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شركة أبوظبي للنقل و التحكم
Abu Dhabi Transmission & Despatch Company

UNITED ARAB EMIRATES INTERCONNECTIONS

Abu Dhabi Transmission and Despatch Company
Dr. Najib H Dandachi
Eng. Salem Jraib Al-Harthi

Abu Dhabi UAE

- ESCWA Mtg Dec 2009
- Beirut, Lebanon

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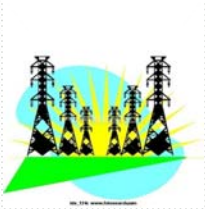
Presentation - outline

- The UAE Power Structure - Overview
- ADWEA System Overview
- Current Power Interconnections
- The key Benefits
- The Key Challenges
- On Going Interconnections
- UAE Recommendations



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UAE Systems

All four utilities have Independent Networks

SEWA

FEWA

Vulnerable to faults

Individual Capital Investment is High

DEWA

ADWEA

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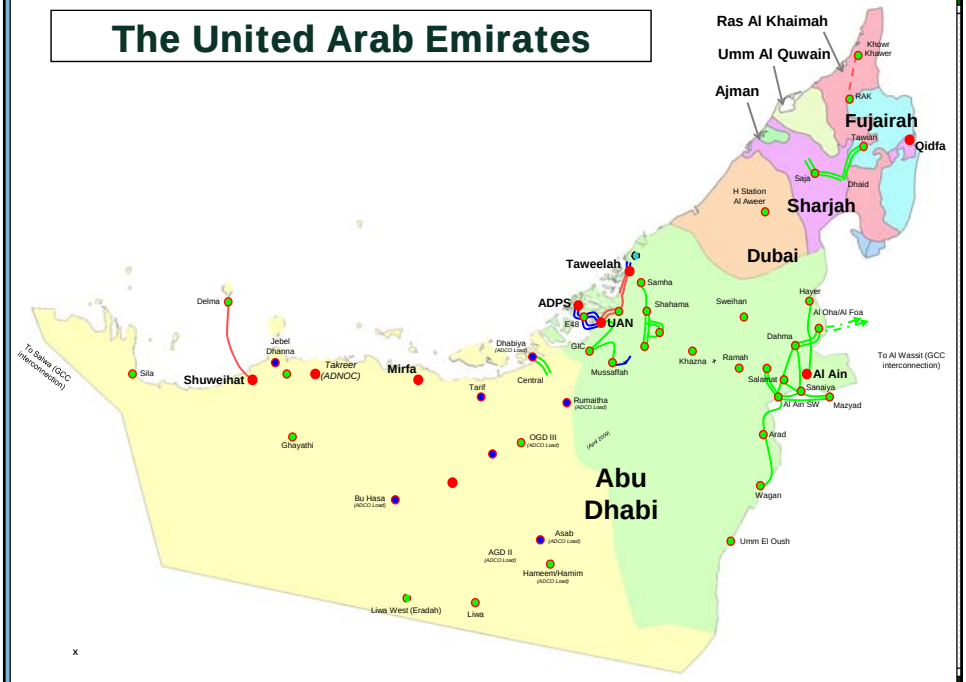
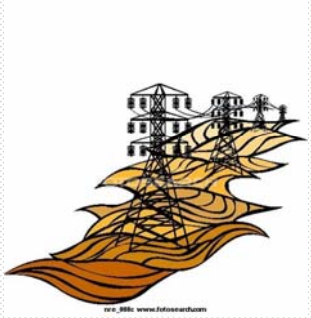
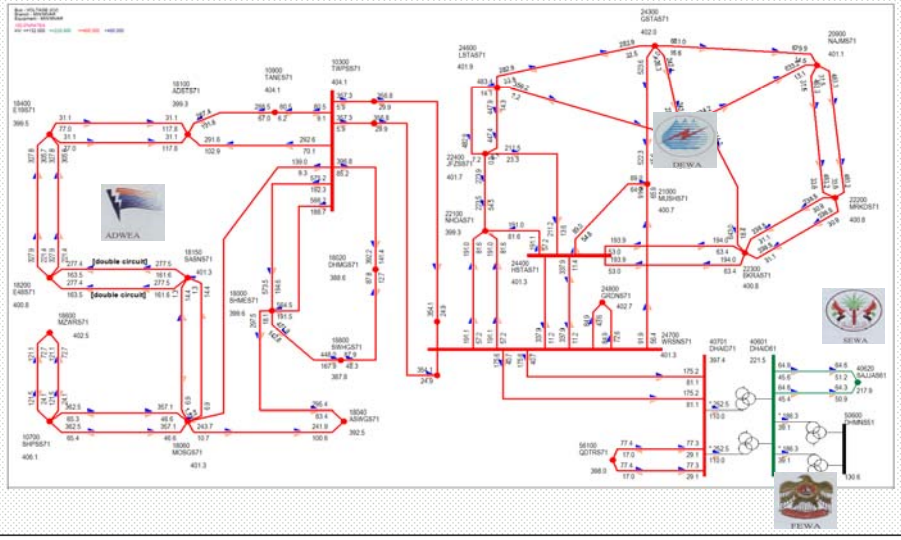
The United Arab Emirates

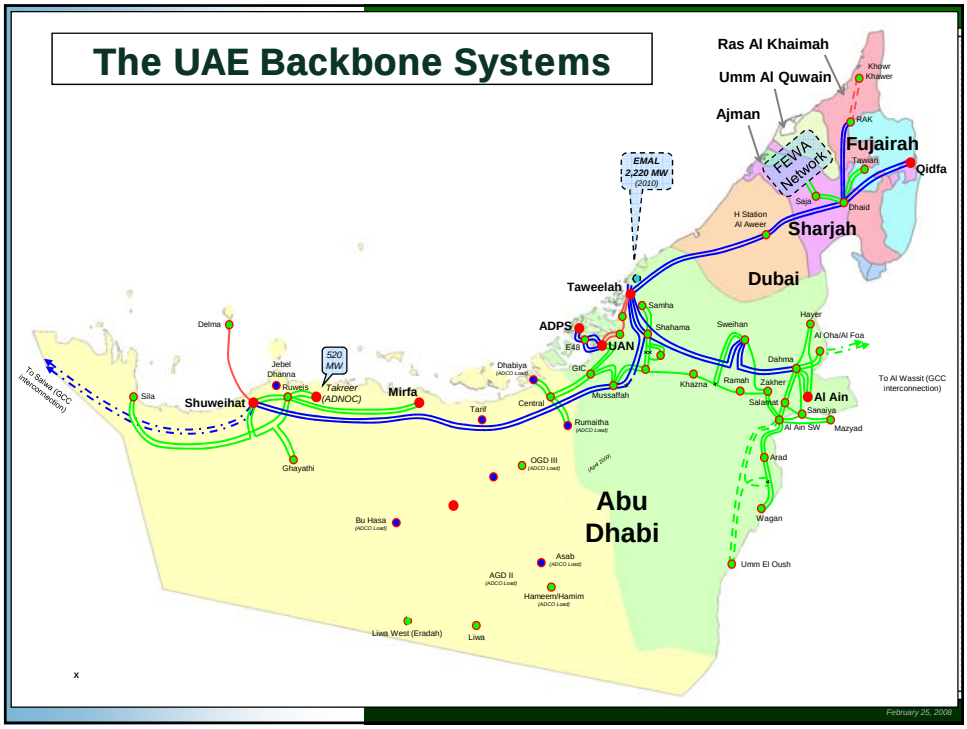


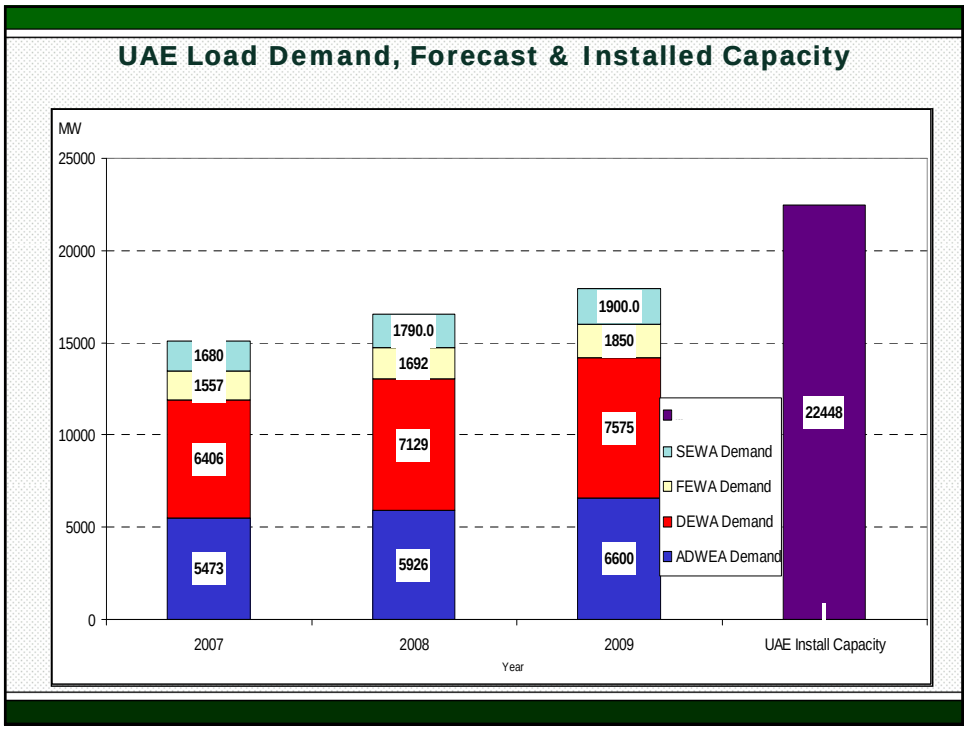
ENG Interconnection

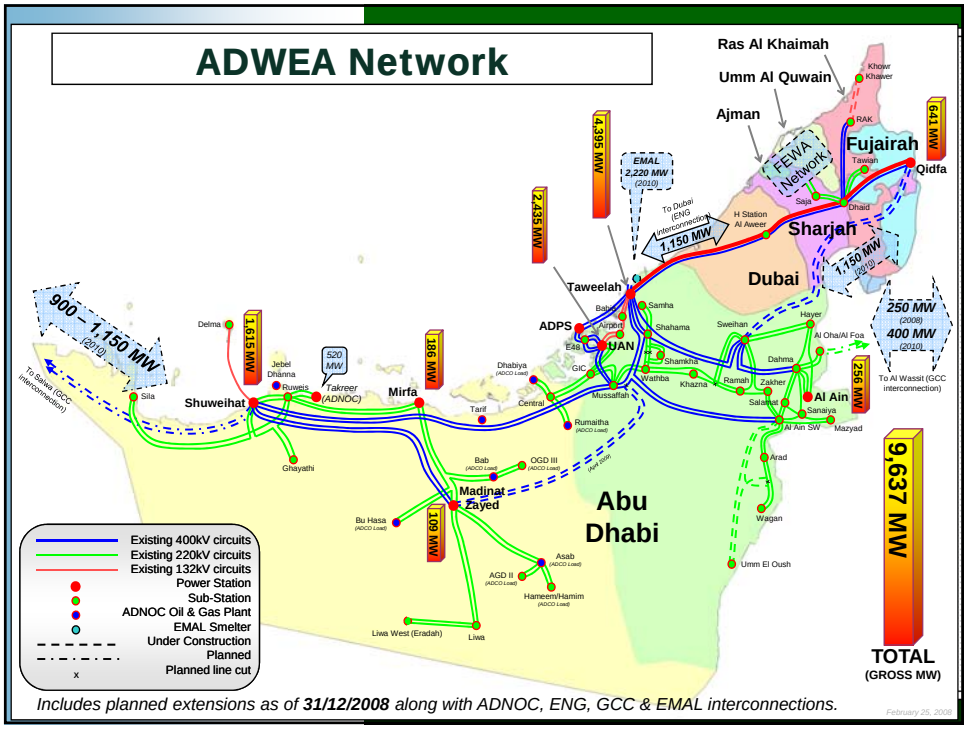


ENG Connectivity




The UAE Backbone Systems
Ras Al Khaimah
Umm Al Quwain
Ajman
Fujairah
Qidfa
Sharjah
Dubai
Abu Dhabi
FEWA Network
EMAL 2,220 MW (2010)
520 MW
Taweelah
ADPS
Shuweihat
Mirfa
Takreer (ADNOC)
Al Ain
To Al Wassit (GCC interconnection)
To Sawa (GCC interconnection)
February 25, 2008

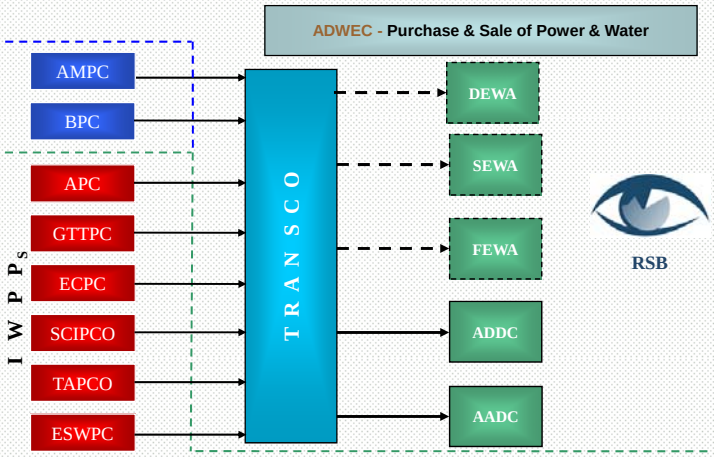

UAE Load Demand, Forecast & Installed Capacity
MW
25000
20000
15000
10000
5000
0
1680
1557
6406
5473
1790.0
1692
7129
5926
1900.0
1850
7575
6600
22448
SEWA Demand
FEWA Demand
DEWA Demand
ADWEA Demand
2007
2008
2009
UAE Install Capacity
Year



*Includes planned extensions as of **31/12/2008** along with ADNOC, ENG, GCC & EMAL interconnections.*

February 25, 2008

Structure of the Water and Electricity Sector in Abu Dhabi



IWPP = Independent Water & Power Producers

Supply of water & electricity

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Emirates National Grid

- Different and isolated Networks
- Exposed to risks
- High Capital Investment
- Shortage of Power in some utilities
- Necessity for nationwide grid
- Emergency Support
- Reserve Sharing

ENG Bodies

- ADWEA, DEWA, SEWA, FEWA
- ENG Higher Committee
- EMC monitoring and coordination centre
- ENG Operation Committee
- ENG Planning Committee
- ENG Technical Committee

Interconnection Rules & Procedures

Each Interconnection has a set of rules developed specifically for that Interconnection.

- **General Interconnection Code**
- **Planning Code**
- **Operation Code**
- **Standard Operation Procedures**
- **Trading Code**

Control Responsibilities

Central body for coordination between member authorities for system security and commercial interchanges

- Monitor Frequency, Primary and secondary reserves/response
- Monitor, record and Coordinate voltage and MVAR at cross-border
- Monitor, record and Coordinate scheduled exchange between authorities
- Record and Calculate the deviation of transactions and schedule compensation
- Coordinate outage management / approval and its execution in real time.

Harmonization of Operating/Control Régimes

To operate the system the following are unified:

- Operating Normal and Emergency Frequency limits
- Operating Normal and Emergency voltage and MVAR at cross-border
- Under Frequency Load Shedding Schemes
- Cross-border Record of Inter System Safety Precaution (RISSP)
- Cross-border outage management / approval and execution

Transco Rules & Procedures

License Obligation and Regulatory Requirement

POWER/WATER Transmission Codes

MDEC Code

TRANSCO Standard Procedures

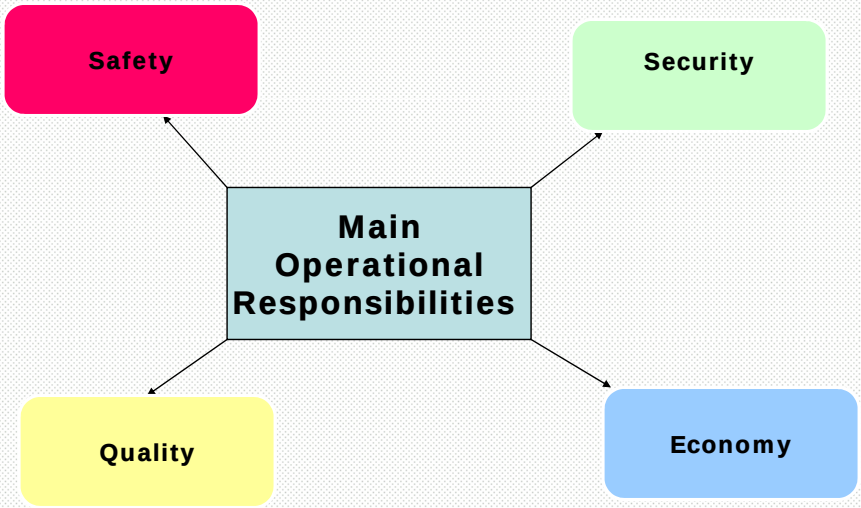
TRANSCO Security Standard

PWPA Requirement

Transco Responsibilities Within ENG

- Security and reliability including adoption of N-1 criteria
- Keep Sufficient spinning reserve
- Monitor and control power quality (F & V)
- Keep cross-border exchange to its scheduled value
- Utilize AGC for controlling exchange and frequency
- Execute switching operation for interconnectors in predefined steps
- Implement own safety rules within the control authority and (RISSP) on the interconnectors

The key Operational Drivers



The key Organisational Challenges

- Different organizational regime among member authorities
- Communication difficulties
- Data and information exchange difficulties
- Transformation from the individual operating approach into ENG approach

Operational Benefits

- **Reserve Sharing**
- **Improved Stability and Security of Interconnected Network**
- **Energy Support**
- **Voltage Support**
- **Emergency Support**

Real Cases of Mutual Support

- Instantaneous loss of 480 MW Generation (Mar 2009).
- Loss of 7GTs & 3STs (1040 MW) over few mins (June 2009).
- Continuous Export of 1275 MW from AD.
- 510 MW was exchanged on GCC Grid following a drop in frequency from 50.014 Hz to 49.765 Hz (30th Aug 2009).

On-Going Interconnections

- Oil Industry Interconnection
- Aluminium Industry
- Bilateral Connection to Oman
- GCC Interconnection

The Particularity of UAE

- Large Part is Operating in a Privatised Environment.
- Combined Cogen add to complexity: The Water Factor
- Various types of Interconnections: Models, Controls, Environment, etc.
- Wheeling through to Oman

UAE Recommendations

1. Do not hesitate - Connect
2. Vertical Interconnections more beneficial than the Horizontal
3. Simplify The Rules – The engineers to drive, others to support
4. Market is not a pre-requisite
5. Open up the Sector for Wider Participation
6. State Companies must change

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