

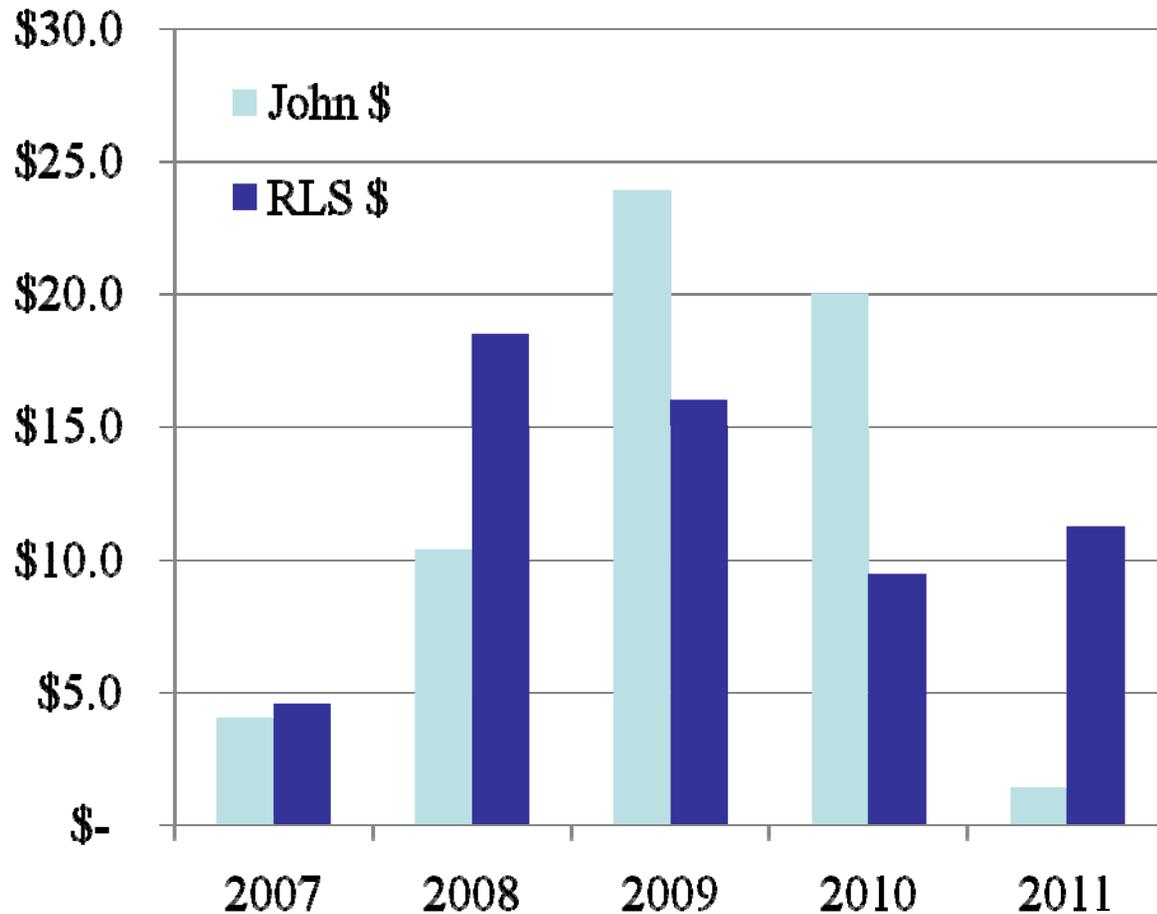


NOvA ANU Shutdowns

- Need to delay October 2009 Accelerator Upgrades Shutdown by about a year
 - October 2010
 - Shutdown will be about 8 months long (worst case I hope)
- Similarly need to delay NuMI Upgrades Shutdown ~ 7 months
 - October 2011
 - Length still estimated at ~3 months (unless driven by NOvA near detector excavation work, then may be longer)
 - May need to delay more based on resource leveling presently in progress
- These changes driven by the funding profile and the availability of ME and Drafter/Designers in the next few years



Funding Profile by FY



- Best from resource point of view to have FY08 and FY09 relatively level

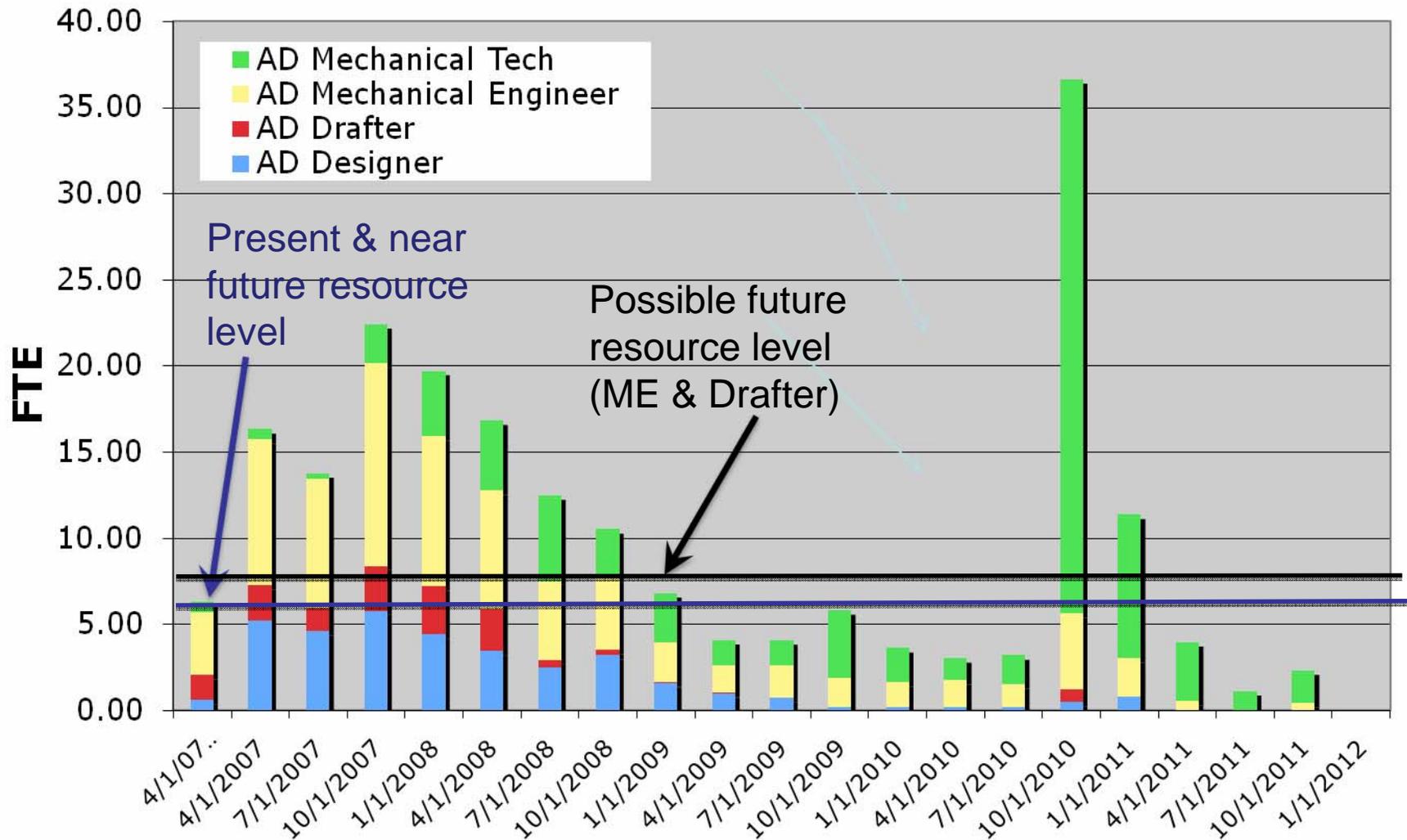
- We are working on resource leveling

- Now the Accelerator Upgrades Shutdown is in FY2011 (start of) thus much more money needed then

- Also some \$ in FY2012 for NuMI

- NOTE: John's numbers are rough ANU numbers we are iterating on, using for guidance – with the goal to balance detector readiness and accelerator readiness

ANU Total Resource Requirements



- **NOTE: We have not completed resource leveling since we have moved the shutdown dates later.**



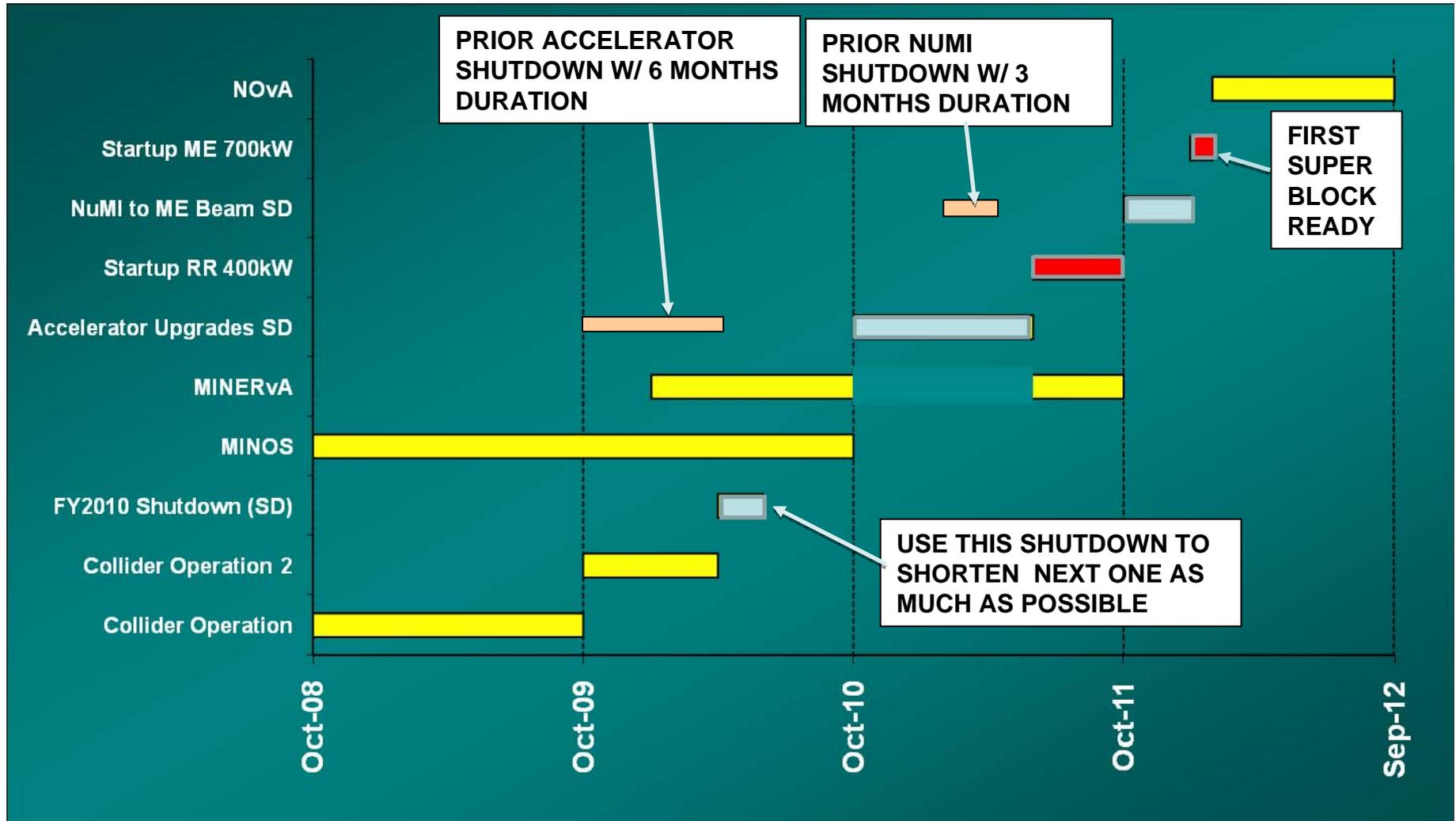
NOvA ANU Shutdown Delay

Why the delay :

- Funding profile does not allow for all the R&D and construction work to occur that needs to occur in FY08 and FY09 (and FY10)
- AD Mechanical and Drafting resources also can not support the required work
- NOvA estimates of the first superblock (5 blocks) ready ~Feb 2012
 - If we were able to meet the 10/09 date: would be ready 6/11 to commission ME beam (including 1 year of commissioning RR with slipstacking at lower power before the move to ME beam)
- My rough guess that the manpower and money resources imply a 1 year delay in the shutdown(s) (within a few months of uncertainty)
 - Main accelerator shutdown to finish all accelerator work then starts ~ October 2010
 - Assume NuMI one starts 1 year after that (October 2011)
- This also allows float in case the TeV does not shut down 10/09



Graphically how does it look...





NOvA ANU Shutdown Issues

- Accelerator shutdown was 6 months before, I think it will be ~8 months
 - Shutdown 10/1/10 to 6/1/11 for accelerator upgrades (and a lot of NuMI work too)
- NuMI Shutdown 10/1/11 to 1/1/12 (7 months later) - move to ME beam
 - Was 3/1/11, so this may be tight for Mike to meet once we level resources, I am hopeful (was thinking a year delay, not 7 months)
 - Allows for commissioning RR with slip-stacking and higher rep. rate for the complex for 4 months before NuMI shutdown
 - NuMI shutdown ~3 months long, then...
- Commissioning for 700 kW operations and NOvA begin in early 2012
- First superblock is thought to be ready early 2012 also
- How does MINERvA low energy running fit in all this?
 - Runs between when they are ready for beam and when the first shutdown starts 10/11
 - Can then continue to run LE beam while we commission the RR after the 10/11 shutdown, but before the NuMI shutdown (~4 mos)



Shutdown Schedule: Accelerator Upgrades Shutdown

- Accelerator Upgrades Shutdown (NuMI work also):
 - October 2010 to end of May 2011 (about 8 months long)
 - Plus or minus 8 weeks on start date (and thus on end date also)
 - If there is an accelerator shutdown after the TeV shuts down & before Oct. 2010, we would take advantage of it:
 - Remove magnets that need to come out and be refurbished and then put back in
 - Look to move out other items to make installation work go more quickly
 - Would make the longer 8 month shutdown shorter
 - We will make sure we are prepared to take advantage of such a shutdown.
- For the Accelerator Upgrades Shutdown: Plan to baseline with approximately the 10/1/10 to 6/1/11 dates
 - Need to add schedule float to the Milestones that relate to us being ready for the shutdown, thus it will make things look much later than we plan/hope.



What are we looking for?

- Feedback on this rough shutdown schedule as we need to baseline for the DR something in line with what lab management can live with



Proton Projections/Accelerator Efficiency

(Bob Zwaska numbers)

- Assume that the complex runs for 44 weeks per year, with 8 weeks being devoted to long, scheduled shutdown – **is this reasonable?**
- **John is worried:** $(4.6/6.0 \times 700\text{kW}) = 537\text{ kW}$ - a 34% gain over 400kW ~ \$ 60M
- \$60M spent on more detector, then the gain would be 40%
- But this is comparing apples to oranges.....

	Phase 1	
	Design	Base
Batch Intensity	4.3×10^{12}	4.0×10^{12}
Cycle Efficiency	0.95	0.9
Cycle Time	1.333	1.333
Peak Beam Power	707	623
Complex Uptime	85%	85%
Avg-to-peak	90%	90%
NuMI Uptime	80%	70%
Operating Eff.	61%	54%
Annual Running Time	44	44
Annual Protons	6.0×10^{20}	4.6×10^{20}

- Need to compare Annual Protons projected in the same way.
- This was last done at the Director's Review for SNuMI.
- We should update the chart (next slide) with newer Proton Plan numbers to make it more accurate



This is the best apples to apples I know...

	Present operating conditions *	Proton Plan Multi-batch slip-stacking in MI *	SNuMI phase I Multi-batch slip-stacking in Recycler	SNuMI phase II Accumulator momentum stacking
Booster intensity (p/batch)	4.5×10^{12}	4.3×10^{12}	4.3×10^{12}	4.7×10^{12}
No. Booster batches to NuMI	5	9	12	18
MI cycle time (s)	2	2.2	1.333	1.333
MI intensity (ppp)	3.1×10^{13}	4.5×10^{13}	4.9×10^{13}	8.3×10^{13}
To NuMI (ppp)	2.25×10^{13}	3.7×10^{13}	4.9×10^{13}	8.3×10^{13}
NuMI beam power (kW)	210	<u>320</u>	<u>700</u>	1200
POT/yr to NuMI	2×10^{20}	3×10^{20}	6×10^{20}	10×10^{20}
MI protons/hr	5.5×10^{16}	7.3×10^{16}	1.3×10^{17}	2.2×10^{17}

This talk and most of the talks that follow will address SNuMI phase I only

* NuMI values are given for mixed-mode cycles