For Discussion Only

PTS Data Overview:

A presentation to the Meter Task Force

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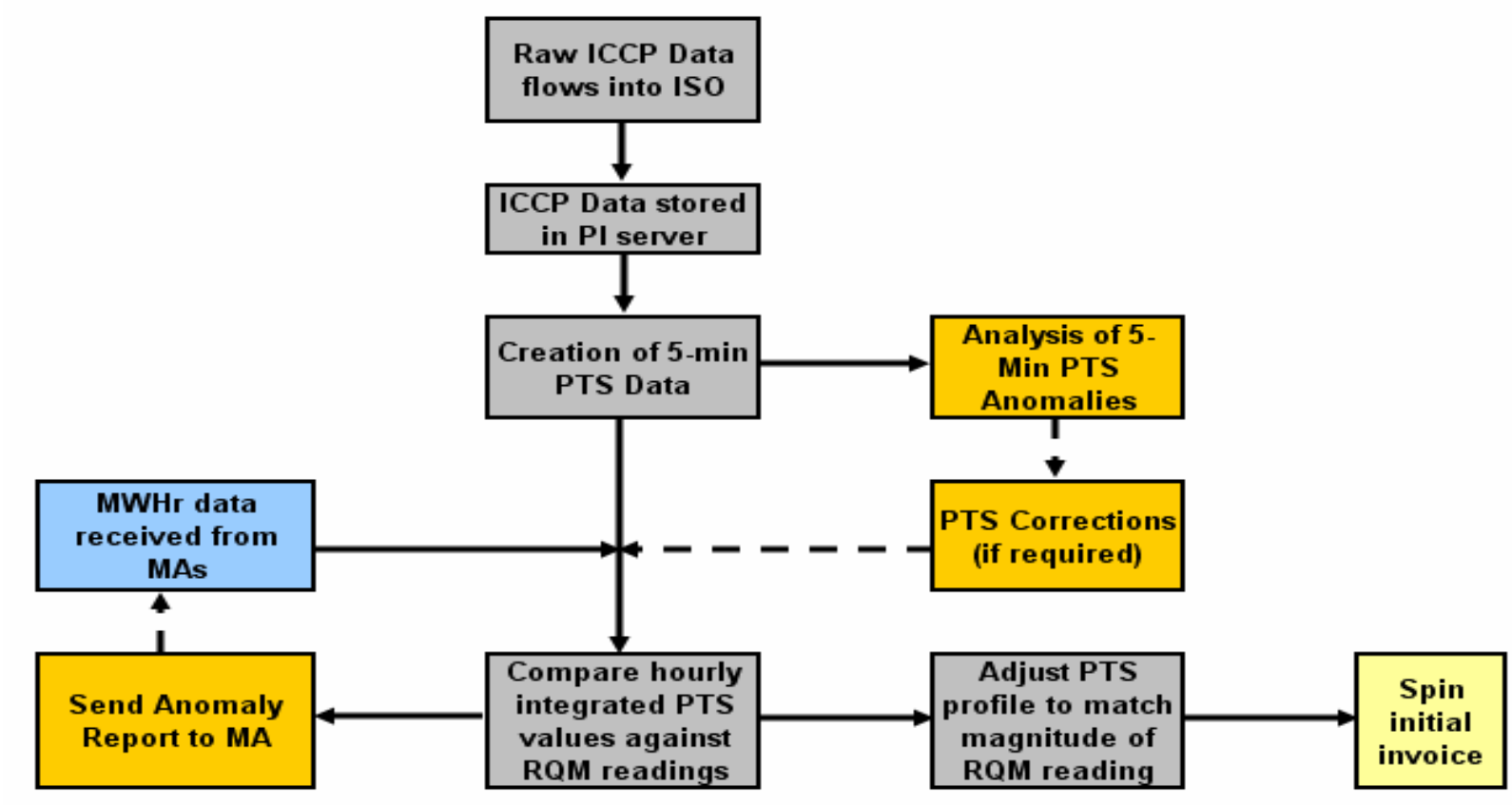
PTS Data Process



Creating 5-min PTS Data

Time	ICCP Data/PI
13:00:00	37.4
13:00:06	37.7
13:00:12	38.0
13:00:18	37.7
13:00:24	37.6
13:00:30	38.2
13:00:36	37.6
13:00:42	37.8
13:00:48	37.9
13:00:54	37.8
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- Real-time (R/t) data flows into the ISO Energy Management System and is stored in PI

Start Time	Avg Actual
13:00	37.8
13:05	40.8
13:08	50.8

- Average values for each dispatch intervals are stored in Performance Tracking System (PTS)

Analyzing 5-min PTS Values

Start Time	Avg Actual (MW)
13:00	37.8
13:05	40.8
13:08	50.8
13:18	52.4
13:20	12.9
13:25	0.0
13:30	0.0
13:35	20.8
13:40	44.7
13:45	41.7
13:50	44.7
13:55	46.2

- Statistical programs identify anomalies in the 5-min PTS data
- Analysts examine logs, PI data, etc. to determine if the anomalies are data errors

Fixing 5-min PTS Values

Start Time	Avg Actual (MW)
13:00	37.8
13:05	40.8
13:08	50.8
13:18	52.4
13:20	54.9
13:25	55.9
13:30	53.4
13:35	49.7
13:40	44.7
13:45	41.7
13:50	44.7
13:55	46.2

- Analysts use all available data to determine actual flow when meter errors are identified
- Corrections are made per procedure, in order to fix the shape of the energy flow curve

Integrating Hourly PTS Values

Start Time	Duration (Sec)	Avg Actual (MW)	Avg Act (MWHr)
13:00	300	37.8	3.2
13:05	180	40.8	2.0
13:08	600	50.8	8.5
13:18	120	52.4	1.7
13:20	300	54.9	4.6
13:25	300	55.9	4.7
13:30	300	53.4	4.5
13:35	300	49.65	4.1
13:40	300	44.65	3.7
13:45	300	41.65	3.5
13:50	300	44.65	3.7
13:55	300	46.15	3.8
Total Hour	3600		48.0

- Create a time-weighted sum of 5-min PTS values to get Integrated PTS value for the hour
- Actual length of interval based on Real-time dispatch, nominally 5 minutes

Analyzing Hourly PTS Values

Start Time	Duration (Sec)	Avg Actual (MW)	Avg Act (MWHr)
13:00	300	37.8	3.2
13:05	180	40.8	2.0
13:08	600	50.8	8.5
13:18	120	52.4	1.7
13:20	300	54.9	4.6
13:25	300	55.9	4.7
13:30	300	53.4	4.5
13:35	300	49.65	4.1
13:40	300	44.65	3.7
13:45	300	41.65	3.5
13:50	300	44.65	3.7
13:55	300	46.15	3.8
Total Hour	3600		48.0

- Integrated PTS values are compared to Revenue Quality Meter (RQM) data uploaded into WebRec by Meter Authorities (MA)
- An anomaly report is sent to MAs to validate the RQM value

RQM: 50 MWHr

Adjusting 5-min PTS Values

Start Time	Avg Actual (MW)	Avg Act (MWHr)	Adj Act (MW)	Adj Act (MWHr)
13:00	37.8	3.2	39.4	3.3
13:05	40.8	2.0	42.5	2.1
13:08	50.8	8.5	52.9	8.8
. . .	. . .	. . .	. . .	. . .
13:50	44.65	3.7	46.5	3.9
13:55	46.15	3.8	48.1	4.0
Total Hour		48.0		50.0

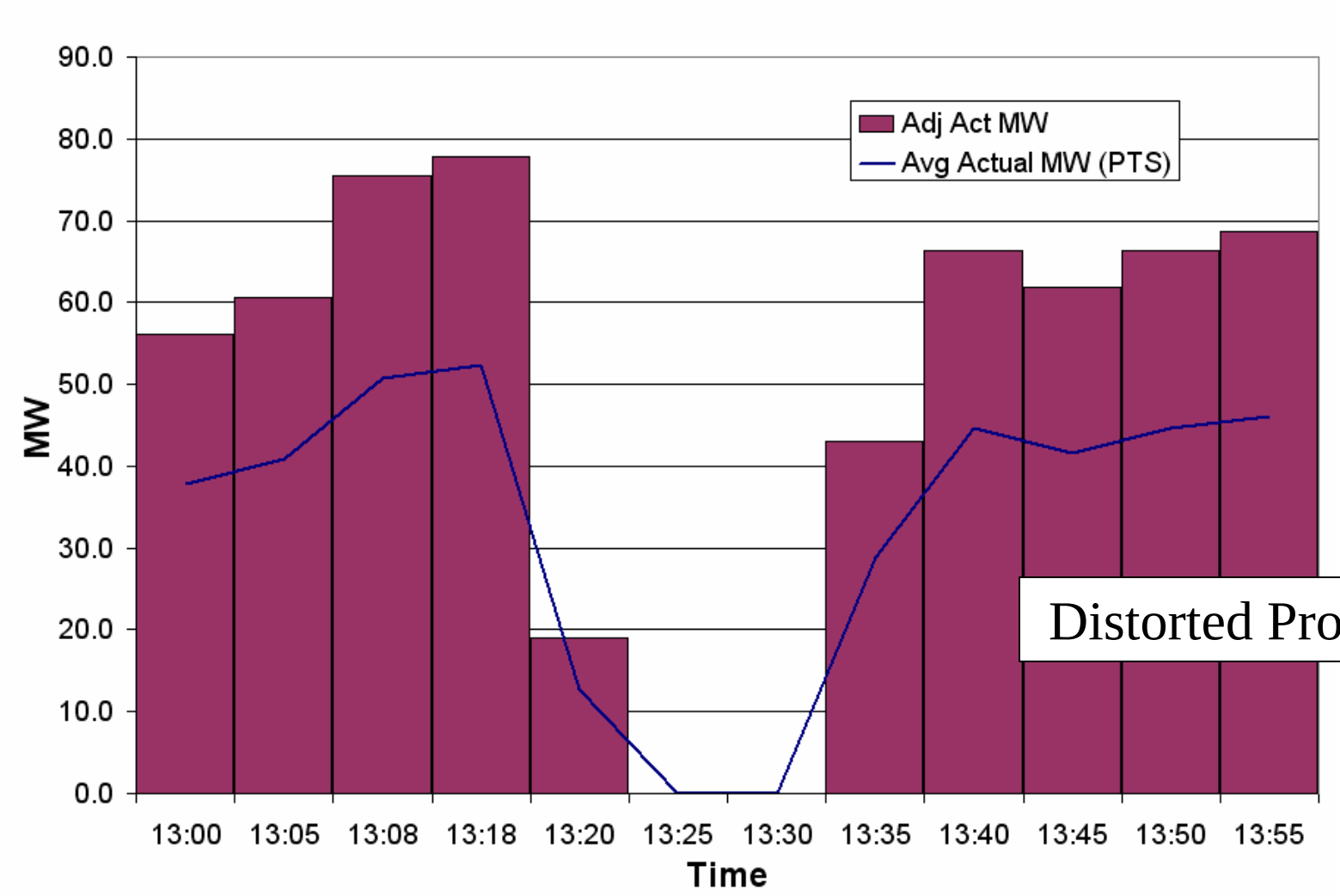
- Each interval is automatically adjusted so the time-weighted average adds up to the RQM value
- For 13:00, the Average Actual value of 37.8 is multiplied by (50.0/48.0) to get a Adjusted Actual value of 39.4

Ex.: Missing R/T Values

Start Time	Avg Actual (MW)
13:00	37.8
13:05	40.8
13:08	50.8
13:18	52.4
13:20	12.9
13:25	0.0
13:30	0.0
13:35	20.8
13:40	44.7
13:45	41.7
13:50	44.7
13:55	46.2

- Missing data distorts the shape of the curve
- The distortion will be exaggerated when adjusted to sum up to the RQM value

Results: Missing R/T Data

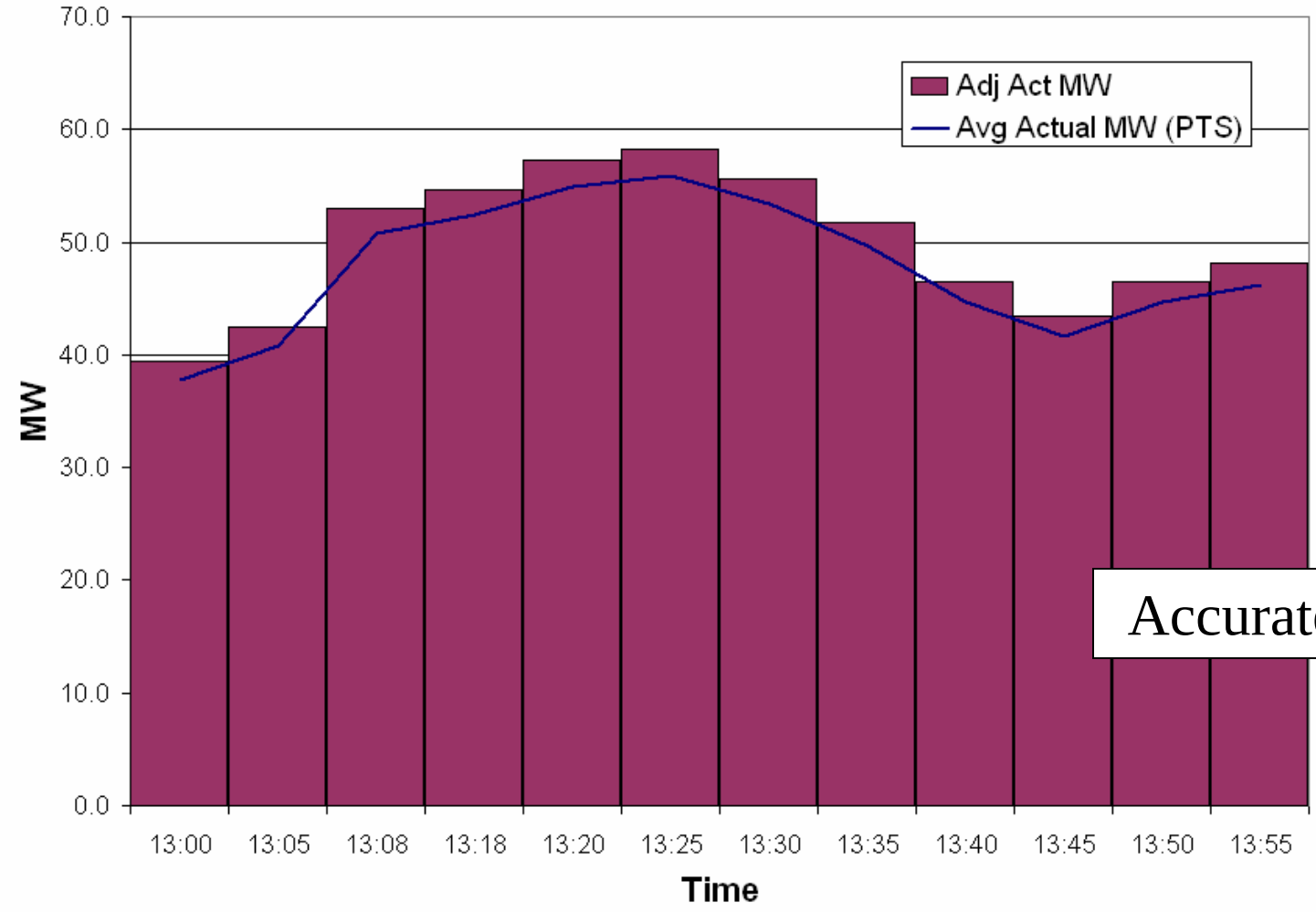


Ex.: Smooth RT Data

Start Time	Avg Actual (MW)
13:00	37.8
13:05	40.8
13:08	50.8
13:18	52.4
13:20	54.9
13:25	55.9
13:30	53.4
13:35	49.7
13:40	44.7
13:45	41.7
13:50	44.7
13:55	46.2

- Corrections were made according to procedure to fix the shape of the energy flow curve
- The data can be easily adjusted to sum up to RQM value

Results: Good R/T Data



Accurate Profile

Ex.: Low R/T Data

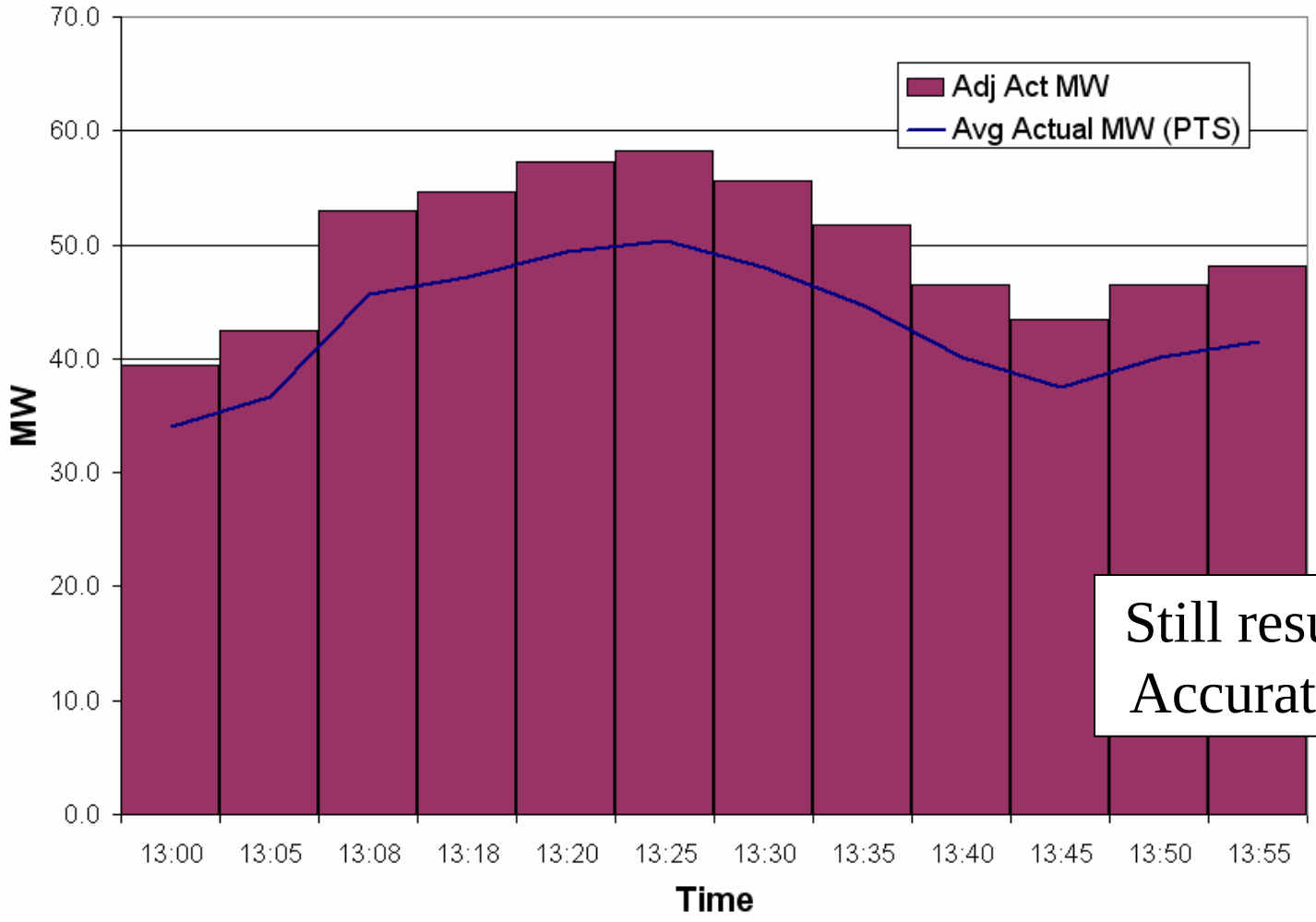
Start Time	Avg Actual (MW)	Avg Act (MWHr)
13:00	34.02	2.8
13:05	36.72	1.8
13:08	45.72	7.6
13:18	47.16	1.6
13:20	49.41	4.1
13:25	50.31	4.2
13:30	48.06	4.0
13:35	44.685	3.7
13:40	40.185	3.3
13:45	37.485	3.1
13:50	40.185	3.3
13:55	41.535	3.5
Total Hour		43.2

- Although the integrated PTS data is low, the shape is consistent
- Following validation by the MA, no further action is required – the PTS Adjustment process corrects the magnitude

RQM: 50 MWHr

Anomaly: > 10% Deviation

Results: Low R/T Data



Still results in an Accurate Profile

Projects affecting R/T Settlement

- PTS Analysis - Lean Six Sigma (LSS)
- R/T Automatic Meter Switching - Power System Applications Engineering
- Automatic PTS Smoothing - Future Project

PTS Analysis (LSS)

- Examining existing process of analyzing PTS anomalies
- Goal is to improve accuracy of advisory invoice (and all subsequent invoices) by reducing cycle time for correcting PTS anomalies
- Ongoing project

Automatic Meter Switching

- Identify and possibly prevent meter errors contributing to jumps in Zonal Load
- Automatic and operator-assisted switching of r/t data sources using multiple sources of data
- Dependent upon availability of redundant meter sources in ICCP
- Developing implementation plan

Automatic PTS Smoothing

- Build on existing anomaly reports by automatically smoothing data
- Action would be based on rules approved through the MP committee process
- May use input from Automatic Meter Switching project