WAMRP – IT FORUM
ENERGY, AS AND SETTLEMENTS

26 October 2016

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AUSTRALIAN ENERGY MARKET OPERATOR

WHOLESALE MARKET SYSTEMS – INTRODUCTION

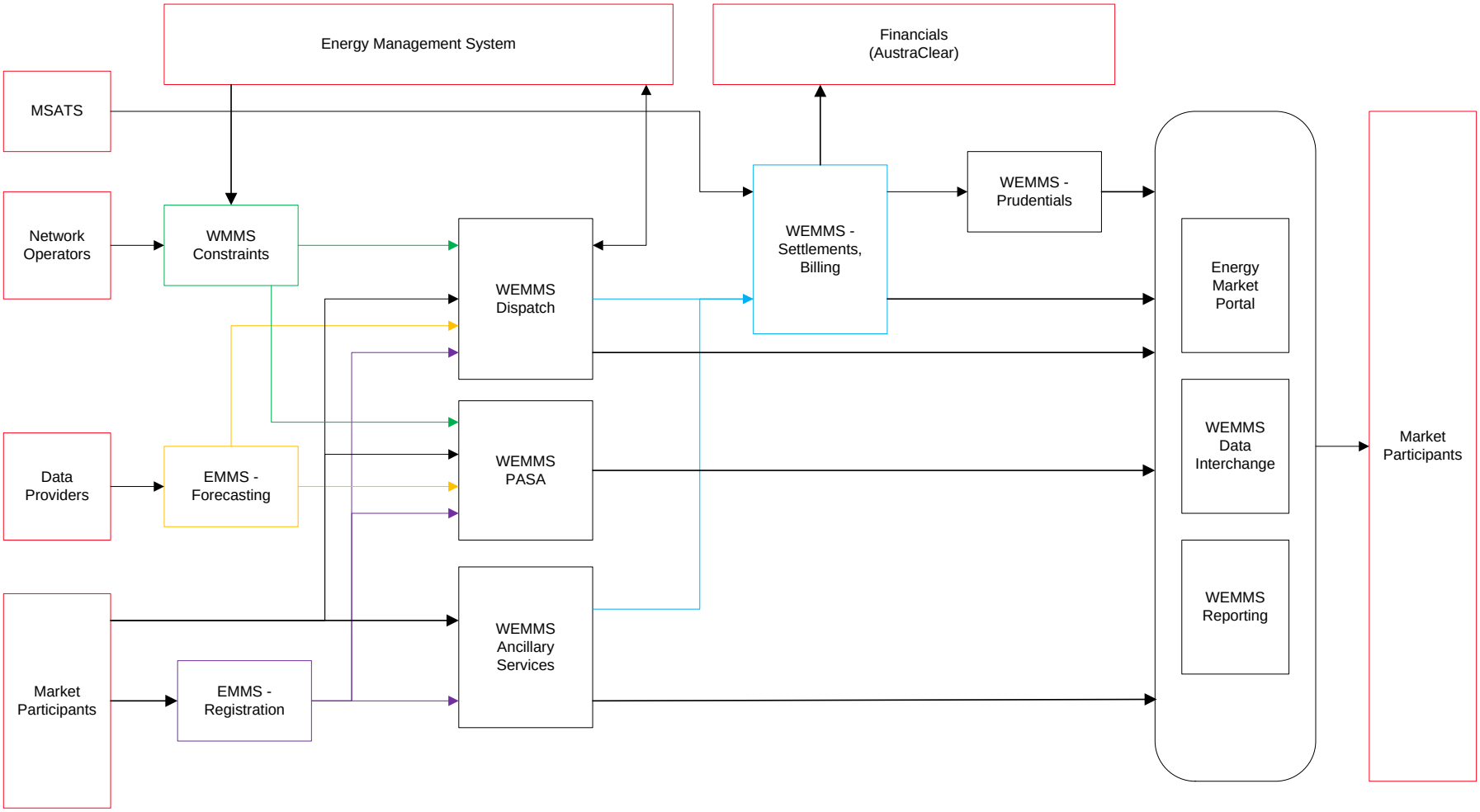
- AEMO's proposed approach is to leverage existing expertise and market systems currently deployed to the NEM to deliver on requirements for WA

- Leveraging AEMO's market systems supports:
  - Reduced implementation and operation cost
  - Lower risk by using known solutions
  - Reduce barriers to entry by harmonising interfaces to Australian energy markets

- A key principal in our project decision framework is to deliver on WA requirements in the following prioritised approaches
  1. Consolidation of NEM and WA systems into a single solution
  2. Configuration of NEM system for WA
  3. Customisation of NEM system for WA

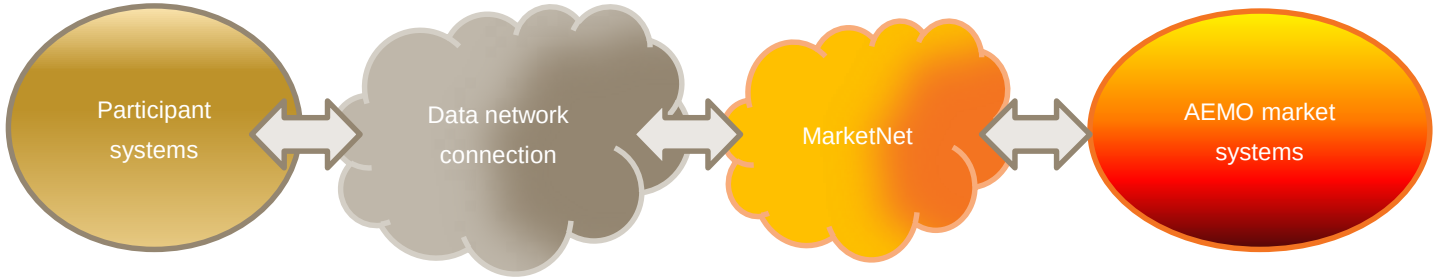
  This precedence of approaches ensure our decisions are consistent with the over-arching value proposition and managing delivery risk

WHOLESALE MARKET SYSTEMS OVERVIEW



ACCESSING THE WHOLESALE MARKET SYSTEM

- Any access to AEMO's market systems requires a data network connection to MarketNet



- AEMO provides two types of connection options:
  - A permanent continuous connection, available as either a dedicated link or via VPN
  - A variable connection, intermittently connected for short durations. For security reasons, the connection is dropped if there is no activity for 30 minutes.

- Further reading: Guide to Information Systems v2.03

INTERACTIONS WITH THE WHOLESALE MARKET SYSTEMS

The Wholesale Market Systems offer two primary methods of access for market participants:

- Batch interface
- Browser interface

Both access methods support the core Business-to-Market transactions associated with the interacting with the wholesale electricity market.

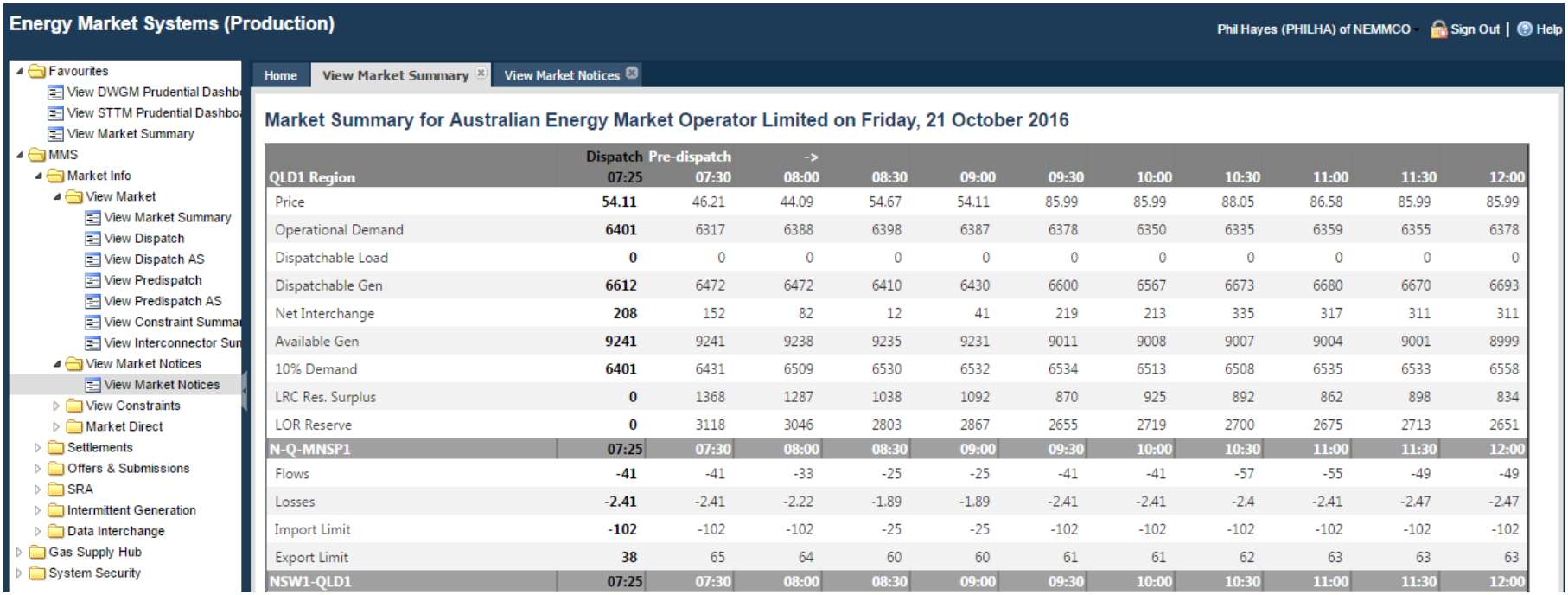
A limited set of market information is available via the browser. More comprehensive data sets are available via the batch interface supporting participant activities such as detailed market analytics

BROWSER INTERFACE - ABOUT

The browser access is delivered via the “Energy Market Systems Portal” Wholesale Market Systems. This facility is largely equivalent to the MPI. The Web Portal can cut participant’s cost and client side footprint by:

- Reducing the requirement for participants to maintain an IT infrastructure at their site.
- Allowing participant business user access 24 hours a day, 7 days per week for 365 days per year—wherever a connection to MarketNet is available.
- Being fully maintained and supported by AEMO.
- Being available to all participants at no additional cost.
- Providing a secure web interface with access rights managed by participants.
- Allowing the use of multiple participant IDs.
- Being easy to learn with user interface guides available for each web application—requiring less staff training.
- Providing a consistent look and feel across each web application.

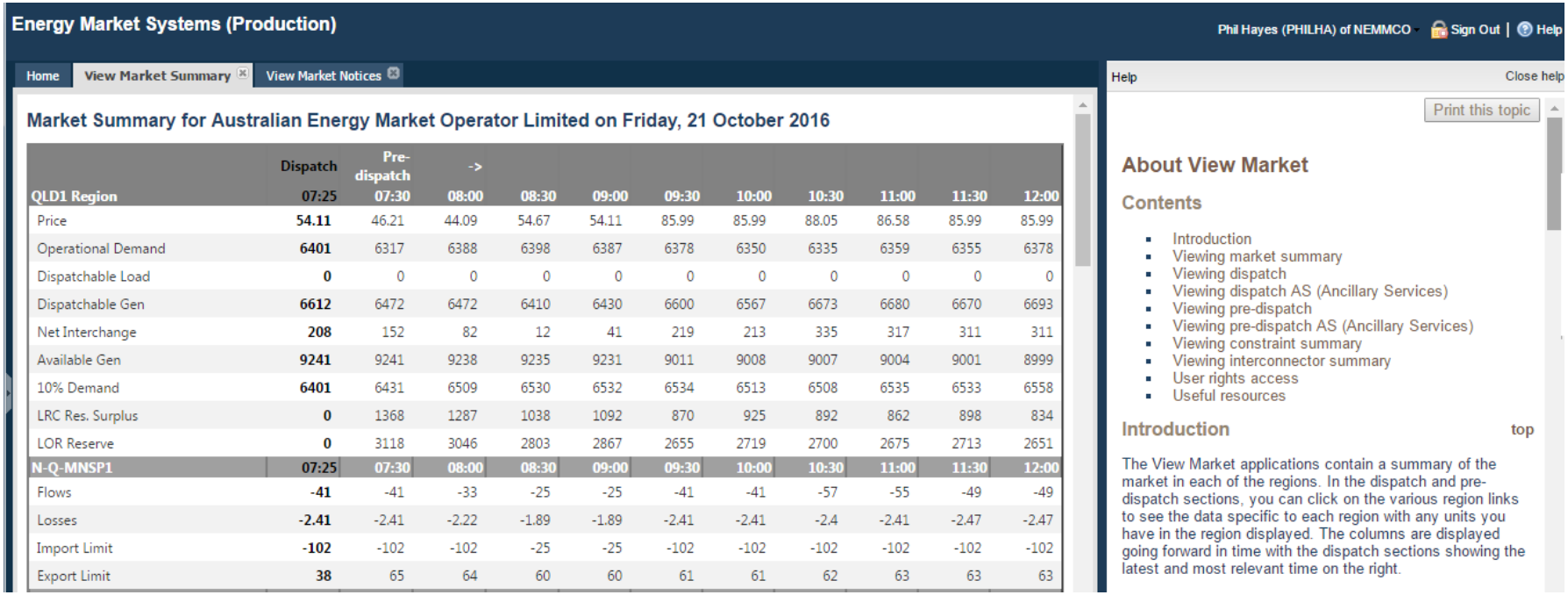
BROWSER INTERFACE – EXAMPLE 1



Market Summary for Australian Energy Market Operator Limited on Friday, 21 October 2016

	Dispatch	Pre-dispatch	->								
QLD1 Region	**07:25**	**07:30**	**08:00**	**08:30**	**09:00**	**09:30**	**10:00**	**10:30**	**11:00**	**11:30**	**12:00**
Price	**54.11**	46.21	44.09	54.67	54.11	85.99	85.99	88.05	86.58	85.99	85.99
Operational Demand	**6401**	6317	6388	6398	6387	6378	6350	6335	6359	6355	6378
Dispatchable Load	**0**	0	0	0	0	0	0	0	0	0	0
Dispatchable Gen	**6612**	6472	6472	6410	6430	6600	6567	6673	6680	6670	6693
Net Interchange	**208**	152	82	12	41	219	213	335	317	311	311
Available Gen	**9241**	9241	9238	9235	9231	9011	9008	9007	9004	9001	8999
10% Demand	**6401**	6431	6509	6530	6532	6534	6513	6508	6535	6533	6558
LRC Res. Surplus	**0**	1368	1287	1038	1092	870	925	892	862	898	834
LOR Reserve	**0**	3118	3046	2803	2867	2655	2719	2700	2675	2713	2651
N-Q-MNSP1	**07:25**	**07:30**	**08:00**	**08:30**	**09:00**	**09:30**	**10:00**	**10:30**	**11:00**	**11:30**	**12:00**
Flows	**-41**	-41	-33	-25	-25	-41	-41	-57	-55	-49	-49
Losses	**-2.41**	-2.41	-2.22	-1.89	-1.89	-2.41	-2.41	-2.4	-2.41	-2.47	-2.47
Import Limit	**-102**	-102	-102	-25	-25	-102	-102	-102	-102	-102	-102
Export Limit	**38**	65	64	60	60	61	61	62	63	63	63
NSW1-QLD1	**07:25**	**07:30**	**08:00**	**08:30**	**09:00**	**09:30**	**10:00**	**10:30**	**11:00**	**11:30**	**12:00**

BROWSER INTERFACE – EXAMPLE 2



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BROWSER INTERFACE - USERS

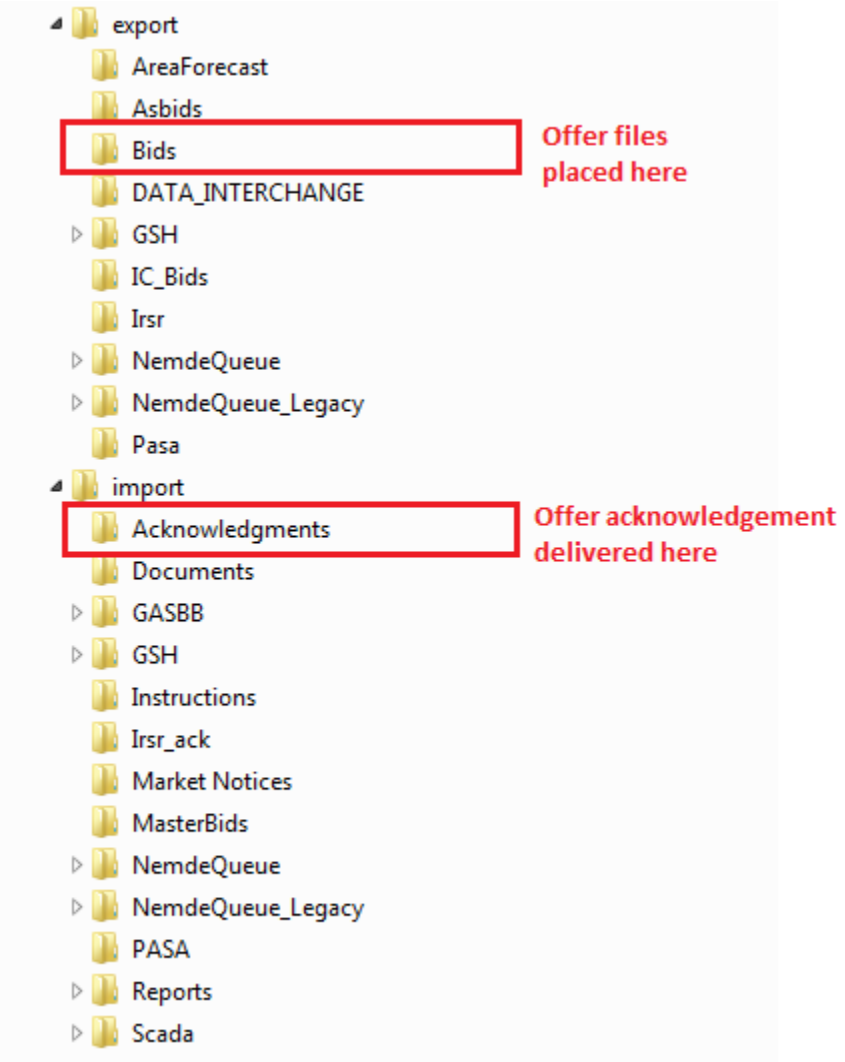
- Is managed through “User Rights Management” (URM)
- URM is a centralised identity repository with de-centralised user administration
- For each Market Participant:
  - AEMO creates a “Participant Administrator” (PA) user
  - The PA can define “Rights” which are a collection of access permissions to the web applications contained within the Portal. These “Rights” definitions are private to the Participant.
  - The PA can create additional users associated with their Participant ID, assigning them “Rights” which match a desired level of access
  - The PA can perform administrative functions such as password resets
  - The PA is responsible to ensure that user accounts within their associated Participant ID are appropriate.
- Further reading: Guide to Information Systems v2.03

BATCH INTERFACE - ABOUT

- Is provided by a file server
- Each Participant has their own private directory
- A standard folder structure is established within each participants private directory
- Business to Market transactions (e.g. generator offer submission) is completed by placing an offer file compliant the offer file specification into the appropriate directory. The AEMO systems process input files from participants and generate an acknowledgment file

BATCH INTERFACE – GENERATOR OFFER

- Prepare offer file using your local systems. This is a text based file and must conform to the specification MNSP/FCAS Bid file
- Place the offer file into the Export\Bids folder of the participant file server. The available protocol to access the file server is FTP
- Poll the import\acknowledgements directory for the return acknowledgement from the AEMO systems
- An “ACK” return file means that the offer has been accepted
- An “CPT” (Corrupt) return file means that the offer has been rejected. The reason(s) for rejection are contained within the acknowledgement file



DATA INTERCHANGE - OVERVIEW

- DI manages, monitors, and replicates data between AEMO's Electricity Market Management System (EMMS) and a participant's database conforming to the Electricity and/or Gas Data Models
- The core elements of DI are:
  - AEMO applications generate compressed, structured .CSV files into the participant file server, according to the subscriptions managed by participants
  - Participant runs software to download the compressed data from the participant file server across a MarketNet connection.
  - Participant runs software to load this data into one or more local databases at the participant's site, with optional monitoring.
  - Participants manage their local databases.

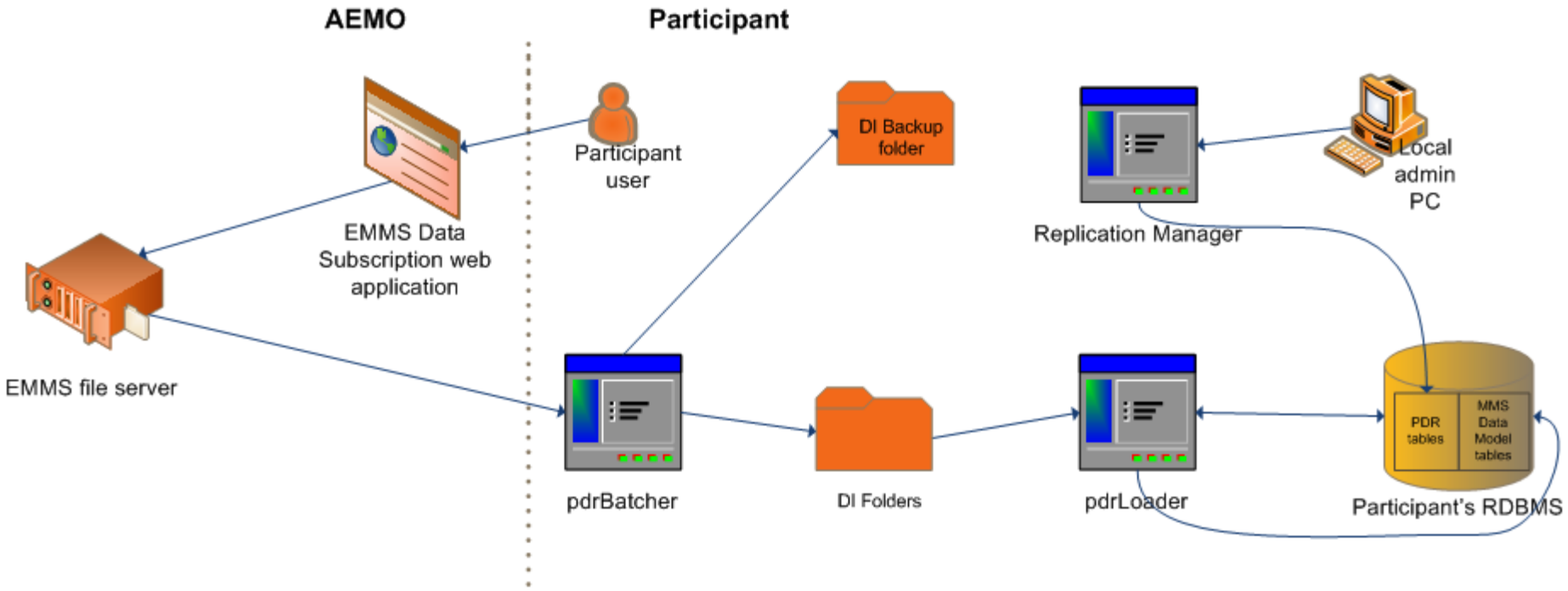
DATA INTERCHANGE - BENEFITS

- A consistent logical data model across the industry
- A broad range of vendor solutions now available which can be deployed out of the box without vendor lock in on data store.
- Supports both high speed delivery (dispatch committed to participants database within 60 seconds), delivery of large data volumes (145MB largest single data set) with QOS
- Fully managed delivery, including data reconciliation and recovery processes to detect and refetch missing data

DATA INTERCHANGE – FACTS AND FIGURES IN THE NEM

- Delivering over 4 million files per week to market participants
- Published data volumes at around 130GB/week
- Managed data delivery to over 60 participant sites
- Oracle (11g, 12c) and SQL Server (2008,2012) supported
- Platform independent – installations running on Windows, Linux and Solaris
- Delivered as CLI and full GUI based installer packages

DATA INTERCHANGE - OVERVIEW



DATA INTERCHANGE – ELEC DATA MODEL

- Viewing the market data published in the data model will require the user to have skills in developing SQL queries to retrieve information. Full documentation of the data model tables and entity-relationship diagrams are provided to assist participants with querying the data model
- Vendor packages are also available that integrate to the data model. These packages provide comprehensive data visualisation and analytics

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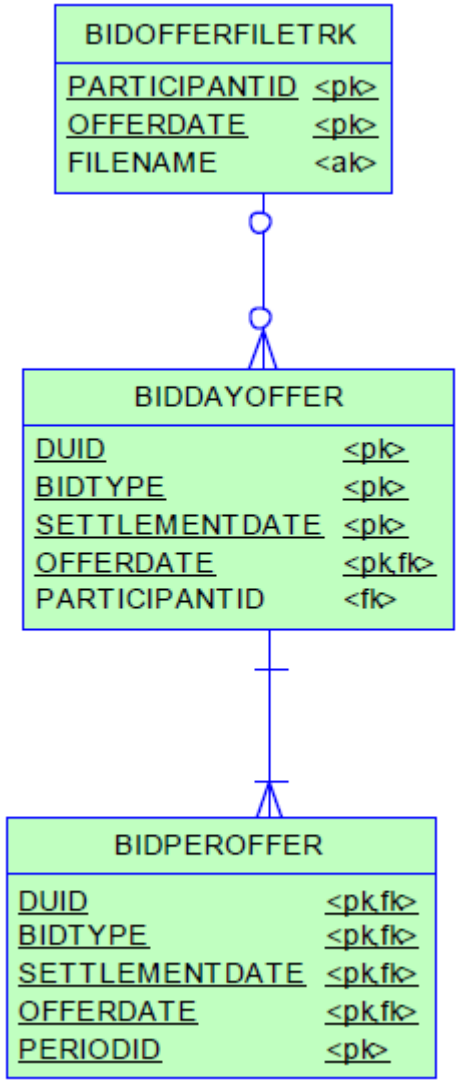
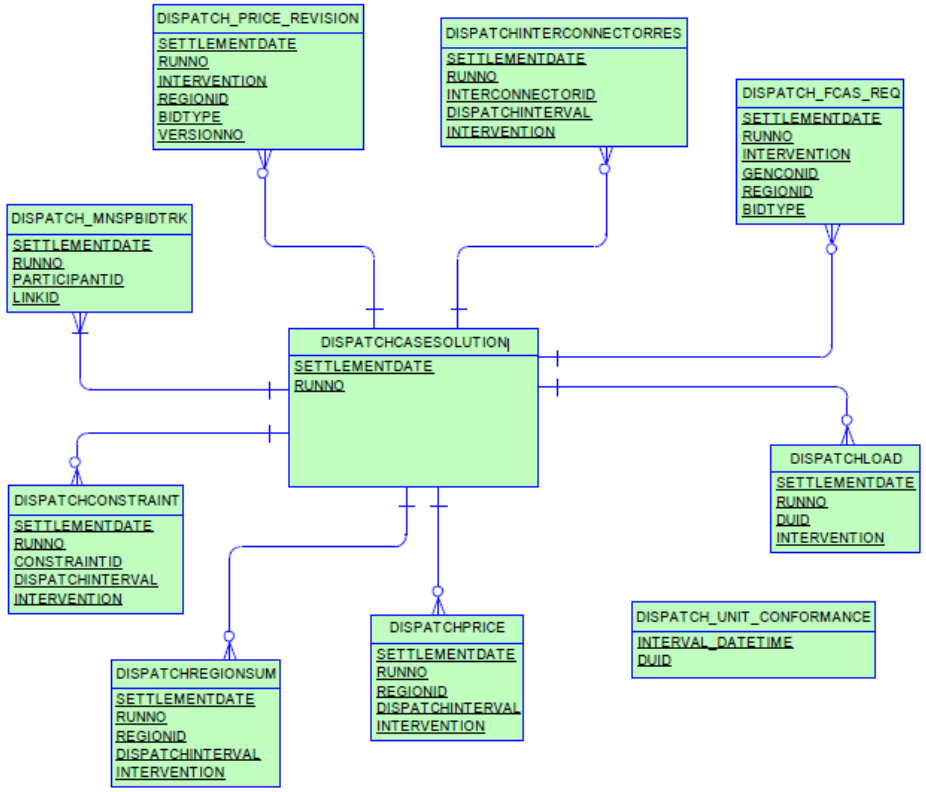
ELEC DATA MODEL – TRACKING

- Input data is generally modelled using a top level tracking table, with child tables containing the set
- In this example, which shows the data model table relationships for generator offers …..
- There will be one row for each offer file submitted to AEMO in the top tracking table
- For each generating unit / service / trading day within that offer file there will be a single row in BIDDAYOFFER
- The BIDPEROFFER contains the information for each trading interval within the trading day



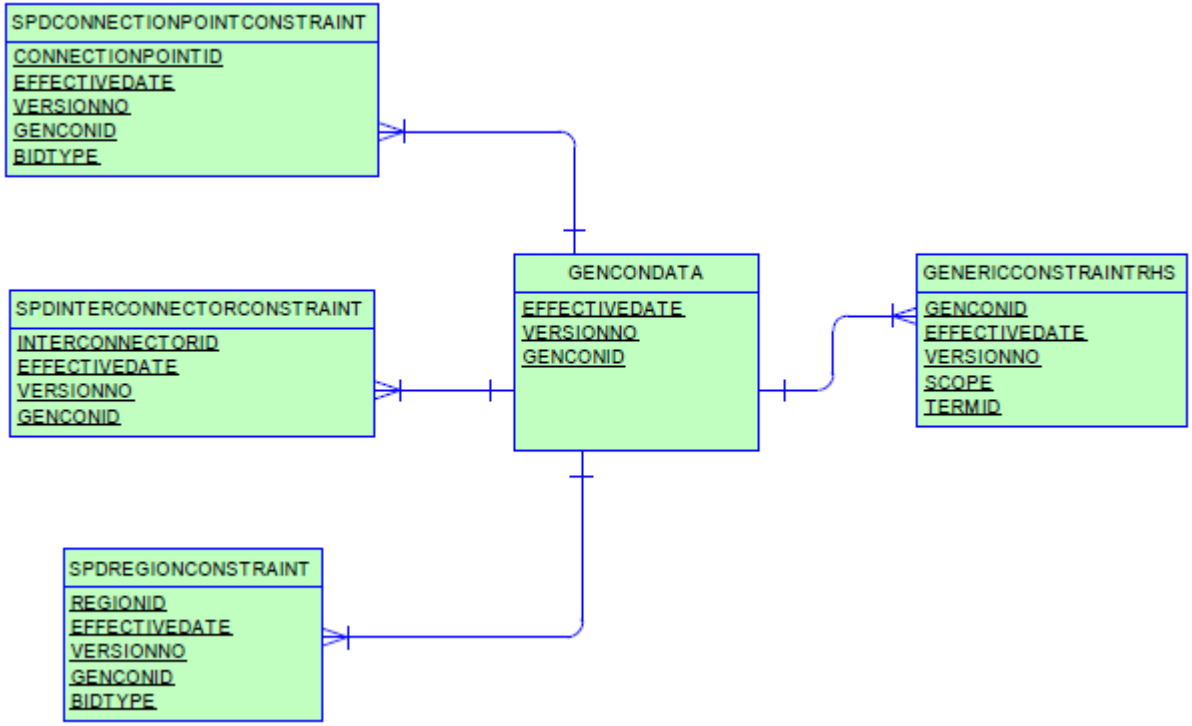
ELEC DATA MODEL – CASE SOLUTION

- Output data is generally modelled using a top level “case solution” table, with child tables containing the more detailed information set
- In this example, which shows the data model table relationships for 5 minute dispatch …..
- There will be one row in DISPATCHCASESOLUTION for each 5 minute dispatch interval calculation
- The market prices are contained in the DISPATCHPRICE table for each market region within the 5 minute solution



ELEC DATA MODEL – EFFECTIVE DATE

- Configuration data which evolves over time is modelled using EFFECTIVEDATE, meaning that the particular entry applies from that point in time forward
- In this example, which shows the data model table relationships for constraint defintions …..
- As the definition of a constraint evolves, a new row will be published to GENCONDATA
- This EFFECTIVEDATE is replicated into the child tables such that the complete set defining that constraint is published each time any element changes.



DATA INTERCHANGE – INSTALLATION

To install a Data Interchange system will require:

- MarketNet connection and Participant ID
- Access credentials to the AEMO participant file server
- Access credentials to the Energy Market Systems Portal
- A DBMS supporting the Electricity Data Model. The Electricity Data Model supports versions of Oracle and Microsoft SQL Server. The participant is responsible for hardware, OS and database licencing costs. The participant should also have suitable IT support capabilities (platform and DBA) to establish the environment.
- Java runtime engine suitable for the AEMO DI applications. The distribution file from AEMO contains supported JDBC drivers for Oracle and SQL Server.
- The Replication Manager software, which is an administrator interface runs on Windows OS only. This element is optional. The other Data Interchange software components run on both Windows and Unix-like operating systems.

DATA INTERCHANGE – MAINTAINING

To maintain a Data Interchange system will require:

- The participant should have suitable IT support capabilities (platform and DBA) to maintain the environment going forward. This will need to include activities such as backup, patching, troubleshooting, data archiving, etc.
- AEMO updates the Electricity Data Model typically every 6 months. Implementing a release will require participants to apply scripts to their local database and update their subscriptions in order to receive new and updated data feeds.
- AEMO updates the Data Interchange software every 1-2 years. This is typically associated with certification of the AEMO supplied software against later versions of Java and database versions. Participants should plan to keep their software on supported versions.
- In general AEMO's approach to release management is to support N and (N-1) versions. When a new release is introduced, the previously current release remains supported for a period of time. Maintaining your Data Interchange installation on supported versions will ensure that AEMO can provide any support that is necessary with the DI elements that AEMO supplies to participants.

TRANSITION TO THE NEW MARKET

- The new market will go live at midnight on 1st July 2018. Participants will need to prepare to manage the transition of any on-premise systems at this time. Participants are strongly encouraged to actively participate in the market trial in early 2018 to assess and confirm readiness.
- AEMO will retain the existing Settlement solution to manage revisions over the 12 month settlement revision period under the legacy WEM rules. Participants will therefore be required to maintain interfaces and processes to the legacy system over this timeframe.
- The legacy WEM systems will be decommissioned at the conclusion of the settlement revision period.
- AEMO will provide more information about the transition as part of market readiness planning

QUESTIONS