



**INTERNATIONAL OPERATIONS & MAINTENANCE CONFERENCE
IN THE ARAB COUNTRIES**

**UNDER THE THEME
"MANAGING MAINTENANCE WITHIN INDUSTRY 4.0"
CONICIDE WITH THE 16TH ARAB MAINTENANCE EXHIBITION**

**DEVELOPMENT OF A UNIFIED TOWER DESIGN FOR
THE HV OHTL IN THE KINGDOME OF SAUDI ARABIA**

**BY
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4.0



SEC HV Network Length



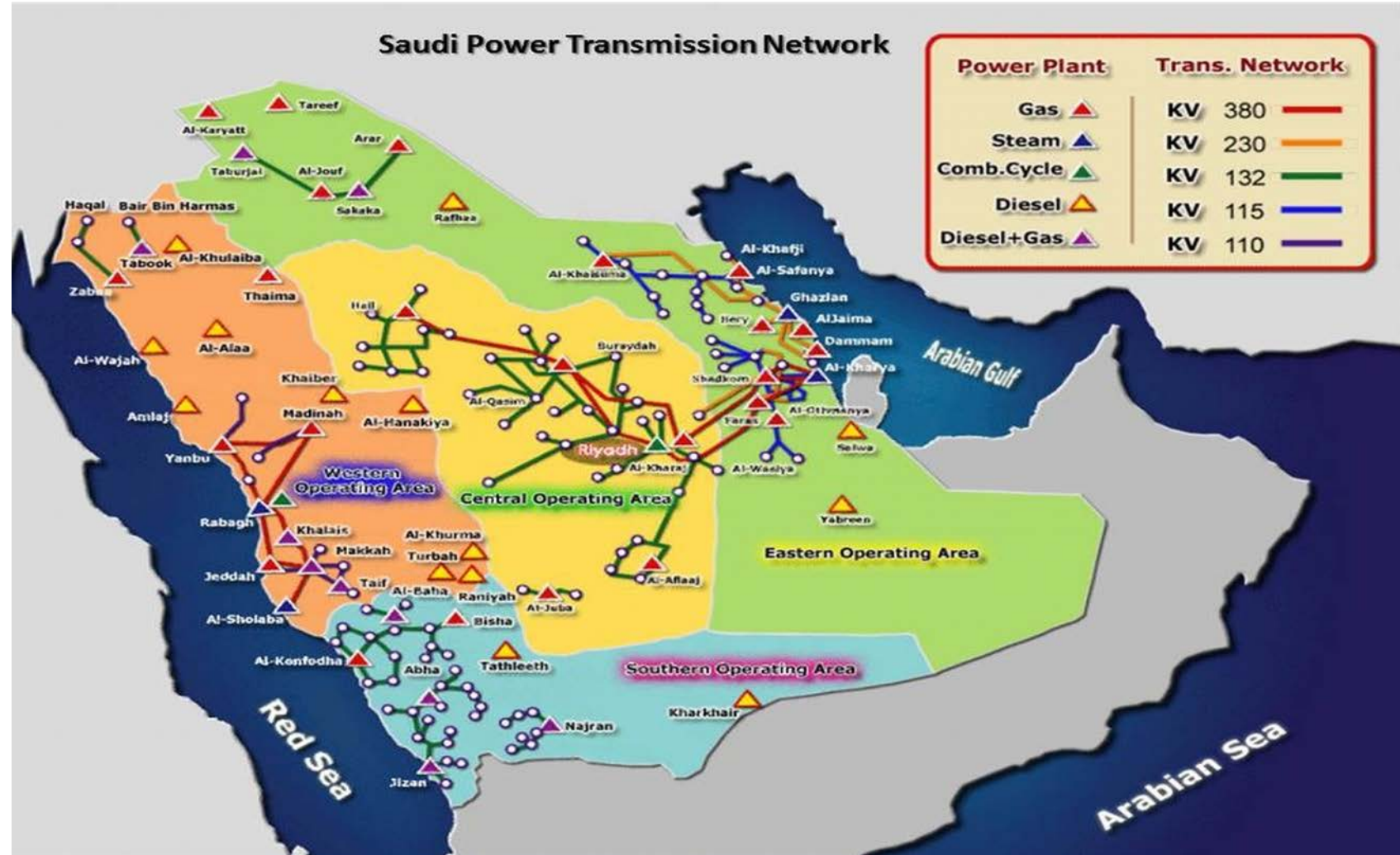
HV Network Length
(110, 115, 132KV)



Radial Distance:
Cairo -- Washington DC



Diversity of Designs



Today Vs. Tomorrow

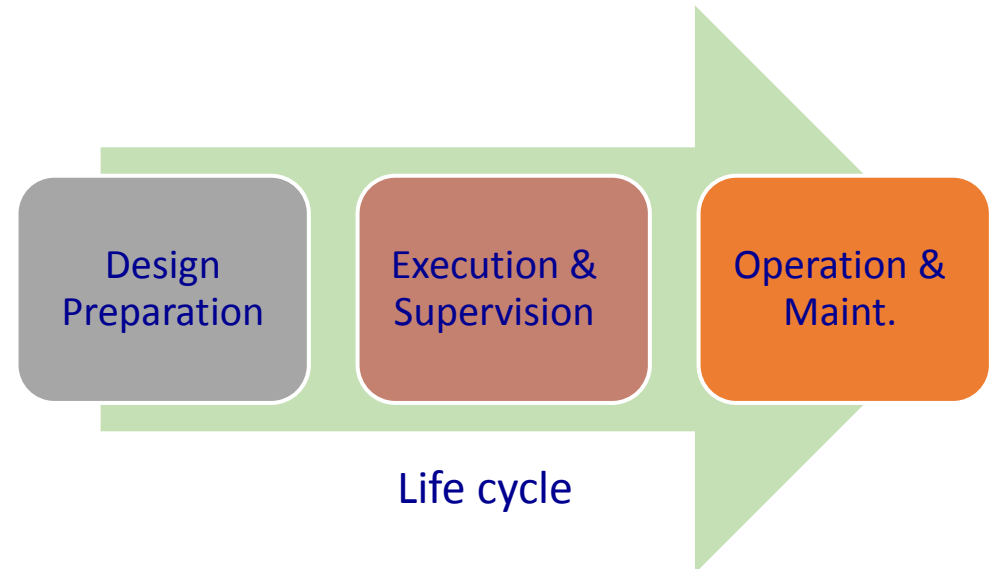
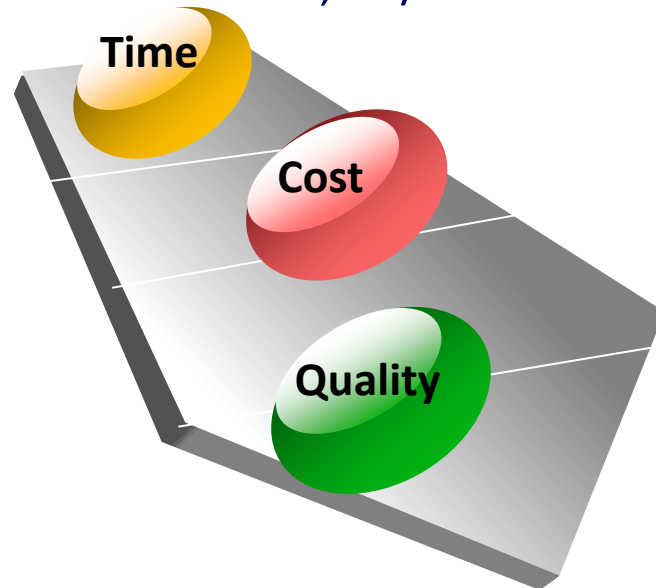


- **Business As Usual:**

Different families of tower design at all Regions based on different factors (voltage level, number of cond., topography, altitude, costal..etc.)

- **Target:**

To develop a Unified Family of Towers applicable for all HV Lines in National Grid, SA/SEC



Outline



1

PROJECT STAGES

2

METHODOLOGY & RESULTS

3

UNIFIED DESIGN

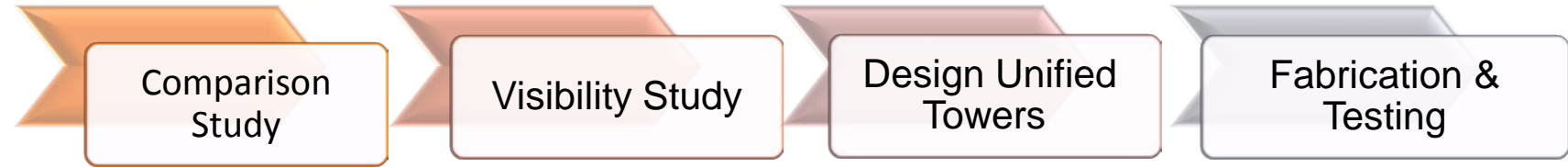
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PROTOTYPE & TESTING

5

OPERATIONAL BENEFITS & SAVINGS

Project Stages



- Collect different towers design (5 project / region) and highlight the differences

- Compare present designs with international standards

Technical & Economical Study:

- Evaluate the impact of design parameters
- Exercise different technical scenarios and economical models

Design Unified Towers

- Prepare final design for approved unified towers

- Prepare outline drawings for unified tower

Tower Tests & develop fabrication drawings

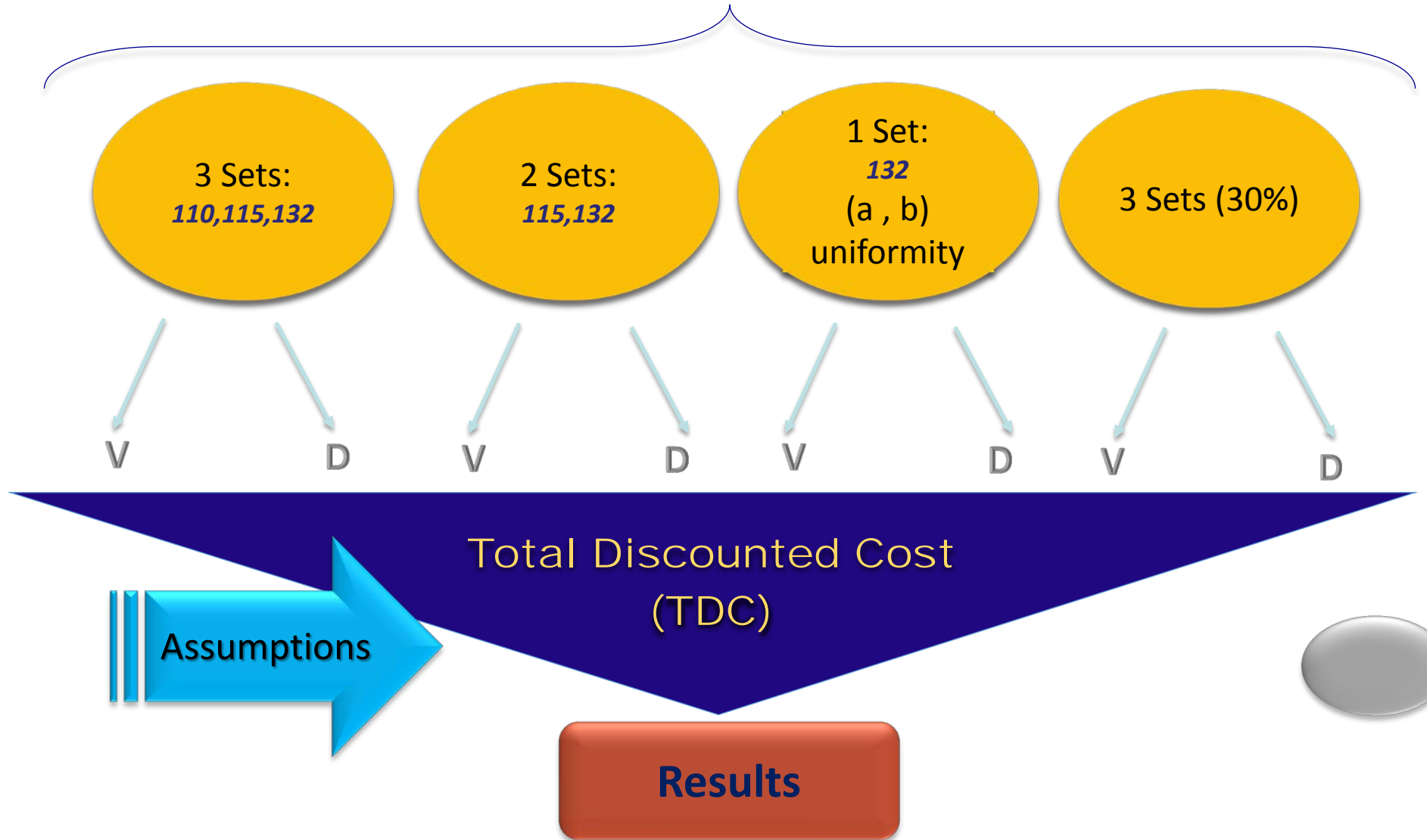
- Test for full scale models

- Develop fabrication drawings

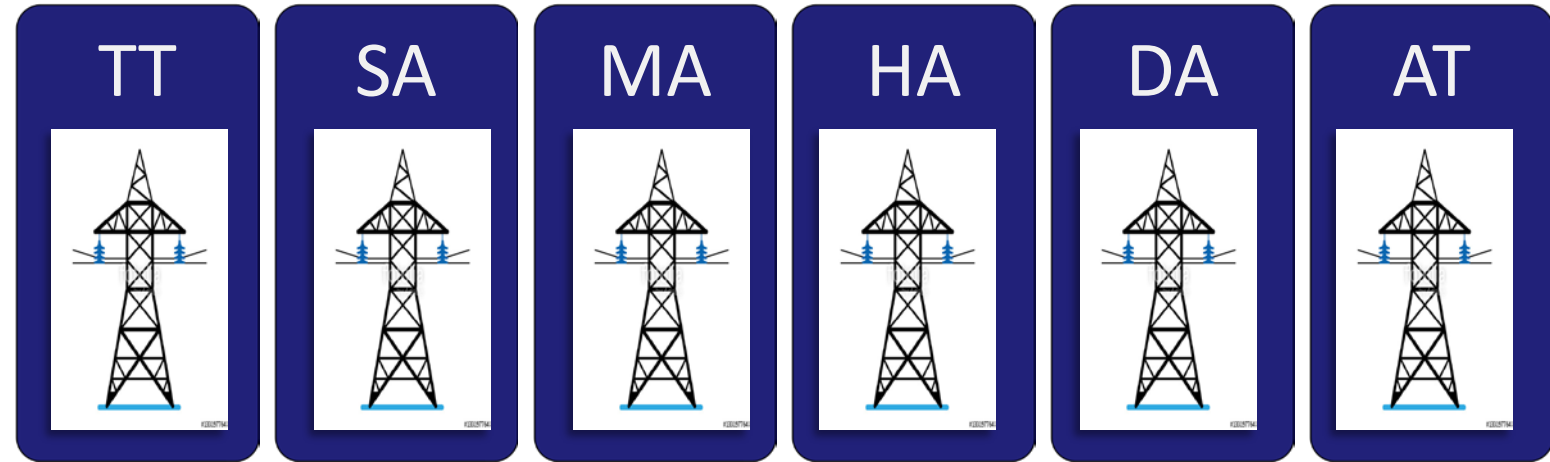
Methodology



(8) Scenarios



Prototype Tower & Testing Results



- All the tower types were prototyped and tested
- Loads were applied in increments of 50%, 75%, 90%, 95%, and 100%
- (3) minutes/step from 50% to 95% and five (5) minutes at 100%
- At load in excess of 100% in increment of 5% each until apparent failure occur or up to maximum of 130%



Operational Benefits



- Reduce Overall Project Execution Period (**3 Months Less**) ■
- Maintain low Level Of Material Diversity = high level of material **availability** ■
- Uniqueness and exclusiveness** of tower materials to certain areas is **eliminated** ■
- Reduce cost and **warehouse storage space** ■
- Reduce **time to execute** existing transmission line shifting/diversion ■
- Future **upgrading of existing line** from single to twin conductor **without** going to expensive special conductors ■

Direct Savings



- ✓ **NO** more Engineering & Testing is required (**Shelf Design**)
- ✓ Total of min 16 different tower designs is now only **ONE unified design**

Item	Before (SAR)	Today (SAR)	Sub total (SAR)
Engineering	1.2	0.0	1.2
Testing	1.0	0.0	1.0
Total = 2.2 Millions (SAR)/Project			



THANK YOU