AESO
Market Roadmap Update

February, 2009
1.0 Background

The AESO Market Roadmap (MRM) is a directional project plan that sets the context and scope for market changes envisioned by Department of Energy (DOE) policy work and AESO market consultation. The MRM outlines initiatives that are underway while providing some framework and timeline for those discussions. The AESO will implement the market policy outlined by the DOE through consultation, incremental market rule changes, OPP’s and development of the AESO IT systems to support the necessary initiatives. The MRM identifies market improvement and incremental changes intended to enhance market efficiencies, improve long-term market stability and sustainability and to minimize out of market interference.

The original MRM was released to industry in August 2007 and a brief update was provided in February 2008 to the Market Advisory Committee (MAC), a committee of industry participants. These documents can be accessed by http://www.aeso.ca/downloads/AESO_Roadmap_Aug_30_2007(1).pdf and http://www.aeso.ca/downloads/MAC_Agenda_and_Discussion_Feb_22.pdf. To ensure that the MRM stays current regarding the state of projects at the AESO, including consultations and IT systems changes and upgrades, the AESO plans to update the MRM on a timely basis, usually annually. This version reflects the second update to the MRM. There has been substantial progress on related market design work over 2008 and it is apparent by this MRM update that all related market policy projects are now underway. The AESO thanks the industry for their ongoing participation in these market initiatives and evolving the market structure per the market policy to ensure its long-term success.

Appendix A lists the current initiatives and identifies where each initiative is in this consultation process. The consultation process outlined below is a guideline and provides information to stakeholders regarding where a project is in the process and how stakeholder input can be provided. Each initiative, depending on stakeholder feedback and design complexity may follow a slightly modified approach. Key checkpoints or deliverables have been identified at critical points during the process and will be delivered to industry as appropriate. These are: Issue Paper, Discussion Paper, Recommendation Paper, Draft Rules and Finalized Rules. The summary matrix in Appendix A identifies where each project is in relation to this consultation timeline.
This document also identifies a “markets system visioning” project that will commence in 2009 designed to solicit industry input into system specifications for current, expected and possible future system capability required to support the competitive market structure and support the grid operations. Following the conclusion and implementation of the market systems visioning project (which is discussed in section 2.1), it is expected that the roadmap can better provide details and possibilities around what AESO IT systems are affected which impacts the timing of implementation for any new or change initiative. It is anticipated that the market systems visioning project will provide a foundation for the development of future AESO IT systems and platforms. Once these effects are known by the AESO, they will be identified in a more “integrated” market roadmap document.

The AESO proposes to introduce the systems and operational linkages and considerations under review at an upcoming stakeholder session on the Market Roadmap. AESO is looking for input and feedback on both the direction of the market projects workplans to finalize delivery of the 2005 Department of Energy Market Policy, but also on how system and operational efficiencies can be developed into current and future market and grid operations.

1.1 Market Design Principles

While the intent of the design principles remains consistent with those listed in the August 2007 Roadmap, the principles in this update reflect feedback received from the Market Advisory Committee and other stakeholders and provide greater clarity. The AESO remains committed to address market issues and challenges in ways that provide for continuity of services as incremental design changes are developed, and also strike a balance between design complexity and implementation stability and simplicity. The following list of design principles will aid in the market design efforts.

1. Market design and operation must:
   a. align with the Fair Efficient and Openly Competitive (FEOC) principles; and,
   b. support a reliable and efficient electric system.
2. Market design should encourage competition and reduce barriers to entry;
3. Market design and operation should not be unduly influenced by the agencies;
4. Policy development and implementation should follow meaningful consultation;
5. Competitive outcomes are preferred over administrative outcomes when feasible;
6. Market design changes must:
   a. prove sustainable over the long-term; and,
   b. balance design complexity and implementation simplicity.
7. Rule making and IT system development support efficient dispatch and reliable grid operations.

2.0 Market Roadmap Update

This MRM includes new initiatives and updates to the last MRM in February 2008. This project listing continues to reflect direction contemplated by DOE Policy, Regulation and the Electric Utilities Act (EUA). Also, this document can assist in future discussions on priorities and groupings. A summary of all the initiatives is tabulated in Appendix A.

2.1 New Initiatives added to Market Roadmap

Pool Price Cap
A review of the pool price cap is a new initiative in the MRM. The AESO has started working with a sub committee of the MAC to consult any issues the pool price cap may have in the energy market. The sub committee of the MAC has undertaken to examine the topic and share this early research with industry. This report will attempt to quantify the impacts of the price cap on the market design and provide direction for appropriate next steps.

Draft FEOC Regulation
On October 17 the Department of Energy issued a draft FEOC Regulation seeking comment from market participants. The FEOC regulation is the result of long standing industry work to identify and clarify anti competitive behaviours in the market and to design measures and thresholds for monitoring same. The current draft identifies requirements for AESO reporting on asset ID’s and collection of offer control data by offer block.

Existing Inter-tie Capabilities
Initiatives have been underway since 2005 on restoring the import and export capability of the Alberta/BC inter-tie.
In 2005 and 2006 a stakeholder group worked with the AESO to investigate ways to restore the export capability. Improvements were made to increase the physical capacity through operational improvements. The group also provided input related to short and medium term capital improvements, proposed market rule changes and tariff development.

Since 2006 the AESO has been consulting with stakeholders on restoring the import capability by way of procuring new and expanded ancillary services. Stakeholders have provided feedback on a number of items including appropriate methods for procuring the necessary services as well as who should be responsible for paying for these services.

The AESO recommends competitively procuring these ancillary services in the first quarter of 2009 and continuing to consult with stakeholders on any other appropriate next steps and considerations.

In the MRM there are a number of new or ongoing initiatives related to interties summarized in the attached matrix. In the first half of 2009 the AESO will consider, in its consultations, possible synergies between these initiatives and commence working group consultations.

**Market Suspension Rules**
The existing ISO Rules regarding Suspension of the Market have been in place since 1999 in anticipation of potential “Y2k” issues. The AESO will be initiating a review of the current language in the ISO Rules, starting with stakeholder consultation on an Issue Identification Paper in the first half of 2009 designed to identify the issues related to the current rule thresholds and actions.

**Market Systems Visioning**
A market systems visioning project will commence in 2009 designed to provide industry input into system specifications for current, expected and possible future system capability required to support the competitive market structure and support the grid operations. The AESO recognizes the importance of robust IT platforms to support grid operations and market capabilities and in evaluating system enhancements wants to ensure that these processes are efficient and support possible market system changes. This initiative is expected to take approximately 6 months.

**Ancillary Services Procurement Process**
The AESO will commence consultations with market participants on developing a more comprehensive ancillary services procurement process, consistent with the Alberta Utilities Committee (AUC) Approved Article 11 Negotiated Settlement. The work will commence in the first half of 2009 and include transparent procurement procedures.
2.2 Market Roadmap Projects Update

Updates to initiatives in this section are grouped together based on whether it is:

- implementation of legislative direction or guidance from DOE Policy, Regulation or the Electric Utilities Act; or
- associated with Monitoring and Metrics.

2.2.1 Policy Implementation: The following initiatives are as a result of guidance provided by legislative documents, including DOE Policy, Regulation and the EUA.

Wind

In September 2007 the AESO issued the “Market and Operational Framework for Wind Integration in Alberta” (MOF) which outlined the measures that would be used to manage increasing wind variability. Subsequently, the AESO established a series of industry working groups to advise the AESO on:

1. Wind power forecasting requirements,
2. Supply surplus protocols,
3. Wind power management protocols, and
4. Wind power management technical requirements.

The working groups were led by the AESO and comprised of a broad cross section of stakeholders who committed to exploring the issues in greater detail and developing a discussion report and specific recommendations for the AESO’s consideration. The AESO has completed its review of the work group findings and these have been incorporated into an overarching recommendation paper which describes how to advance the MOF and ultimately facilitate wind power without compromising system reliability or market principles. The paper reviews how the system is managed currently, describes how wind variability impacts operations and discusses preferred options for implementing rules, practices and systems. This recommendation paper is based on findings and/or conclusions from work on wind forecasting, Operating Reserve Market Re-design, Ancillary Services (AS) / Operating Reserve (OR) forecasting and procurement practices, and the capabilities for wind power management. The AESO expects to issue the recommendation paper in the first quarter of 2009 and commence consultation shortly thereafter. The upcoming consultation will focus on some immediate steps to facilitate additional wind resources on the system, recognizing that incremental rule changes may be required to incorporate a more comprehensive solutions (i.e., related to demand side participation, dynamic scheduling, supply surplus procedures, and AS procurement as examples.)

The AESO has filed the transmission Need Identification Document (NID) for southern Alberta with the AUC. Included in the NID are generation scenarios that
have been used and more visibility of the ten year transmission plan for the south.

Transmission Regulation Section 18 Rules
As per Section 18 of the DOE Transmission Regulation, the AESO was required to develop rules for Outage Coordination and Reliability Unit Commitment (RUC). The AESO commenced its consultations with industry in late 2007 and subsequently finalized and filed rules for approval in April 2008. Objections were filed with the AUC and the AUC hearings took place in September and October 2008. The AUC issued their decision for Outage Coordination in December 2008 and a decision related to RUC in January 2009. Revised rule language to address the recommendations of the respective rulings will be available for industry consultation shortly.

Congestion Management
To achieve the “congestion free” objectives outlined in the DOE policies, the AESO has developed long term transmission plans and has advanced work on various need applications to relieve current congestion or forecasted congestion based on new generation plans. Consultation on congestion management rules took place in 2007 and the AESO subsequently finalized and filed rules for approval in April 2008. Objections were filed with the AUC and a hearing took place during October. Market participants are waiting for an AUC decision before any further action will be taken. Regardless, this project will require a multi-year roll out to accommodate system changes and incremental area specific technical changes to align with the revised approach. Business practices related to the use of Remedial Action Scheme (RAS) during the customer interconnection process will be finalized and available for consultation shortly.

Dispatchability of Interties and Setting Price
Government policy recognizes that allowing imports to set price would better reflect the true cost of energy while recognizing a potential concern associated with importers having an unfair advantage over Alberta generation and system operations scheduling concerns\(^1\).

Implementation of the government’s intent and the associated benefits requires relatively complex changes to rules, processes and systems and the additional difficulty of developing and implementing them in a manner consistent and aligned with neighbouring jurisdictions and common intertie practices and in further stages with other sink / source balancing authorities or markets.

\(^1\)Taken from Department of Energy Alberta’s Electricity Policy Framework: Competitive – Reliable – Sustainable, June 2005
The AESO explored an interim solution to enable intra-hour dispatch of imports and exports but it is no more expeditious than the permanent solution due to the complexities associated with this initiative.

**Inter-tie Business Practices**
The AESO has consulted with industry on new export and import rates and business practices in several consultations since 2004. This resulted in the AESO proposing two new export rates in its 2007 General Tariff Application. The AUC approved one of the new export rates as part of the tariff that became effective August 1, 2008, but implementation is deferred until the AESO develops an Open Access Same-time Information System (OASIS) or similar system. While the AUC did not approve the other proposed "firm" export rate, it did encourage the AESO to address with stakeholders availability and other issues related to export and import services. Until transmission upgrades between Edmonton and Calgary are in place, export capability will continue to be constrained. In the first half of 2009 the AESO will be consulting with stakeholders on a “firm” export and import rate and possible inclusion of these in the AESO’s 2010 tariff application. The AESO is planning on filing the tariff application in the second half of 2009. The AESO is currently reviewing the possibility of requesting the “firm” import service sooner in a separate application to be made in the first half of 2009.

**Operating Reserves**
In October 2007 the AESO commenced a market redesign project to address issues with the current Operating Reserves market, specifically aimed at removing the AESO as the single buyer, addressing issues with dual platforms and a number of contract irregularities.


The AESO has released an Operating Reserve Redesign Recommendation Paper in January 2009 and requested formal industry comments on the paper. The AESO will consider these when deciding on appropriate next steps.

**Demand Response**
The AESO has commenced a Demand Response initiative with industry with the purpose of identifying and developing opportunities and options for demand response to contribute to and support system reliability and facilitate a fair, efficient and openly competitive electricity market. Enhanced demand response will ultimately result in a more efficient market and provide greater market options...
for ancillary services and ongoing market response. This initiative is in the early stages of consultation and expected to run through most of 2009.

**Available Transmission Capacity (ATC)**

The AESO will assess on a case by case basis and as part of future transmission developments both regulated and merchant interties that result in enhanced ATC. Included in this assessment are appropriate cost allocation and any necessary development of scheduling, tagging and dispatching procedures.

The AESO will also be guided by any Transmission Regulation regarding inter-tie capacity criteria. This initiative is subject to ongoing discussion while the AESO also plans on issuing its 10 year transmission plan in the coming months.

At this time the AESO is developing a framework (performing operational studies, developing operating policies and procedures and business practices, considering new tariffs, etc.) to effectively integrate the Montana/Alberta Transmission Line (MATL) into the Alberta system.

### 2.2.2 Monitoring & Metrics:

AESO are conducting a review of market performance metrics. Subsequent work will determine appropriate reports for communication with industry.

An example of reports the AESO is developing include:

- Posting information reports regarding wind variability and system performance;
- Posting new metrics regarding Long-Term Adequacy; and
- Discussions about FEOC metrics per the DOE white paper.

In 2009 metrics will be shared with other agencies and participants when and if appropriate to improve the fair, efficient and openly competitive operation of the market.

### 3.0 Market Infrastructure and Grid Operations Systems

#### 3.1 Major Systems Overview

The AESO hardware and software applications used to facilitate grid and market operations have evolved over time to meet the changing market structure and increasingly complex grid management requirements. Due to the specialized nature of grid and market operations generally, and the market design in Alberta specifically, standardized, off-the-shelf software that meets our requirements is not available. As a result, the AESO has developed custom software in order to meet its specific needs while considering some off the shelf software like Open Access Technology International (OATI) for intertie dispatch.
The seven major software applications that the AESO currently utilizes for purposes of operating the market and system are depicted in the graphic in Appendix B and are summarized below. There is a strong interdependency between these operational systems required to maintain the fluidity and concurrency between grid and market operations.

**Energy Trading System (ETS)**
ETS is a technology system that facilitates the real-time wholesale electricity market. The ETS receives electricity supply offers and demand bids from market participants and provides market information to our website, which may be accessed through the Market and System Reporting button on the AESO home page. The ETS also receives electric metering data and performs financial settlement and billing functions for the wholesale market.

**Energy Management System (EMS)**
EMS is a mission critical system used by the system controller to: maintain supply demand balance, automatic generation control, real time data acquisition, maintain system voltage, manage interconnections, calculate ATC, energy scheduling, determine reserve requirements, contingency analysis, determine transmission must run requirements, coordinate operations and outage scheduling.

**Dispatch Tool (DT)**
DT facilitates the dispatch of energy, dispatch down service (DDS) and ancillary service merit orders, sets the system marginal price and calculates pool price.

**Ancillary Service Procurement (ASP)**
ASP maintains forecasted ancillary service (AS) requirements, records contractual agreements for delivery of AS, determines supplier compliance to AS contracts, supplies AS requirements to the system coordination centre (SCC) so they can be dispatched, and provides sufficient information so that AS invoices can be reconciled.

**Automatic Dispatch and Messaging System (ADaMs)**
ADaMs is a web based component of the dispatch tool that allows the system controller to dispatch energy, DDS and AS electronically rather than by phone. This internet-based system is the primary method for the system controller to issue dispatches, directives and system messages. It works in conjunction with DT, and allows service providers to acknowledge their dispatches back to the SCC.

**Monitor and Advise for Reliable Grid Operations (MARGO)**
MARGO is an application that uses OPP Rules to provide SC recommendations around items such as the Interruptible Load Remedial Action Scheme (ILRAS), load shed service, KEG and SOK operations.
Interconnection Transfer Capability Posting System (ITC)
A web application component of MARGO that maintains the import/export transfer capabilities for the AB/BC and AB/SK interties.

To the extent an initiative in the MRM is at a stage where it is known which of these software applications is affected and to what extent, this will be identified, including an assessment on the timing of implementation.

3.2 Major System Renovations
Currently there are a number of essential/critical system initiatives underway at the AESO intended to shore up core market infrastructure and grid operations systems. A description of these initiatives is outlined below:

- The EMS system is reaching the end of vendor support and requires upgrades to meet industry critical infrastructure standards. A replacement project is underway which includes implementing a new EMS, implementing a new version of our Supervisory Control and Data Acquisition historian software, ensuring that the new EMS integrates with all the associated AESO business systems. This project will allow the AESO to continue to operate one of its critical functions in an effective and reliable manner.

- DT architecture (how the components of the system function together) is operating at or close to its full capability. In its current form it is not capable of reliably supporting all of the upcoming initiatives (i.e. wind, transmission congestion management, RUC). A project is underway that will create a new architecture with a focus on creating greater stability in the existing functionality, improving the ability to accept future changes in functionality by increasing system flexibility and improving system predictability by making it easier to test. In the current version of DT, Energy, AS and DDS markets are closely dependant / integrated with each other but DT treats them individually during dispatch. This results in several dispatches being initiated in order to achieve the final solution. The current DTAU initiative will resolve these issues by solving all the "markets" at the same time resulting in reduced dispatches and instructions that are much clearer. The new architecture is a near-term strategy to provide a foundation for business changes in the next two to three years.

- Implementation of an integration technology is underway to improve overall inter-system communications. This will better facilitate future changes requests and implementation of new systems.

- A project is underway to implement a comprehensive data analysis and reporting platform which focuses on delivering reporting solutions to the AESO and stakeholders. Currently the AESO is constrained in its ability to provide data analysis services.
These IT initiatives will better assist the AESO and stakeholders in the future. It will broaden the possibilities on feasible outcomes on any given initiative, quicken implementation times and allow initiatives to be implemented more reliably.

4.0 Project Plan & Timeline
The MRM provides context for the market design consultations and changes that are needed to meet the intent of DOE market policy. In order for the MRM to be effective, the AESO will take steps to update this document on an annual basis including providing updates about system changes required to meet design specifications that evolve through discussions with industry. Following the conclusion of the market systems visioning project during 2009, it is expected that the MRM can provide greater clarity around implementation and timing of initiatives.

It should be noted that the MRM is not intended to be a comprehensive AESO project planning document or to replace separate communication on related but separate issues.

The AESO will host an upcoming stakeholders session to review the document, answer questions and collect feedback on this document. At this session, the AESO will also roll out its market systems visioning project and hope to discuss these integrated AESO plans related to IT requirements for system and grid operations. The AESO is also soliciting written comments from stakeholders on this document by March 26, 2009.
### Appendix A

#### Draft - AESO and Stakeholder Consultation Process

<table>
<thead>
<tr>
<th>STEP 1</th>
<th>STEP 2</th>
<th>STEP 3</th>
<th>STEP 4</th>
<th>STEP 5</th>
<th>STEP 6</th>
<th>STEP 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultation: reason for Rule amendment inclusion</td>
<td>Consultation: possible options and solutions</td>
<td>Consultation: narrow scope of possible solutions</td>
<td>Consultation continues</td>
<td>Consultation: commence ISO Rule drafting process</td>
<td>Finalize ISO Rule</td>
<td>AUC Process</td>
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| **AEO issue paper identifying reason for rule change** | **AEO issue discussion paper** | **AEO issue recommendation paper** | **AEO issue draft rule** | **AEO issue final rule and submit to AUC** |

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### Market Roadmap Update – February 2009 For Discussion

<table>
<thead>
<tr>
<th>Market Design Element</th>
<th>Planning</th>
<th>Direction</th>
<th>Design Considerations</th>
<th>Timeline / Status / Stage of Consultation Process</th>
<th>Update since last MRM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Market Systems Visioning Project</strong></td>
<td>AEO and Market Participants</td>
<td>Designed to provide industry input into system specifications for current, expected and possible future system capability required to support the competitive market structure and support the grid operations.</td>
<td>Industry input to be solicited first half of 2009. Step 2 of consultation.</td>
<td></td>
<td>New initiative.</td>
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<table>
<thead>
<tr>
<th>Policy Implementation</th>
<th>Direction</th>
<th>Design Considerations</th>
<th>Timeline / Status</th>
<th>Update since last MRM</th>
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<tbody>
<tr>
<td><strong>Quick Hits (DDS, T-2, MOMC, Marg. Unit comp)</strong></td>
<td>Electricity Policy Framework 05 (Market Policy)</td>
<td>Only outstanding item is the 6 month review.</td>
<td>Evaluation of 6 month review Q1 2009.</td>
<td>Follow up reporting item completed. 6 month review moved from Q3 2008 to early 09.</td>
</tr>
<tr>
<td><strong>LTA</strong></td>
<td>Market Policy</td>
<td>Reporting of metrics commences in 2007. Rules for threshold and threshold actions determined and public.</td>
<td>Approved and implemented.</td>
<td>Done</td>
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</table>
| - Outage Coordination - Reliability Assessment (RUC) | Transmission Regulation 07 (T-Reg) | • Outage reporting required on 24 month rolling basis. Directives and compensation for changes to schedule.  
• Development of rules for day ahead reliability assessment and unit commitment directives if required for reliability and associated compensation.  
| - Congestion Management Rules | T-Reg 03 / 07 Transmission Development Policy 03 (TDP) | • Economic dispatch and pro-rata to address real-time congestion management.  
• Plan for TMR and RAS until the tx system is congestion free. Commercial terms for compensation of TMR dispatches, Article 11 as backstop.  
• Market suspension rules as required.  
• Will require implementation of 8 – 10 OPPs and tools to support the procedures set out in the OPPs. | Awaiting AUC decision which will determine next steps and timing. | AESO filed rules in April 2008. Objections filed. Hearing took place Oct 2008. Awaiting AUC decision. |
| - FEOC / Market Power Mitigation | Draft FEOC Reg released. Awaiting further progress and direction. | • Measurement and monitoring system prototyped based on preliminary proposals.  
<p>| - Intertie Projects | Market Policy | • Dispatchable, priced imports and exports | Consultations to | Short-term solution not |</p>
<table>
<thead>
<tr>
<th>Market Evolution</th>
<th>Direction</th>
<th>Design Considerations</th>
<th>Timeline / Status</th>
<th>Update since last MRM</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Available Transmission Capacity (ATC)</td>
<td>TDP New DOE Provincial Energy Strategy</td>
<td>• Work with industry regarding additional interties to meet system and market needs on going.</td>
<td>Step 2 of consultation.</td>
<td>On going.</td>
</tr>
<tr>
<td>- Pool Price Cap</td>
<td></td>
<td>• Small working group consider issues, if any, of pool price cap on market.</td>
<td>Work commenced in Q4 2008. Step 1 of consultation.</td>
<td>New initiative.</td>
</tr>
<tr>
<td>- Dispatchability / Setting Price</td>
<td>TDP</td>
<td>• Increased automation and functionality where possible/practical (Dynamic Scheduling).</td>
<td>commence first half of 2009. Step 4 of consultation.</td>
<td>feasible. AESO commencing consultation on longer term initiative.</td>
</tr>
<tr>
<td>- Existing Intertie Capabilities</td>
<td>Market policy, Transmission Regulation and Electric Utilities Act</td>
<td>• AESO has been in consultation with stakeholders on restoring the import and export capability of the AB/BC inter-tie.</td>
<td>AESO issuing Recommendation Paper in Q1 2000. Step 4 of consultation.</td>
<td>New initiative.</td>
</tr>
<tr>
<td>- Operating Reserves Market</td>
<td>Market Policy Electric Utilities Act 03 (EUA) re role of AESO and Electricity Policy Framework 05</td>
<td>• Operating Reserves market re-design in two Phases. Phase 1 looking at incremental changes in the near term. Consultation taking place in 2008/09. Phase 2 process could place in the coming year/s and would look at a longer term initiative.</td>
<td>AESO issued Phase 1 Recommendation Paper Q1 2009. Step 4 of consultation.</td>
<td>Working group consultation concluded. AESO issued summary paper and received comments.</td>
</tr>
<tr>
<td>- Review Market Suspension Rules</td>
<td>AUC Approved Article 11 Negotiated Settlement</td>
<td>• Existing rules have been in place since 1999 and are potentially problematic as they have not been reviewed since.</td>
<td>Step 1 of consultation to commence Q1 2009.</td>
<td>New initiative.</td>
</tr>
<tr>
<td>Monitoring and Metrics</td>
<td>Direction</td>
<td>Design Considerations</td>
<td>Timeline / Status</td>
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Appendix B – Energy Market Systems Context Diagram