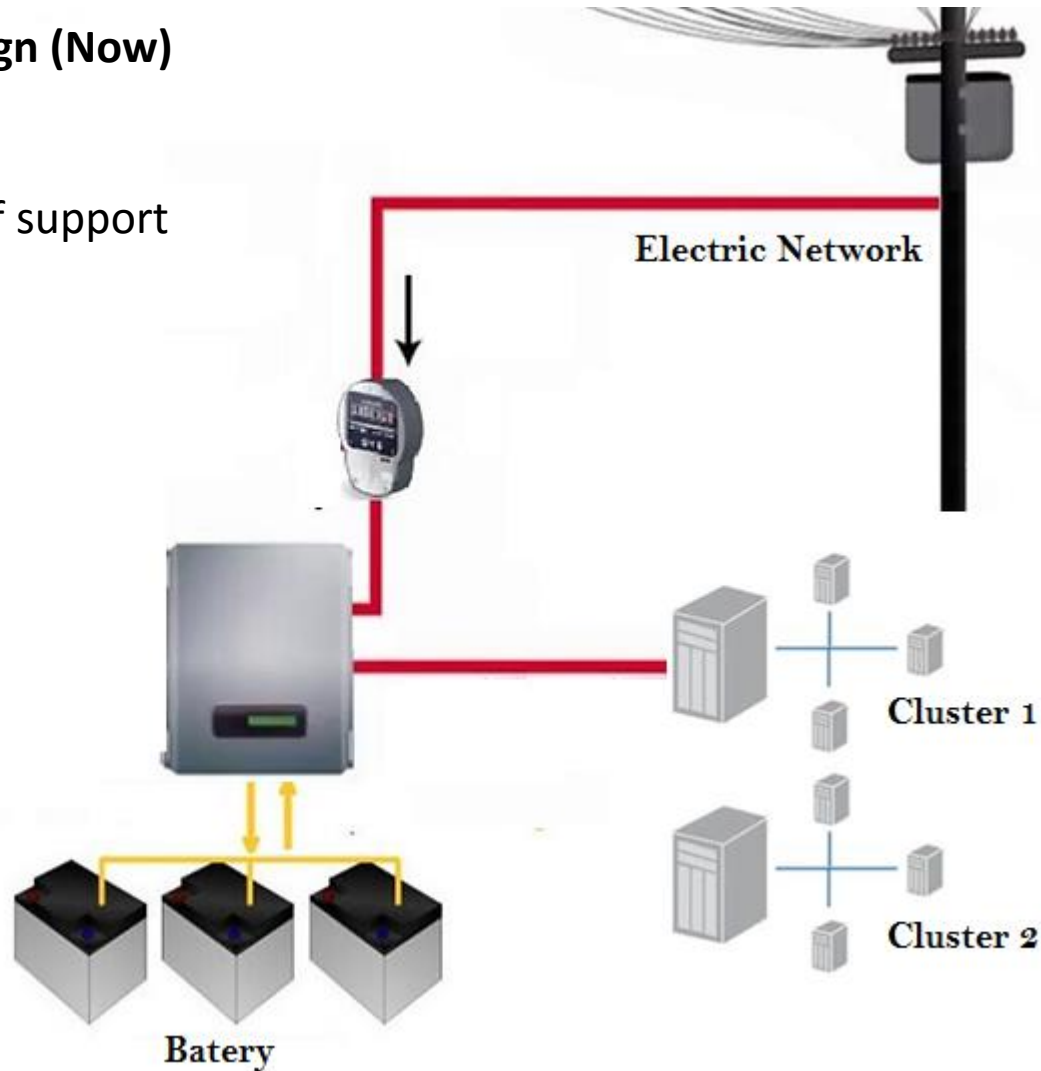


Cluster 2-- 10 Kwh

Support and electrical supply

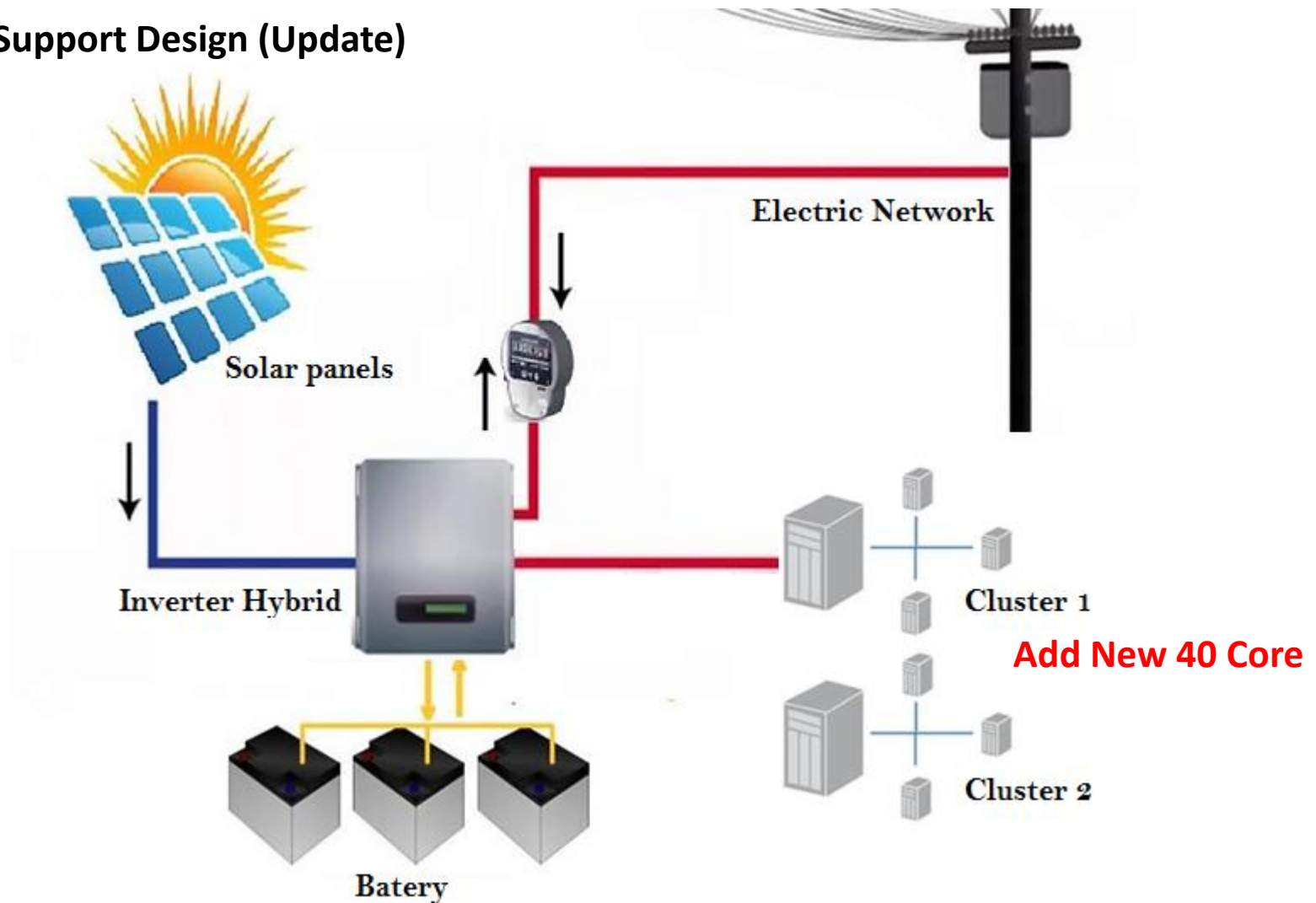
Electric Support Design (Now)

We have only 2 hours of support



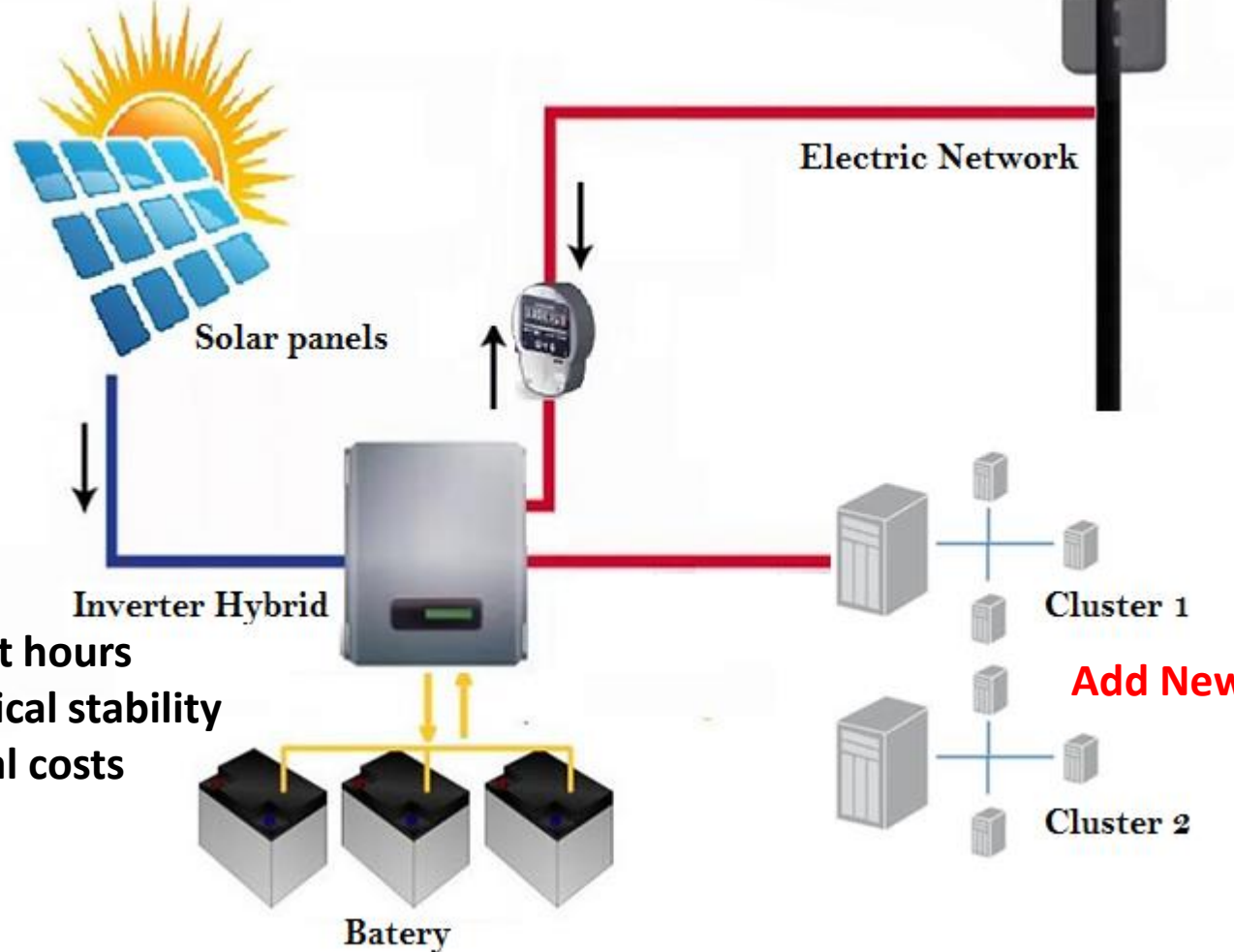
Support and electrical supply

Electric Support Design (Update)



Support and electrical supply

Electric Support Design (Update)

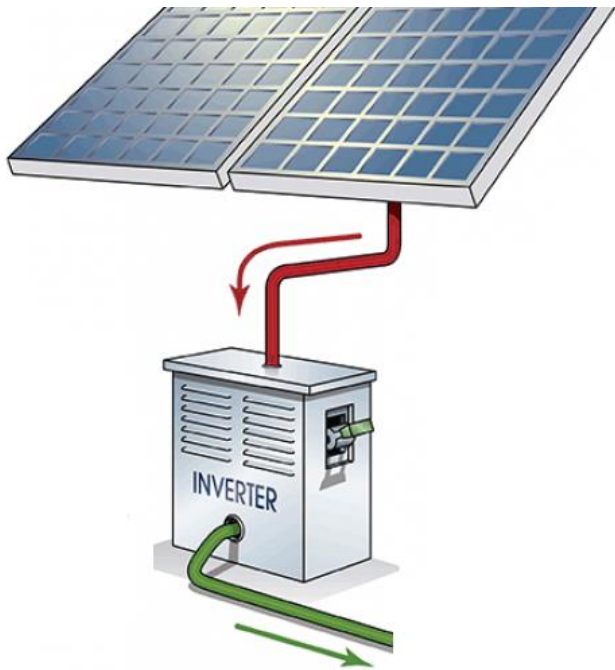


Objectives

1. Increase support hours
2. Get more electrical stability
3. Reduce electrical costs

Support and electrical supply

Electric Support Design (Update)



Is it possible to maintain the Instec cluster with Solar Panels?

1. Small Cluster (**40-60 Cores**)
with Electric consumption ~ **20 kWh**

2. In Cuba the average solar time
is 4.5 hours per day

- For example, if a set of PV modules add up to 5,000 W (5 kWp, 10 modules)
- 4.5 hours per day



It is possible to generate around 22 kWh



For this is necessary ~ 20 m²

Support and electrical supply

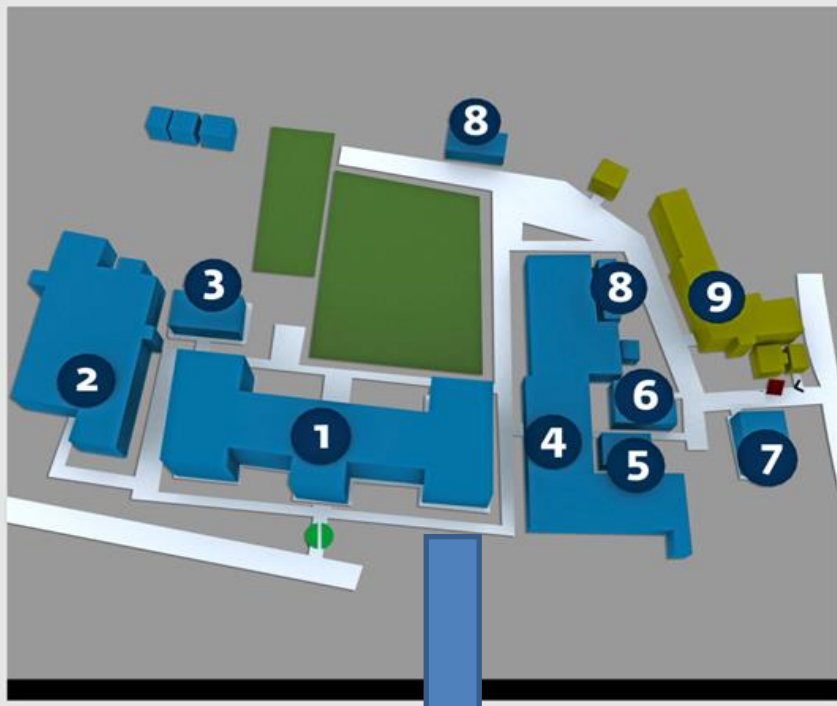
INSTEC INSTITUTO SUPERIOR
DE TECNOLOGÍAS
Y CIENCIAS APLICADAS



■ Parking zone
● Entrance / Exit

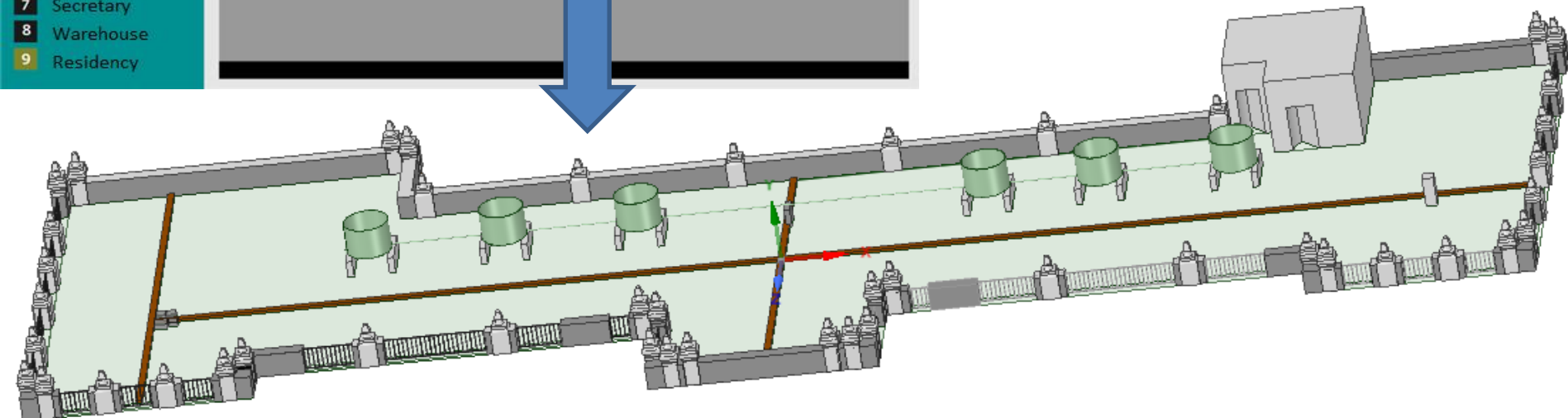
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This Area have around 25 m²

ANSYS
R18.1



Support and electrical supply



THANK 'S

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Head of Department of Nuclear Physics: Dr. Cesar Garcia Trapaga

Cel: (+537 59995836

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