



California ISO

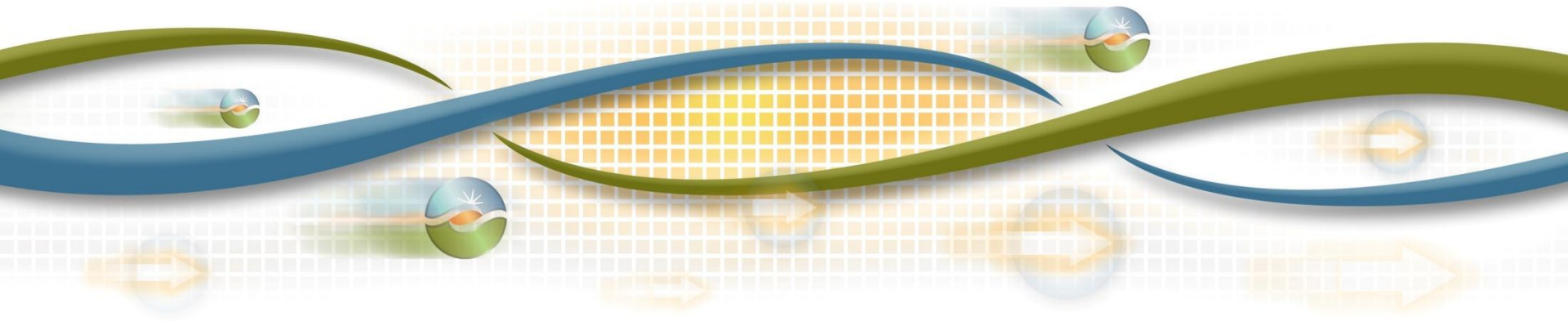
# LMPM Enhancements 2015

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Stakeholder Web Conference

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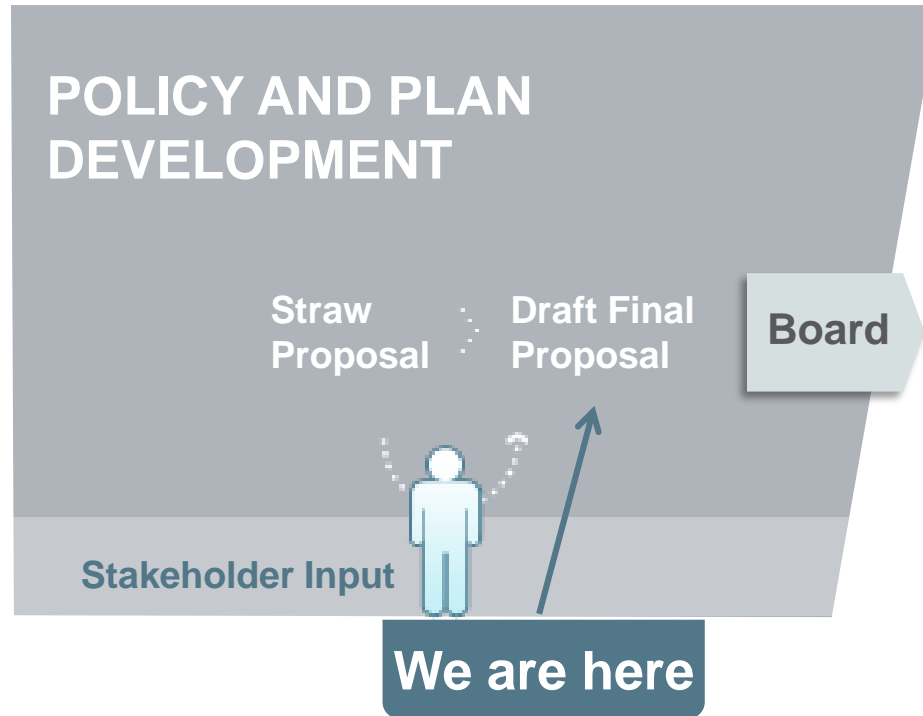
# Agenda

Time	Topic	Presenter
9:00-9:05	Introduction	Kim Perez
9:05-9:45	Review of proposal	Mike Castelhano
9:45-10:30	Discussion of stakeholder feedback	Mike Castelhano
10:30-10:55	Questions and comments	Mike Castelhano
10:55-11:00	Next Steps	Kim Perez

# Stakeholder schedule

Milestone	Date
Proposal posted	December 1, 2015
Stakeholder call on Proposal	December 8, 2015
Comments due	December 22, 2015
Draft final proposal	January 12, 2016
Stakeholder call on draft final proposal	January 19, 2016
Comments due on draft final proposal	February 2, 2016
Board of Governors meeting	March 24-25, 2016

# ISO policy initiative stakeholder process



# Overview of proposal

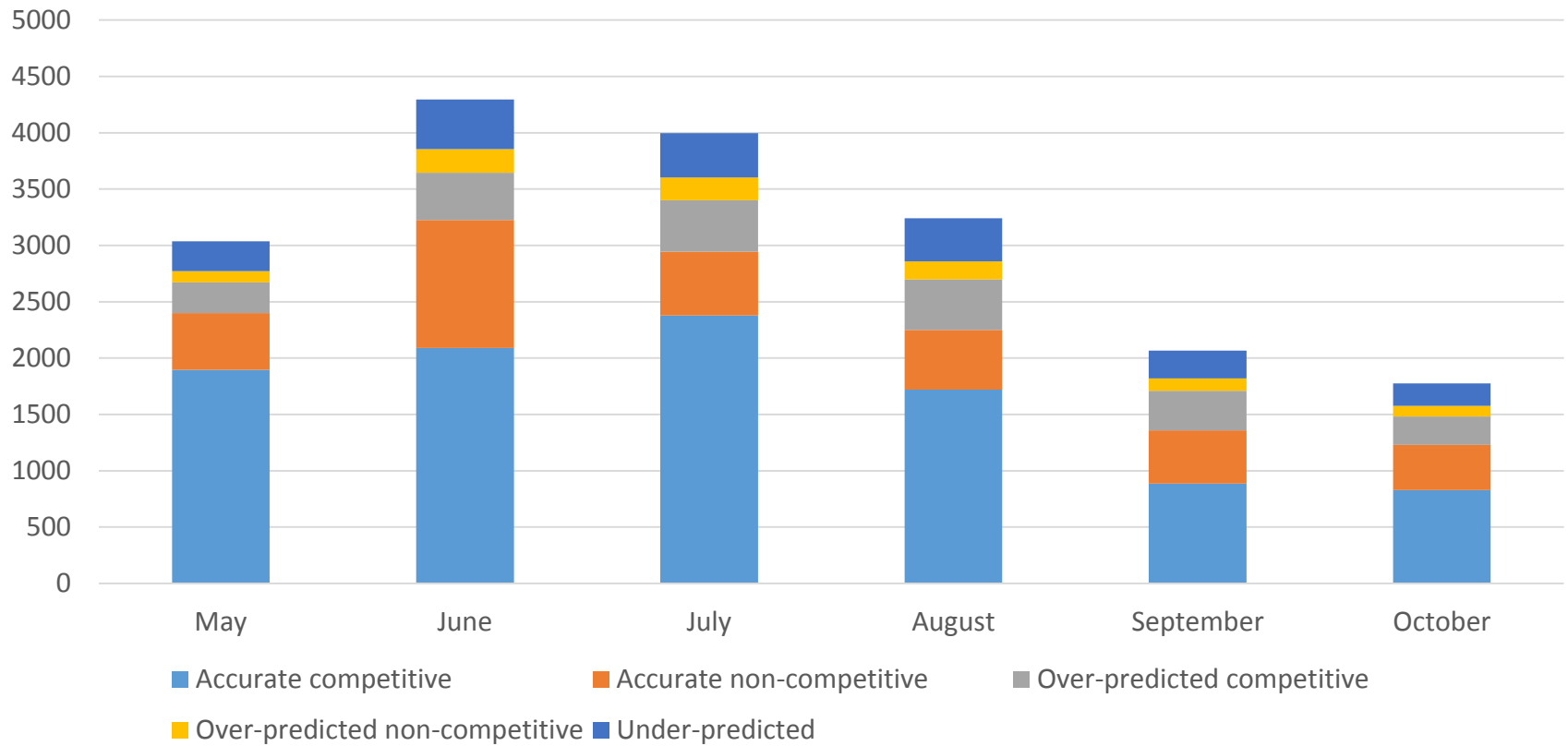
- Accuracy of current LMPM is good, will be improved by changes planned for Spring 2016
- Can be further improved with proposed changes detailed here
- Plan to bring proposed changes to BOG in March
- Hope to implement proposed changes in Fall 2016

## Note on overestimated congestion

- Under current predictive system, overestimated congestion can come from at least two sources
  - Changed bids and dispatch due to mitigation could relieve congestion
  - Changed exogenous conditions mean no congestion occurs
- First is desirable outcome, second is something we look to improve

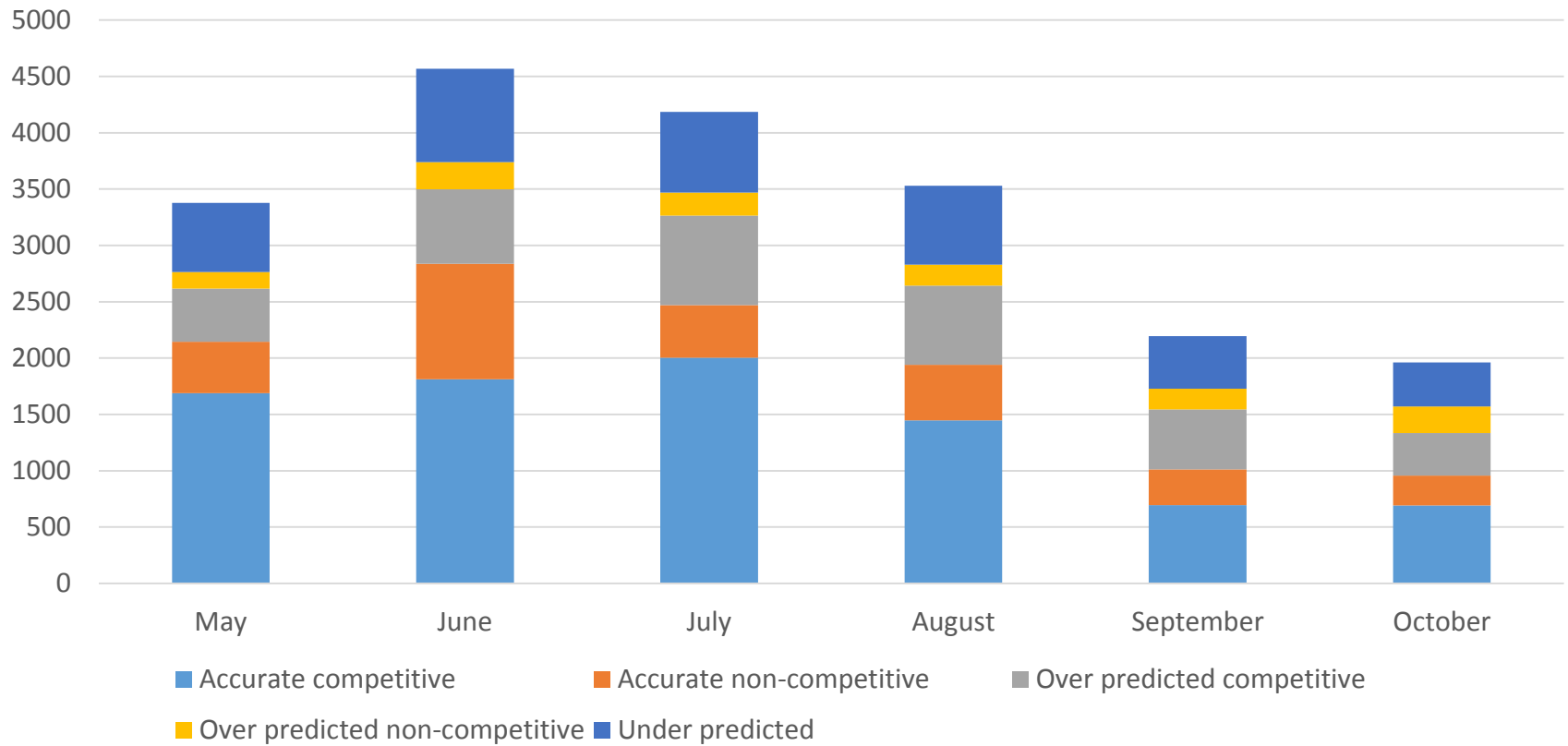
# Graph 1: LMPM predictions compared to RTPD results

Accuracy of congestion predictions for RTPD



# Graph 2: LMPM predictions compared to RTD results

Accuracy of congestion predictions for RTD





# Sources of inaccuracy in congestion predictions

- Changes between runs (exogenous inputs)
  - VER output
  - Load forecast
- Differences between runs (modeling)
  - Different constraint limits
  - Total outlook period in run
  - RTPD vs RTD
- Solution criteria

# Mechanics of current system

- LMPM runs in RTPD, uses advisory intervals and LMPM engine
- Predicts congestion in future with advisory interval results
- LMPM engine measures competition and mitigates where necessary
- Once a bid is mitigated, stays mitigated through that hour
- Final bids used in RTPD runs are passed to RTD, no additional analysis of RTD

# Mechanics slides: Key

KEY:



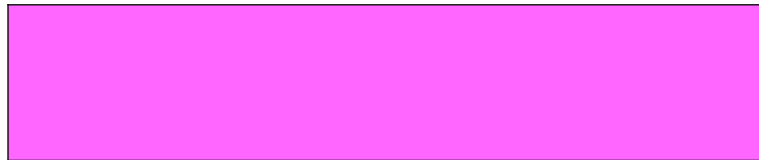
Financially binding results



where mitigation occurs



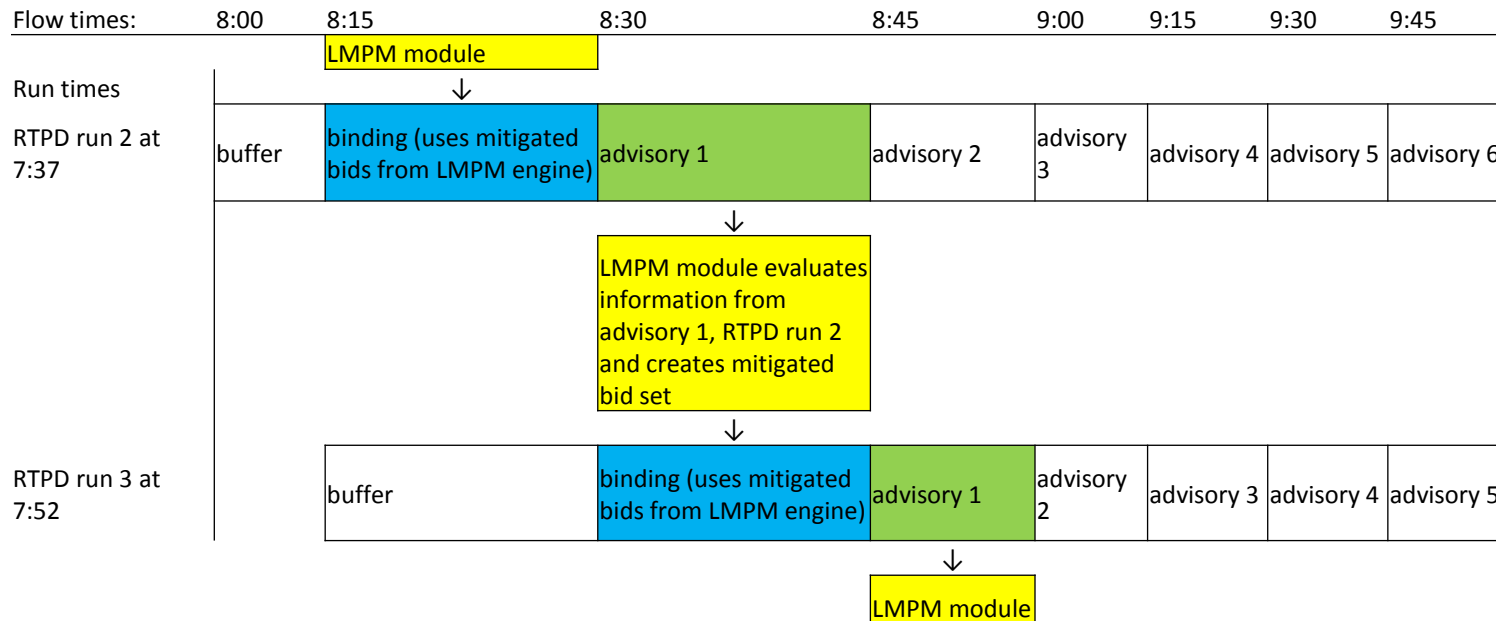
information from previous run applied to subsequent financially binding run



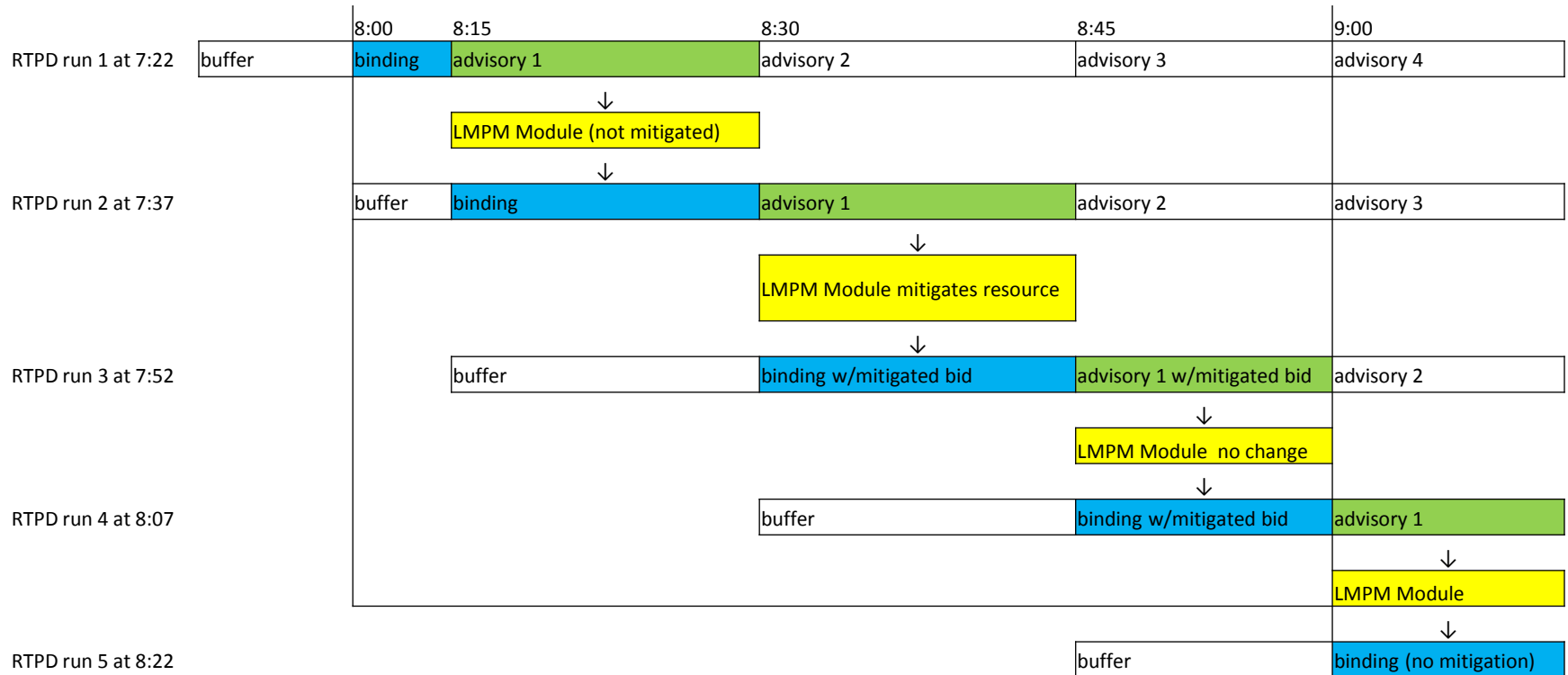
information from previous market type applied to subsequent market (RTPD to RTD)

- All times listed are for the start of a trade interval

# Mechanics of current system: RTPD



# Mechanics of current system: mitigation carry through in RTPD



# Mechanics of current system: RTD

8:15			8:30			8:45		
8:15	8:20	8:25	8:30	8:35	8:40	8:45	8:50	8:55

Final bids from RTPD run 2									
RTD run 4 8:07	binding	advisory 1	advisory 2	advisory 3	advisory 4	advisory 5	advisory 6	advisory 7	advisory 8
RTD run 5 8:12		binding	advisory 1	advisory 2	advisory 3	advisory 4	advisory 5	advisory 6	advisory 7
RTD run 6 8:17			binding	advisory 1	advisory 2	advisory 3	advisory 4	advisory 5	advisory 6

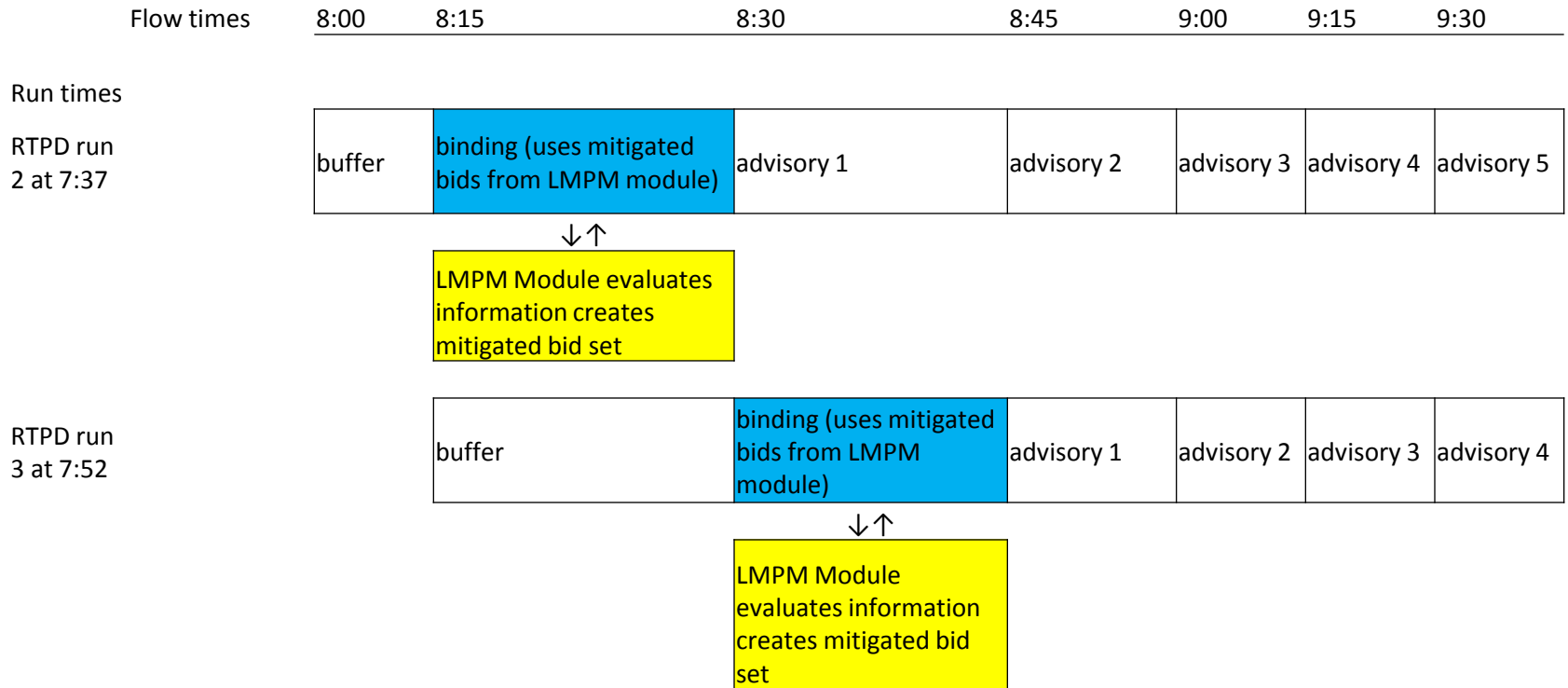
Final bids from RTPD run 3 including bids mitigated by LMPM module from advisory run of previous RTPD run						
RTD run 7 8:22	binding (M)	advisory 1	advisory 2	advisory 3	advisory 4	advisory 5
RTD run 8 8:27		binding (M)	advisory 1	advisory 2	advisory 3	advisory 4
RTD run 9 8:32			binding (M)	advisory 1	advisory 2	advisory 3

Final bids from RTPD run 4			
RTD run 10 8:37	binding (M)	advisory 1	advisory 2
RTD run 11 8:42		binding (M)	advisory 1
RTD run 12 8:47			binding (M)

# Mechanics of planned FMM enhancements

- Planned enhancements do not require tariff change, will be detailed in a BPM update
- Implementation in spring 2016
- LMPM process is part of the binding interval run
- No changes to exogenous inputs or optimization between LMPM and RTPD
- Still possible that results will include differences
- Mechanics of measuring competition and rules of mitigation do not change, nor does mitigation carry-over
- No changes to HASP

# Mechanics of planned enhancement: RTPD





## Benefits of planned enhancements

- Should significantly improve accuracy of congestion predictions
  - Less under predicted congestion
  - Less over predicted congestion
  - Clearer understanding of over-predicted congestion
- Addresses concerns about changes in inputs and changes in modelling between LMPM and RTPD runs
- Will no longer use competitive LMP from advisory interval for mitigation
- Moves LMPM run closer to RTD runs, should lead to more accurate prediction of conditions in RTD runs

# Mechanics of proposed RTD enhancements

- These proposed changes will require tariff changes, and we are seeking stakeholder feedback on any concerns
- Currently targeting fall 2016 implementation
- Introduce RTD LMPM using predictive method
- Essentially the same as current RTPD
- More appropriate to use predictive for RTD because time lag is shorter and potential changes are fewer and smaller
- RTD will still start with RTPD mitigated/final bids

# Mechanics of proposed RTD enhancements

- Mitigation in RTD will be carried through any additional five minute intervals that correspond to the same RTPD 15 minute interval where the RTD mitigation occurred.
- Using mitigation through whole hour due to one 5 minute interval is unnecessary and likely to be overly burdensome
- Next RTPD interval could have different commitment that relieves congestion

# Mechanics of proposed enhancements: RTD

		8:15			8:30			8:45		
		8:15	8:20	8:25	8:30	8:35	8:40	8:45	8:50	8:55
		Final bids from RTPD run 2								
		↓								
		advisory 1	advisory 2	advisory 3	advisory 4	advisory 5	advisory 6	advisory 7	advisory 8	advisory 9
		↓								
		LMPM Module								
		↓								
RTD run 4	8:07	binding	advisory 1	advisory 2	advisory 3	advisory 4	advisory 5	advisory 6	advisory 7	advisory 8
		↓								
		LMPM Module								
		↓								
RTD run 5	8:12	binding	advisory 1	advisory 2	advisory 3	advisory 4	advisory 5	advisory 6	advisory 7	
		↓								
		LMPM Module								
		↓								
		Final bids from RTPD run 3								
		↓								
RTD run 6	8:17	binding	advisory 1	advisory 2	advisory 3	advisory 4	advisory 5	advisory 6		
		↓								
		LMPM Module								
		↓								
RTD run 7	8:22	binding	advisory 1	advisory 2	advisory 3	advisory 4	advisory 5			
		↓								
		LMPM Module								
		↓								
RTD run 8	8:27	binding	advisory 1	advisory 2	advisory 3	advisory 4				
		↓								
		LMPM Module								
		↓								
		Final bids from RTPD run 4								
		↓								
RTD run 9	8:32	binding	advisory 1	advisory 2	advisory 3					
		↓								
		LMPM Module								

# Mechanics of proposed enhancements: RTD mitigation carry through

	8:00	8:05	8:10	8:15	8:20	8:25	8:30	8:35	8:40
	Final bids from RTPD run 1								
RTD run 12	advisory 1	advisory 2	advisory 3	advisory 4	advisory 5	advisory 6	advisory 7	advisory 8	advisory 9
	LMPM Module								
RTD run 1	binding	advisory 1	advisory 2	advisory 3	advisory 4	advisory 5	advisory 6	advisory 7	advisory 8
		LMPM Module mitigates bid							
RTD run 2		binding (M)	advisory 1	advisory 2	advisory 3	advisory 4	advisory 5	advisory 6	advisory 7
			LMPM Module (no change)	Final bids from RTPD run 2					
RTD run 3			binding (M)	advisory 1	advisory 2	advisory 3	advisory 4	advisory 5	advisory 6
				LMPM Module					
RTD run 4				binding	advisory 1	advisory 2	advisory 3	advisory 4	advisory 5
					LMPM Module				
RTD run 5					binding	advisory 1	advisory 2	advisory 3	advisory 4
						LMPM Module	Final bids from RTPD run 3		
RTD run 6						binding	advisory 1	advisory 2	advisory 3
							LMPM Module		

# Benefits of proposed enhancements

- Addresses concerns that changes in modelling between RTPD and RTD lead to under mitigation
- Decreases concerns that changes to exogenous inputs could lead to under mitigation in RTD
- Limits amount of additional mitigation by limiting carry over to two RTD intervals or less

## How this affects BCR

- Currently revenue and costs for RTPD and RTD are calculated separately
- Only difference is that there will potentially be different numbers in the bid price for RTPD and RTD in the future
  - This may mean an additional field in some tables and or statements
- The separate costs of RTD and RTPD are added together, as are the revenues

# Transferring mitigated bids between markets

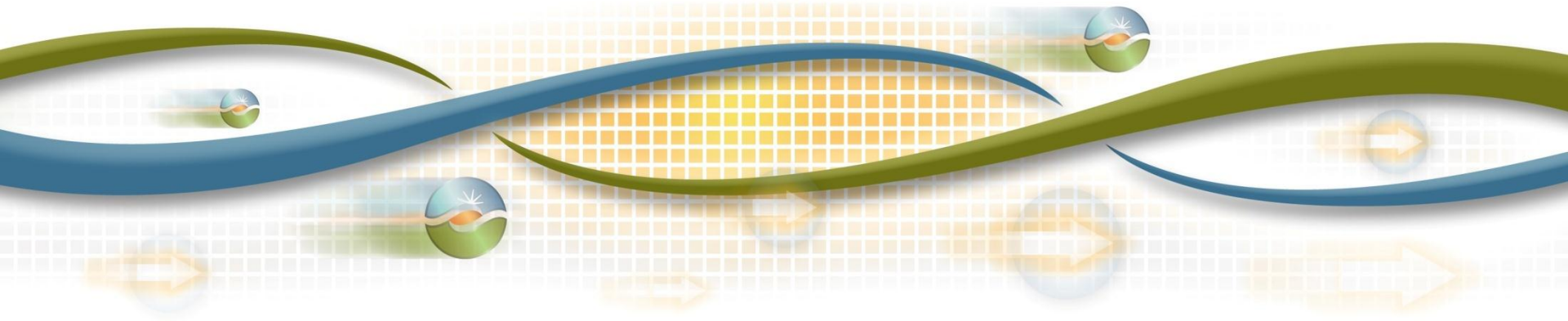
- Under current proposal, bids mitigated in RTPD will be transferred to RTD, even though we have mitigation in RTD
- This is necessary to avoid complications due to inability of RTD to commit units
- Also avoids BCR issue that would potentially involve simply taking money from generators for no reason, seemingly at random





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# Stakeholder feedback



## Summary of feedback

- Stakeholders are supportive of the proposal in principle
- Almost all respondents have concerns about market solution times and performance
- Several market participants are interested in seeing how much of an impact we expect from each of the planned and proposed policies
- NRG is concerned about carrying unnecessary mitigation forward
- WPTF and SDGE believe that the impact will be very small

# Market performance issues

- DC solutions are related to challenges in modeling the network (the entire western interconnection)
  - Run time issues can also be caused by network modeling issues
  - Run time does not cause DC solutions
- Challenges for market performance are not different for this initiative than for others
  - All changes to the market are tested and evaluated carefully
  - Technology group will not implement unreliable new features

## Degree of effectiveness of planned and proposed solutions: RTPD

- In the planned system for RTPD, no mitigation will occur for constraints that are not congested in some part of the binding interval run.
  - Virtually eliminates concerns about unnecessary mitigation
- Expect accuracy closer to IFM levels than to current RTPD levels
- IFM accurate predictions were about 90% of congested constraint intervals in 2014, compared to about 60% for RTPD

## Degree of effectiveness of planned and proposed solutions: RTD

- Proposal estimate: compare current advisory RTD intervals to current binding RTD intervals
- Counterfactual: compare current binding RTPD intervals to current binding RTD intervals
- Comparison can be made separately for
  - flowgates and nomograms
  - EIM transfer constraints
- Data for flowgates and nomograms is from Dec 18 to Jan 7
- Data for EIM transfers is from November 4 to Jan 7

# Degree of effectiveness of planned and proposed solutions: RTD

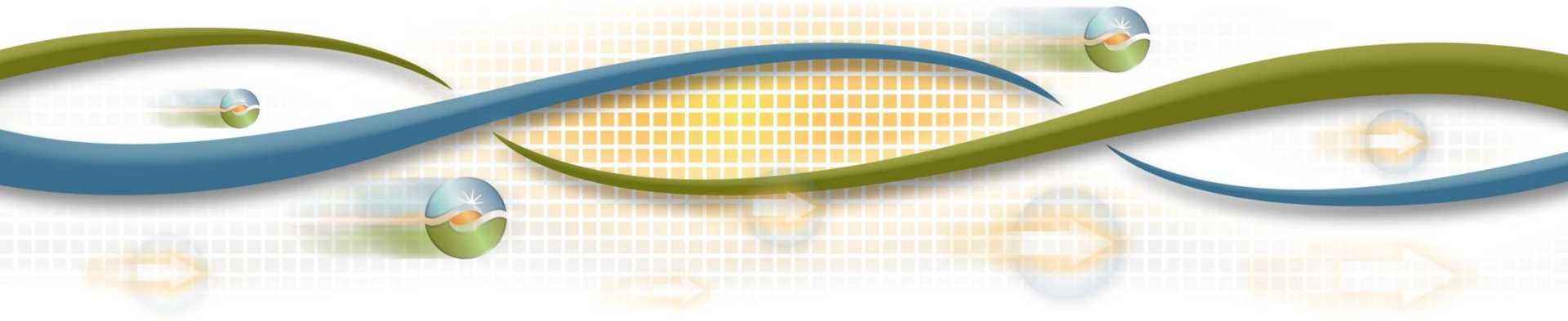
	RTPD vs RTD		ADV vs RTD	
	% match	% under	% match	% under
Flowgates and Nomograms	42.6%	25.7%	75.8%	8.8%
EIM transfer constraints	21.8%	45.1%	65.8%	14.0%

- Percent of congested constraint intervals accurately predicted moves from 42% with RTPD plan to 75% with RTD
- EIM transfer constraints are accurately predicted 3 times as often with advisory interval RTD mitigation



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# Next Steps



# Next Steps

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Comments due	December 22, 2015
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