

DISTRICT COOLING MARCHES ON IN COLOMBIA

TECHNICAL, CULTURAL AND LEGAL CHALLENGES TO CRÉATE A NEW BUSSINESS MODEL IN COLOMBIA



A G E N D A

- ✓ Why district cooling in Colombia?
- ✓ HVAC market in Latinamerica and Colombia.
- ✓ District Cooling in Colombia, 3 case studies.
 - La Alpujarra District Cooling, Medellín - Colombia.
 - Lo Nuestro Shopping Mall, Monteria - Colombia.
 - Serena del Mar District Cooling, Cartagena - Colombia.
- ✓ Conclusions.

ABOUT COLOMBIA!

32 DEPARTMENTS
6 MAIN REGIONS

AREA

TERRESTIAL

1,141,748 km²

MARITIME

928,660 km²

TOTAL:

2,070,408 km²

COLOMBIA

SOCIAL INDICATORS



POPULATION
47,6 million
inhabitants



LANGUAGE
Spanish



CURRENCY
Colombian
pesos (COP)



LIFE
EXPECTANCY
75 years
(Dane, 2013)

ECONOMIC INDICATORS

GDP

2013(BANCO DE
LA REPUBLICA)

US \$378,125
BILLION

GDP

PER CAPITA (NOMINAL
2013-BANCO DE LA
REPUBLICA)

US \$8,021

GDP

PER CAPITA
(PPA, 2013-EIU)

US \$11,188

GDP

GROWTH (2013-
BANCO DE LA
REPUBLICA)

4,7 %

INFLATION
RATE

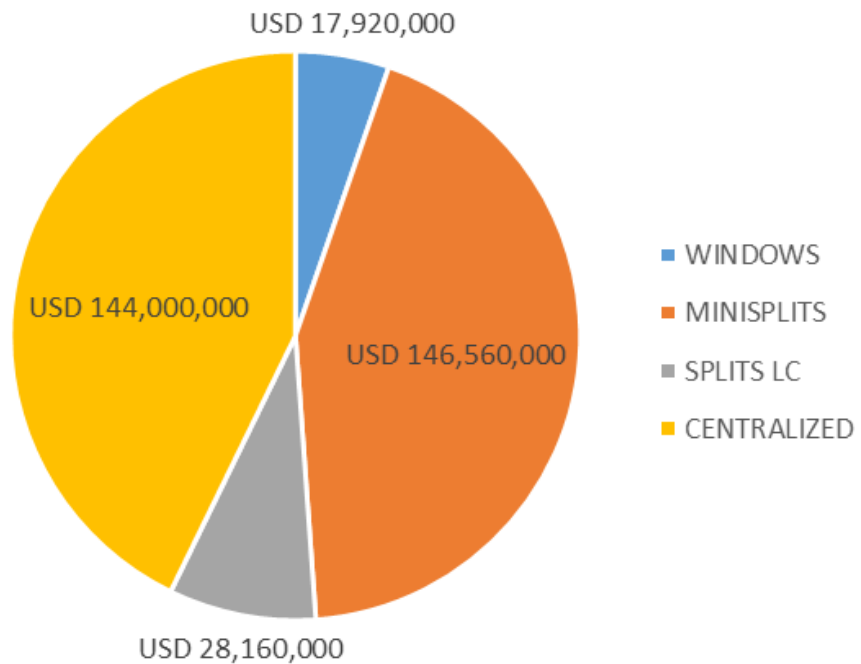
2013(BANCO DE
LA REPUBLICA)

1,9 %

ELECTRICAL SYSTEM

2015
MW **16,420** > 66,6 %
HIDRAULIC > 28,42 %
THERMIC > 4,98 %
MINOR

COLOMBIAN HVAC MARKET BY TECHNOLOGY



- LIGHT COMMERCIAL AND RESIDENTIAL 57%
- CENTRALIZED SYSTEMS CHILLER WATER, WSHP + VRF 43%

USD 336,640,000

SOURCE: Own elaboration BT-Consultants, based on information of manufacturers and import records.



RESIDENTIAL AND LIGHT COMERCIAL APPLICATIONS USE

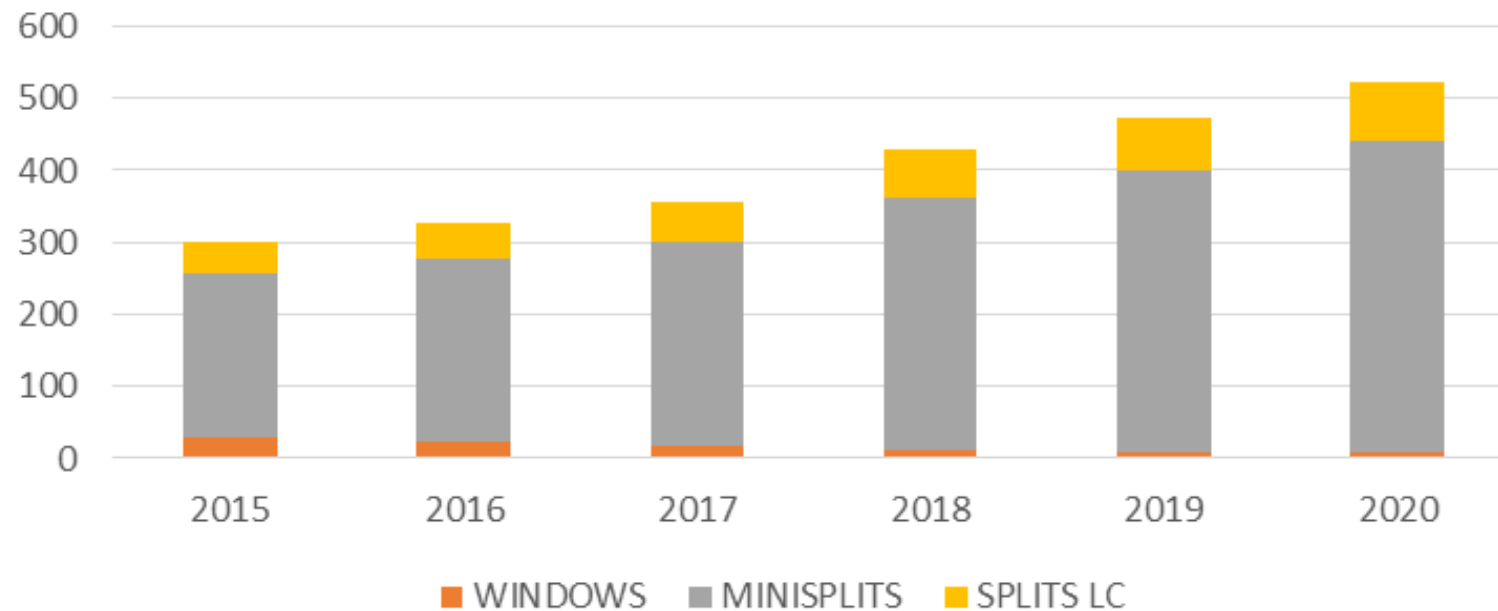
Easy to get and low initial cost systems. Many distribution channels and no permission or inspection needed to install.

“Do it Yourself!!”



MARKET PROJECTION FOR AC LC&R SYSTEMS

2015-2020
(k-TR)



SOURCE: Own elaboration BT-Consultants, based on information of manufacturers and import records.

ENVIRONMENTAL IMPACT LC&R HVAC MINISPLITS DX SYSTEMS 2015



226,000 TR
NOMINAL
CAPACITY



90,000,000 SF
GROSS AREA



500,000 Lb
410A
2100 GWP₁₀₀



471,888 T CO₂ ⁽¹⁾



320 MW
420 GWh/yr



50,400 T CO₂ /yr ⁽²⁾



(1) <http://envira.es/ingenierosasesores/es/servicio/calculador-de-toneladas-de-co2/>

(2) <http://www.ambientebogota.gov.co/documents/10157/237324/Medici%C3%B3n+de+la+Huella+de+carbono+en+el+sector+energ%C3%A9tico.pdf>

ENVIRONMENTAL IMPACT OF CONVERT DX TO HIDRONIC SYSTEMS 2015



226,000 TR



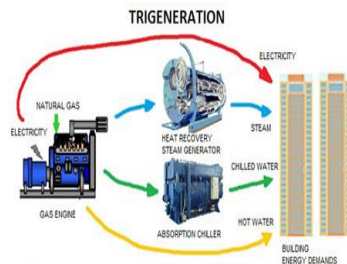
90,000,000 SF
GROSS AREA



158,000 lb.
OF R134A
1370 GWP₁₀₀



-78%
102,771 T CO₂ ⁽¹⁾



170 MW
222 GWh/yr



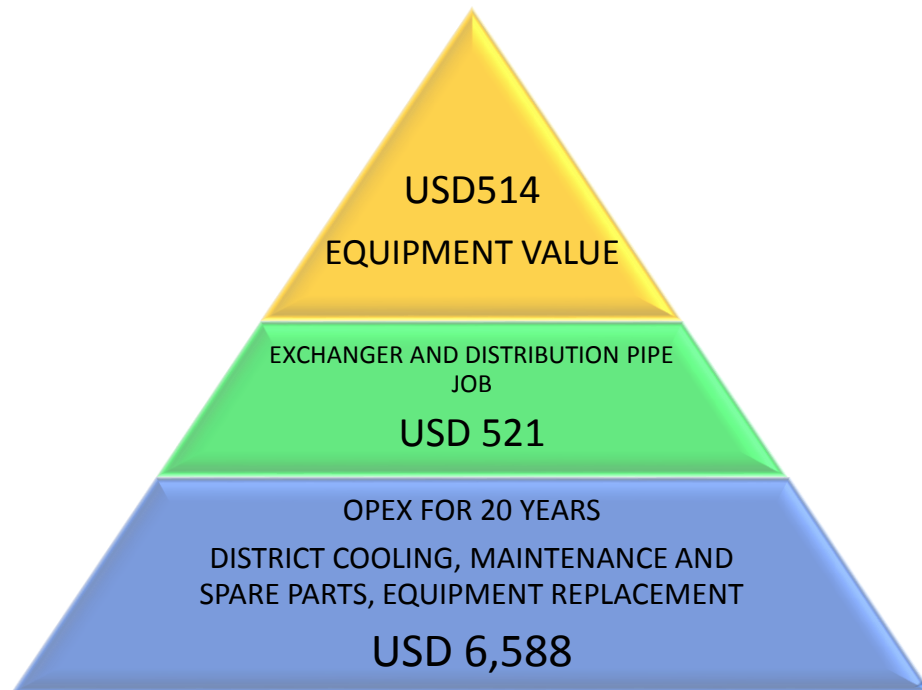
-47%
26,640 T CO₂ /yr ⁽²⁾

(1) <http://envira.es/ingenierosasesores/es/servicio/calculador-de-toneladas-de-co2/>

(2) <http://www.ambientebogota.gov.co/documents/10157/237324/Medici%C3%B3n+de+la+Huella+de+carbono+en+el+sector+energ%C3%A9tico.pdf>

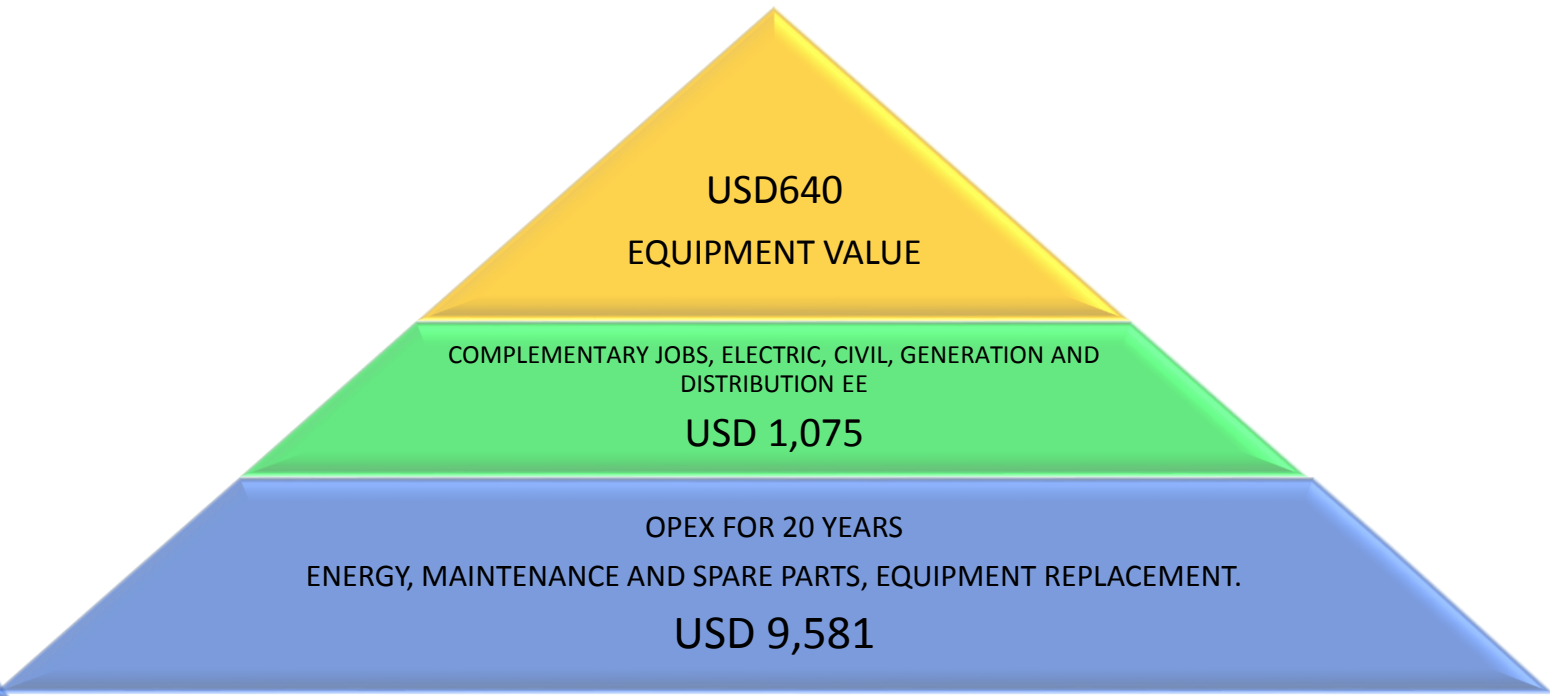
TOTAL OWNER COST 20 YEARS FOR A END RESIDENTIAL USER IN CARTAGENA

DISTRICT COOLING



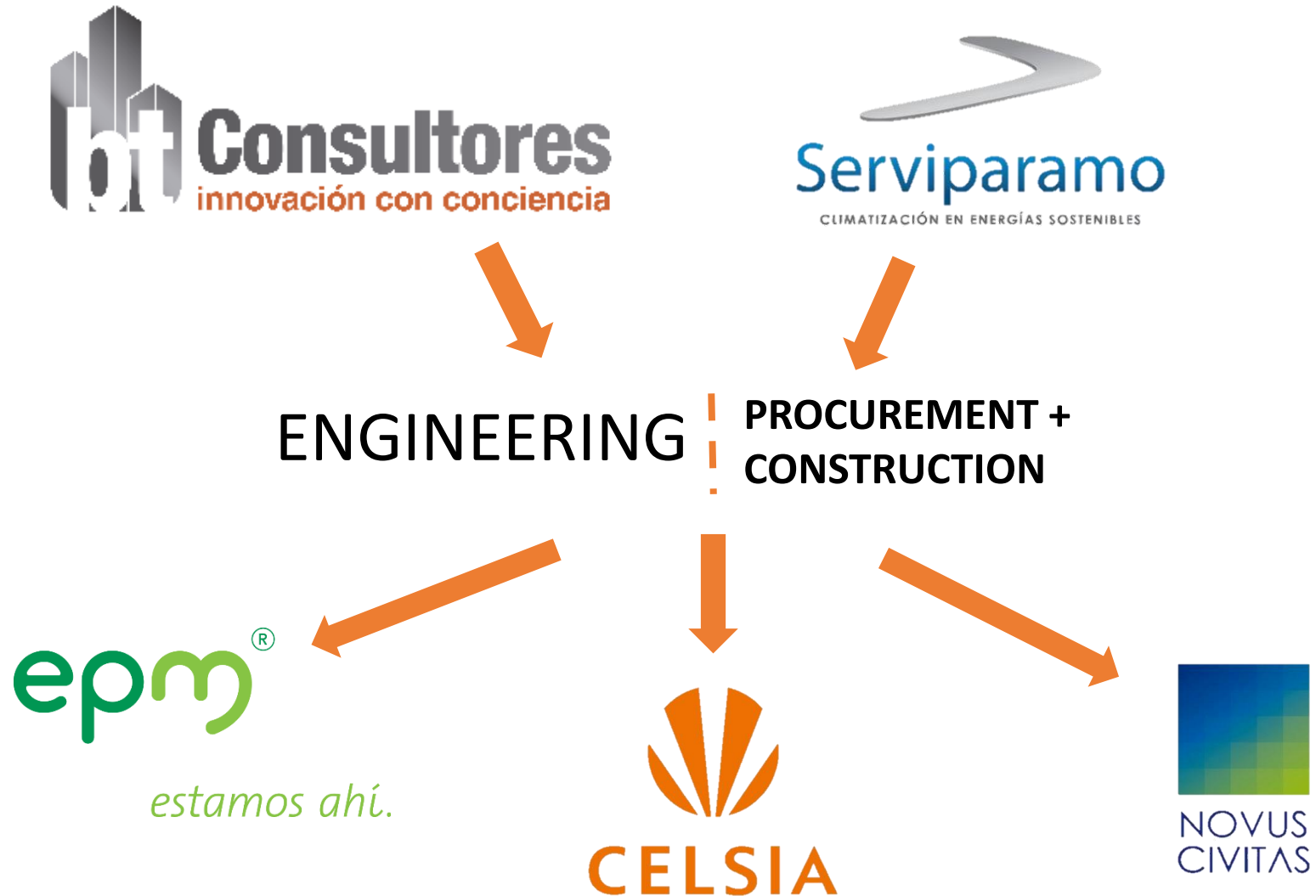
USD 7,623 / TR

COMMON AC SYSTEM



USD 11,296 / TR

STRUCTURING A SOLUTION TO DEVELOP AND BUILD DISTRICT ENERGY PROJECTS



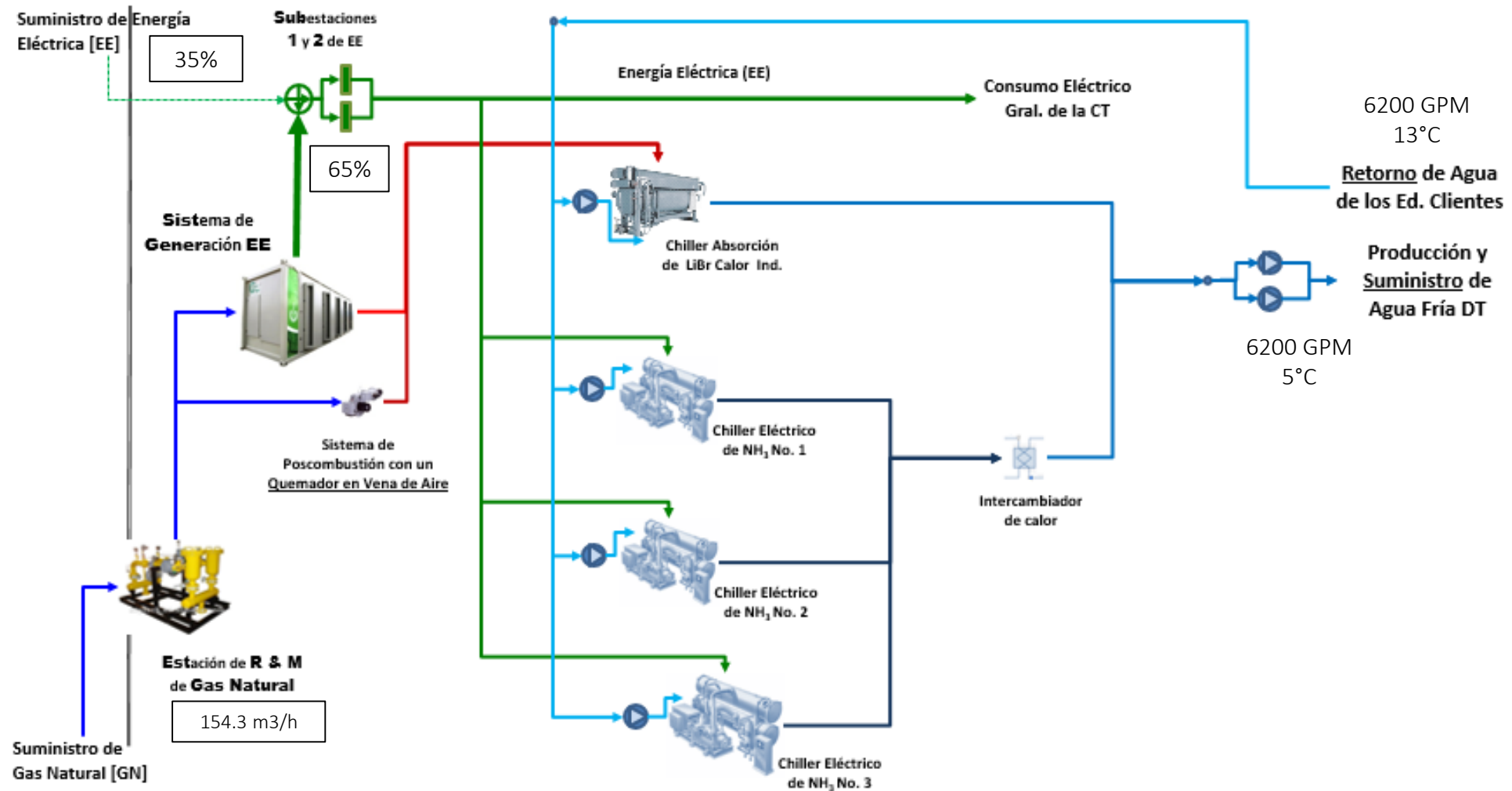
L A A L P U J A R R A D I S T R I C T C O O L I N G

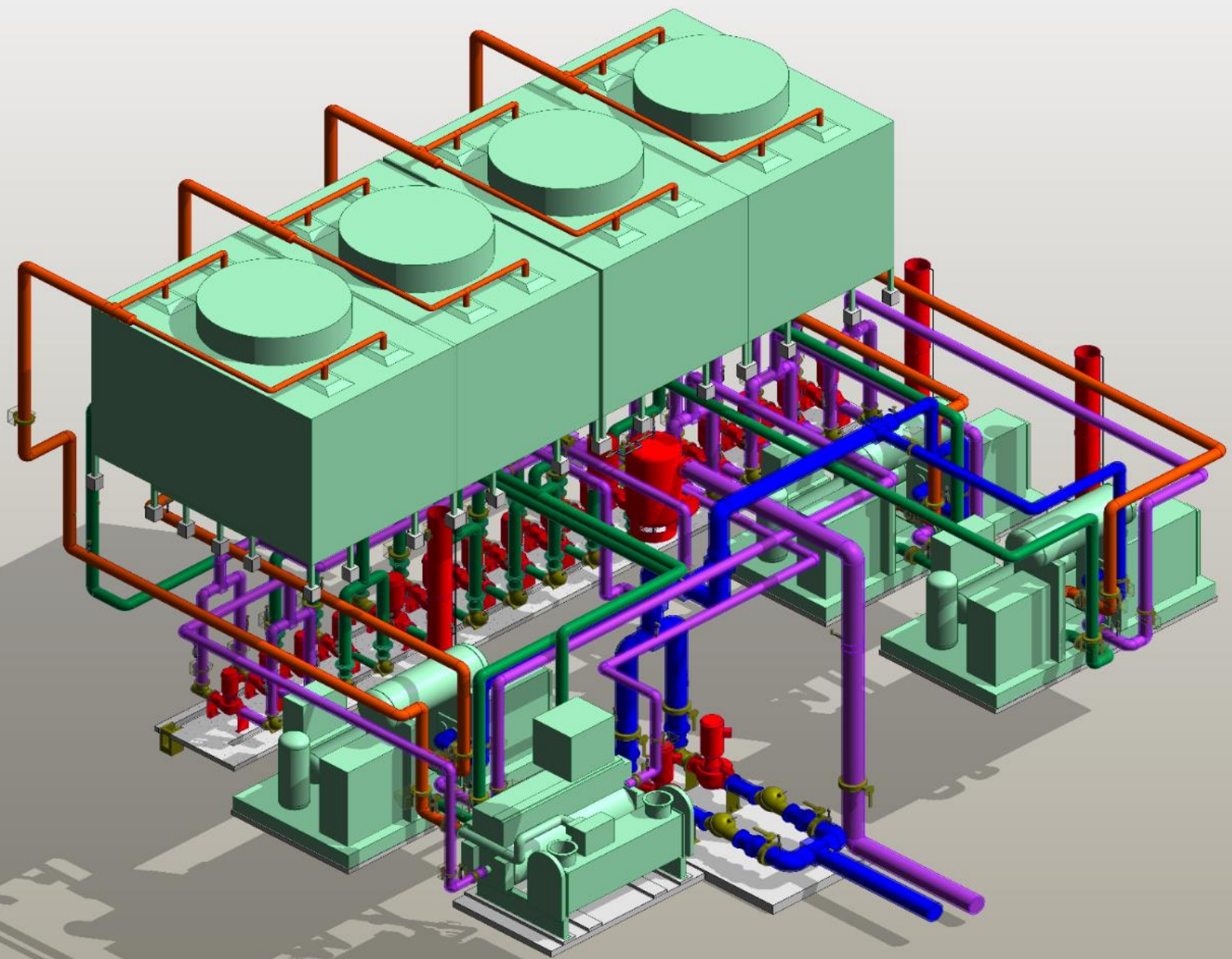
OWNER	EPM – EMPRESAS PUBLICAS DE MEDELLIN
CAPACITY	3624 TR. 1st. STAGE FINAL: 10,000 TR.
CLIENTS	5 1st STAGE. FINAL 15 TO 20.
PIPING:	18" HDPE. 1st STAGE 1.8 KM. FINAL 3 MAIN BRANCHES 18" TO 20"
PLANT:	CHP WITH NATURAL GAS 1 MW MICROTURBINE CAPSTONE 1 508 TR ABSORTION CHILLER YORK 3 1038 TR AMMONIA SCREW CHILLERS YORK 1 BMS SYSTEM JCI PUMPING SYSTEMAS AND PLATE HX ARMSTRONG METERING AND CONTROL DEVICES AT TRANSFER STATIONS BELIMO ENERGY VALVES.
DESIGN	BT CONSULTORES – BOGOTA, COLOMBIA
BUILD AN STARTUP	SERVIPARAMO – BARRANQUILLA, COLOMBIA





LA ALPUJARRA DISTRICT COOLING





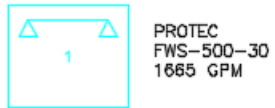
L O N U E S T R O S H O P P I N G M A L L

OWNER	CELSIA
CAPACITY	1410 TR.
CLIENTS	155
PIPING:	14" and Below. 2.5 Km.
PLANT:	CCHP WITH NATURAL GAS AND PV GENERATION 283 kWp. 1 MW MICROTURBINE CAPSTONE 1 400 TR ABSORTION CHILLER YORK 2 505 TR R134a MAGNETIC CENTRIFUGAL CHILLERS YORK 1 BMS SYSTEM SAUTER PLANT CONTROLLER ARMSTRONG IPC-11550 WITH HARTMAN LOOP ALGORITHM PUMPING SYSTEMS ARMSTRONG METERING AND CONTROL DEVICES AT TRANSFER STATIONS BELIMO ENERGY VALVES.
DESIGN	BT CONSULTORES – BOGOTA, COLOMBIA
BUILD AN STARTUP	SERVIPARAMO – BARRANQUILLA, COLOMBIA

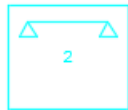


LO NUESTRO SHOPPING MALL

- DESIGN ENVELOPE SENSORLESS 4300 0611-030.0
552 GPM
- DESIGN ENVELOPE SENSORLESS 4300 0815-050.0
1426 GPM
- DESIGN ENVELOPE SENSORLESS 4302 0811-025.0
800 GPM
- DESIGN ENVELOPE SENSORLESS 4302 0608-010.0
504.5 GPM
- DESIGN ENVELOPE SENSORLESS 4300 0513-040.0
705 GPM



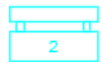
PROTEC
FWS-500-30
1665 GPM



PROTEC
FWS-500-11
1426 GPM



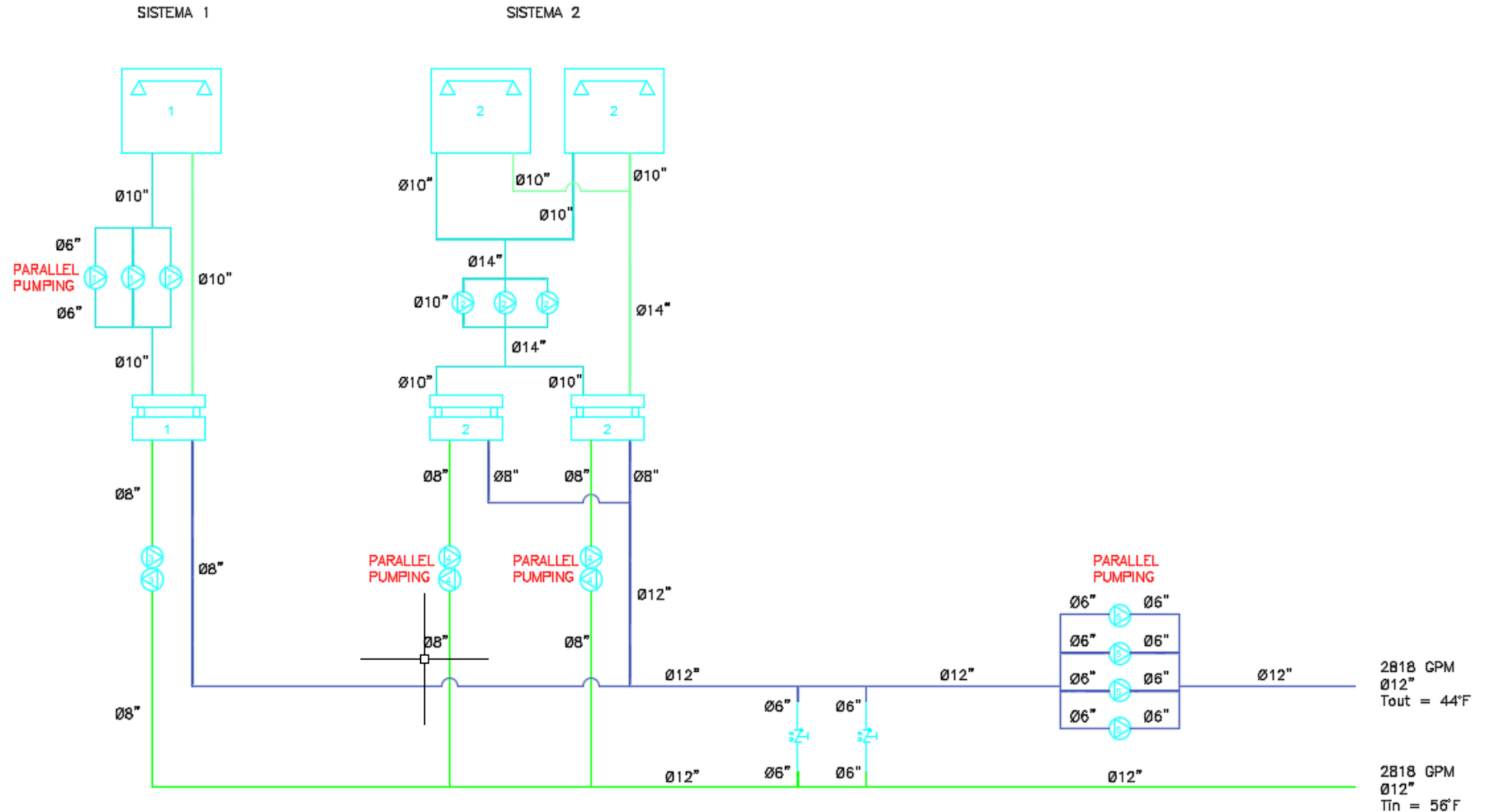
YORK
YMC2-S17BQAB
506 TR - 1009 GPM

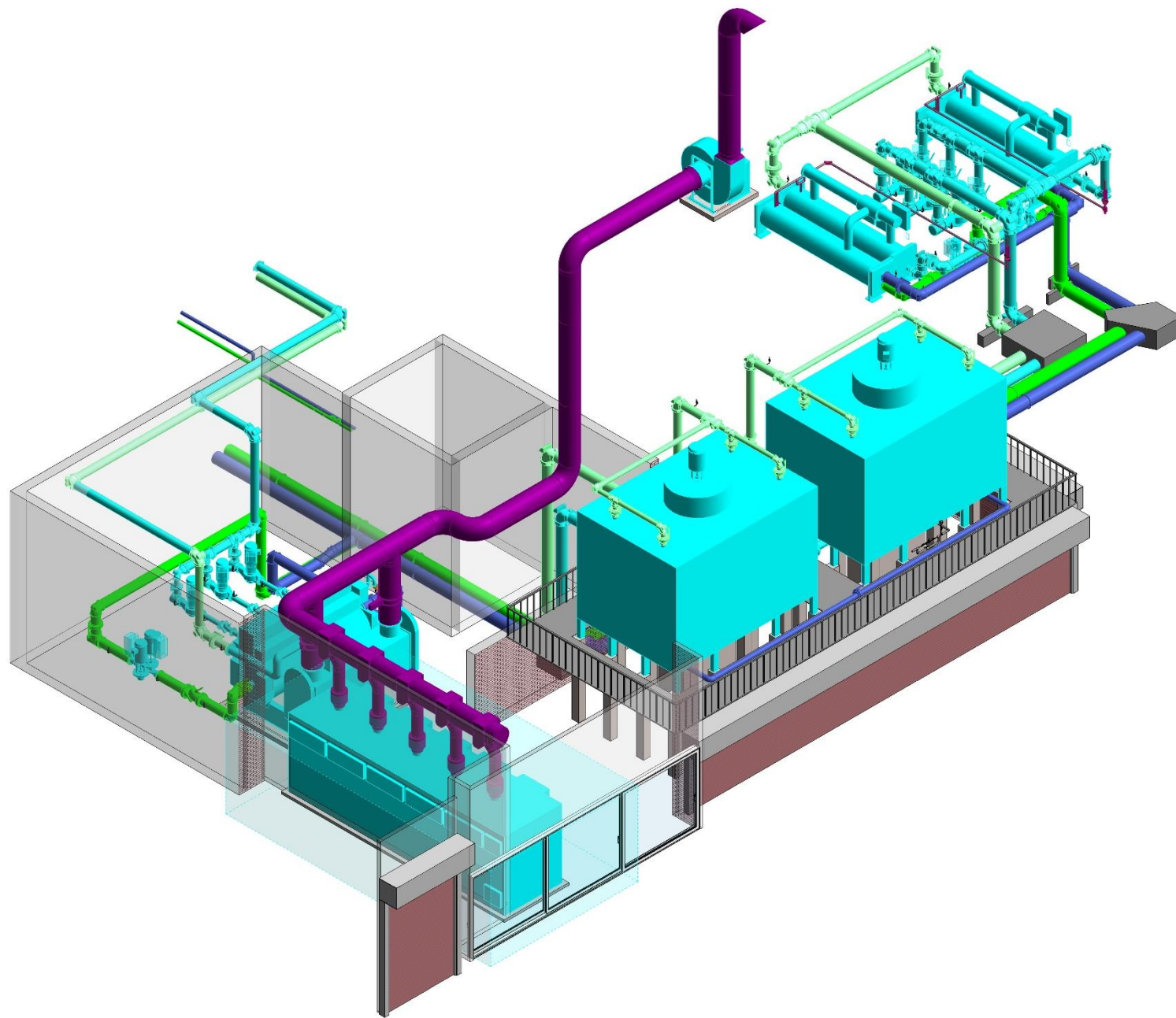


YORK
YWA-YX301-140
398 TR - 800 GPM

- TUBERIA CONDENSACION RETORNO
- TUBERIA CONDENSACION SUMINISTRO
- TUBERIA AGUA HELADA RETORNO
- TUBERIA AGUA HELADA SUMINISTRO

- VÁLVULA MODULANTE CON ACTUADOR PROPORCIONAL
P6600-400- +GRX24-PI+NC

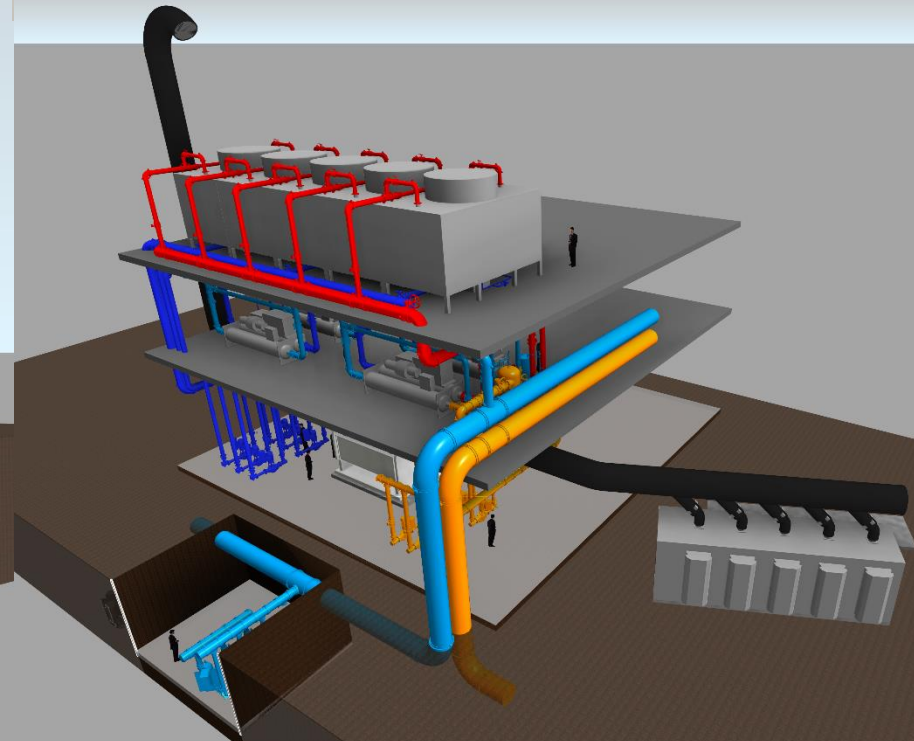
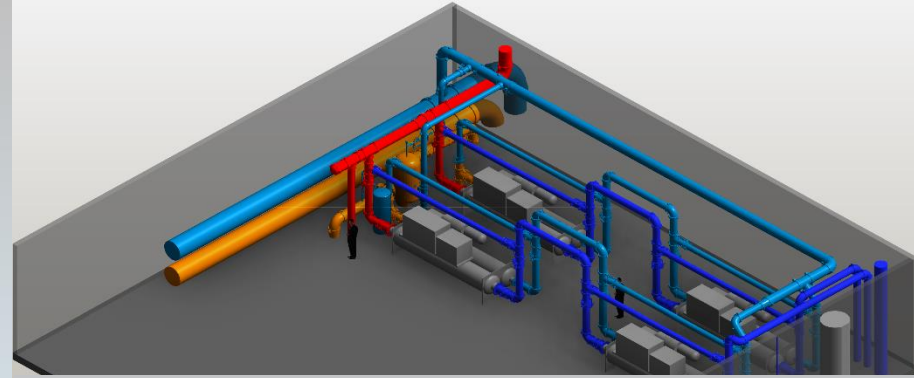
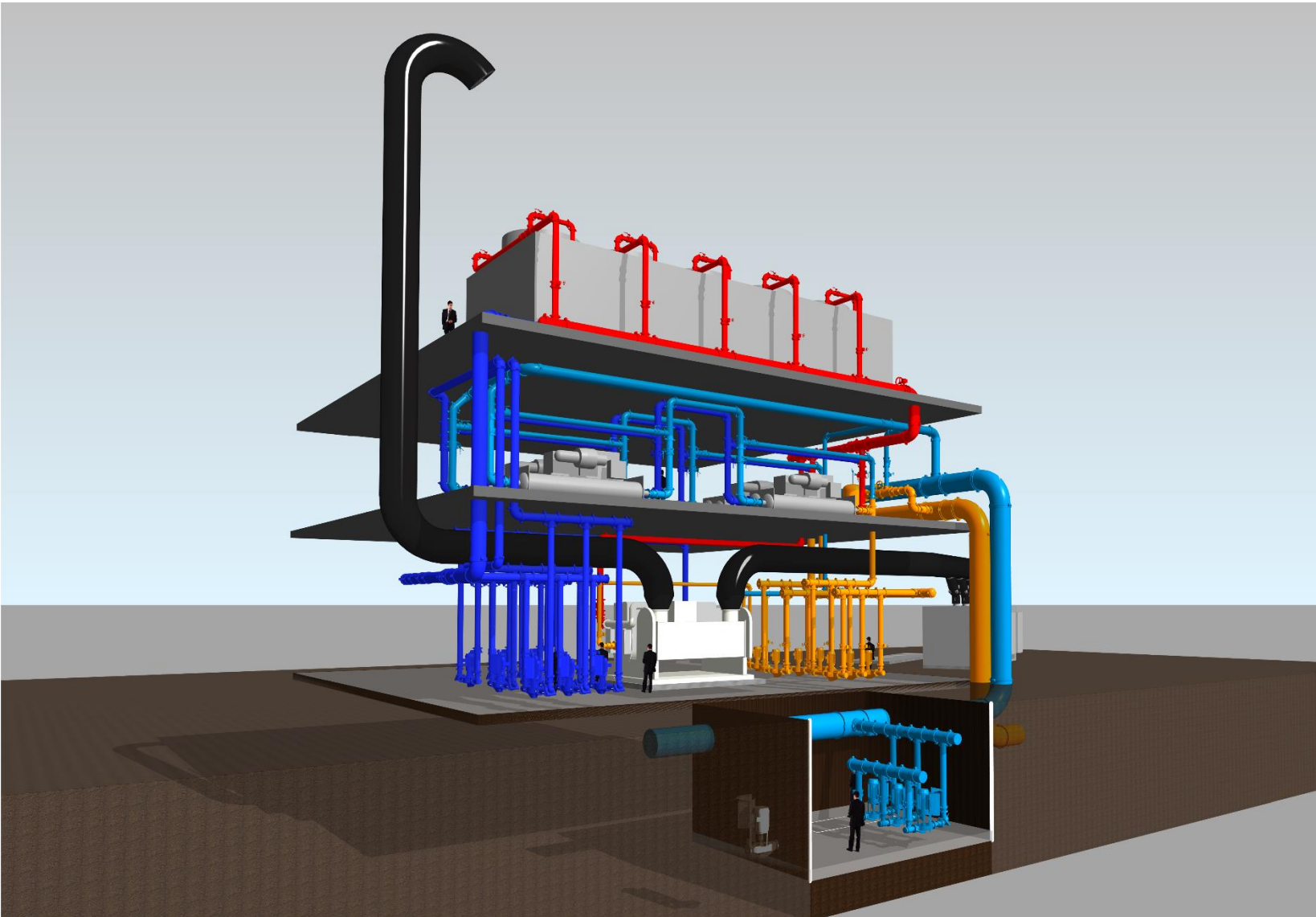




S E R E N A D E L M A R D I S T R I C T C O O L I N G

OWNER	CNC DEL MAR – (CELSIA + NOVUS CIVITAS)
CAPACITY	5000 TR 1st Stage. FINAL: 2x 36000 TR (15 years of development)
CLIENTS	Institutional: >20 residenciales : > 10,000
PIPING:	20" and Below several main branches: 50 km.
PLANT:	CHP WITH NATURAL GAS and PV generation. Distributed plants. THERMAL STORAGE TANK: 1st STAGE: 9000 TR-H Final: 3 distributed tanks 3 MW MICROTURBINE CAPSTONE 1st STAGE. Final 30 MW distributed 1 400 TR ABSORTION CHILLER YORK / MW of Turbine. R134a MAGNETIC CENTRIFUGAL CHILLERS PLANT CONTROLLER ARMSTRONG IPC-11550 WITH HARTMAN LOOP ALGORITHM PUMPING SYSTEMS ARMSTRONG METERING AND CONTROL DEVICES AT TRANSFER STATIONS BELIMO ENERGY VALVES.
DESIGN	BT CONSULTORES – BOGOTA, COLOMBIA
BUILD AN STARTUP	SERVIPARAMO – BARRANQUILLA, COLOMBIA







**SERENA
DEL MAR**

THANK YOU!

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