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Managing Diversification of Gas Quality in Distribution Grids Using Gas Quality Tracking

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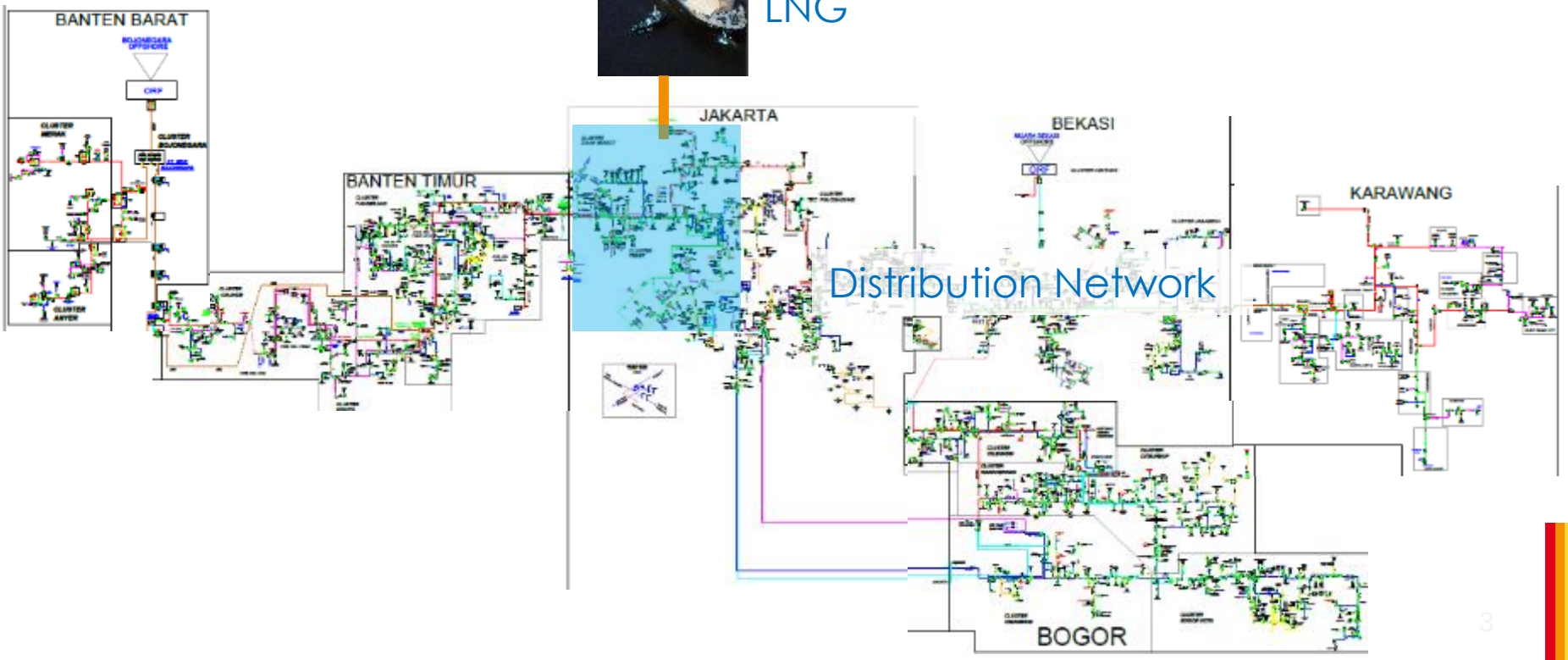
About PGN

- PGN started life in 1859 as a privately owned Dutch company called Firma L.I. Enthoven
- In 1965 became a state owned company named Perusahaan Gas Negara
- Changed to a limited liability company listed on the Indonesia Stock Exchanges in 2003
- Delivering more than 800 MMScfd through 5900 km transmission and distribution network to more 60,200 customers

Background

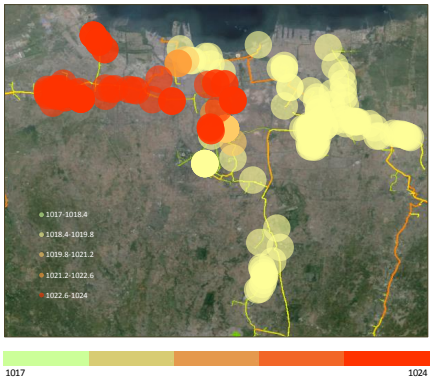
- Fluctuation of calorific value from the introduction of Floating LNG supply led into huge business risk
- Previous method: spot sampling over two weeks period

Floating LNG

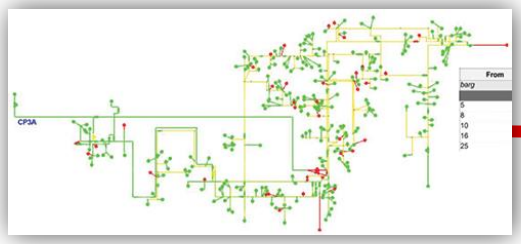


Aims

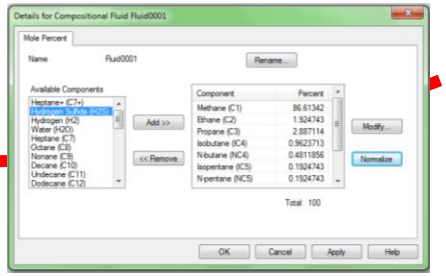
- Option of methods for managing diversification of calorific value:
  - Adding LPG for low quality LNG before supplying city gas
  - Installing numbers of composite sampling which proportional to flow of circulating gas
- Measurement infrastructure in distribution grid is expensive
- A cost effective method is using calorific values from pipeline simulation for managing varied gas composition



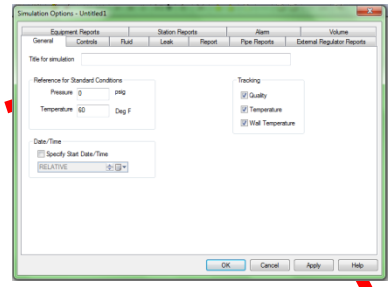
Method: Development of gas quality tracking



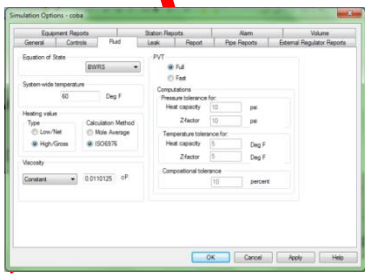
Pressure based simulation



Gas Compositions from direct sampling were inputted

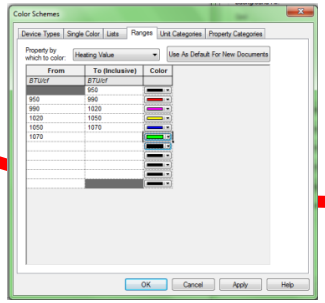


Quality Tracking was turned on

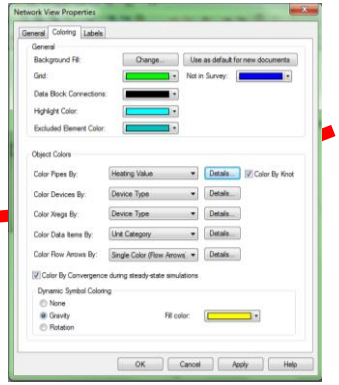


EOS was changed to BWRS and HV Calc to ISO 6976

Gas heating value is verified with direct gas sampling

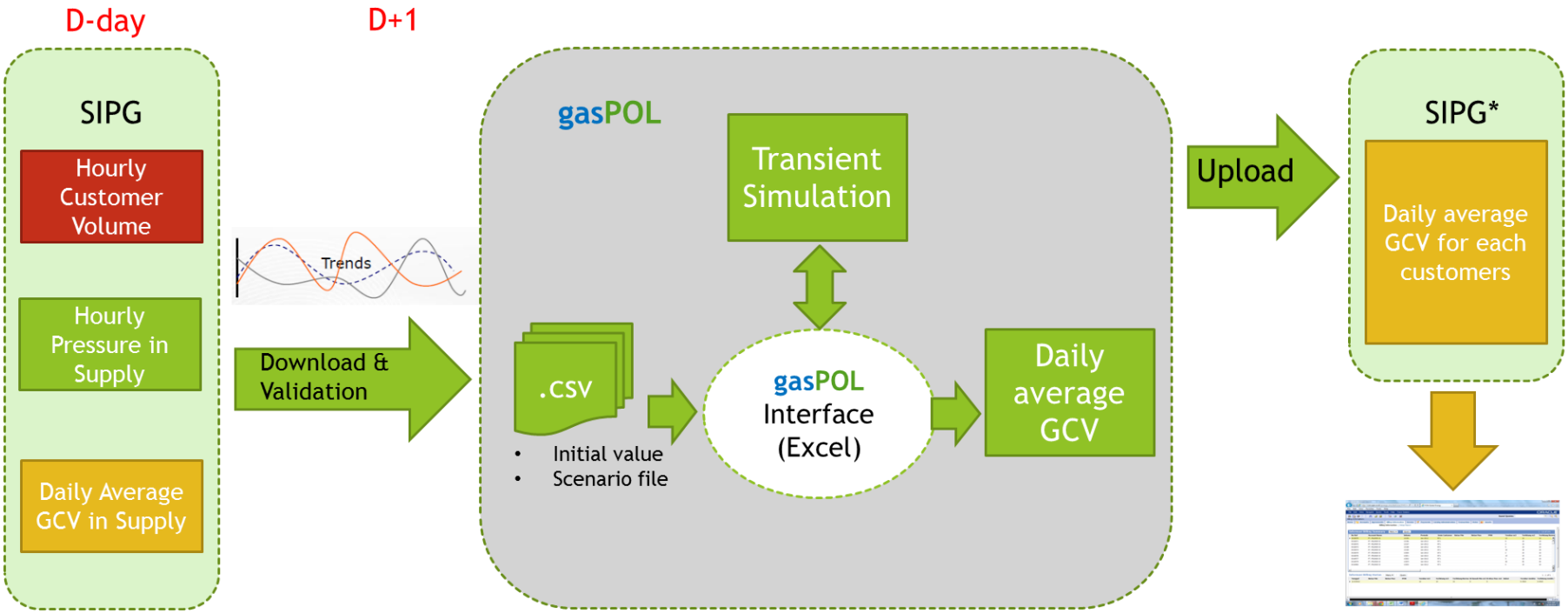


Range for pipeline color were inputted



Pipes were colored based on Heating Value

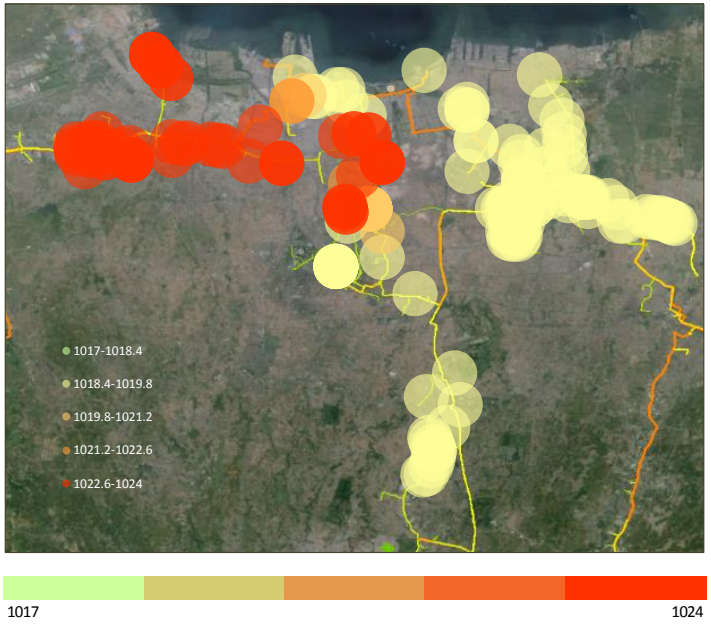
Method: Process of Transient Simulation



*SIPG: Gas Delivery Information System

Method: Validation Results

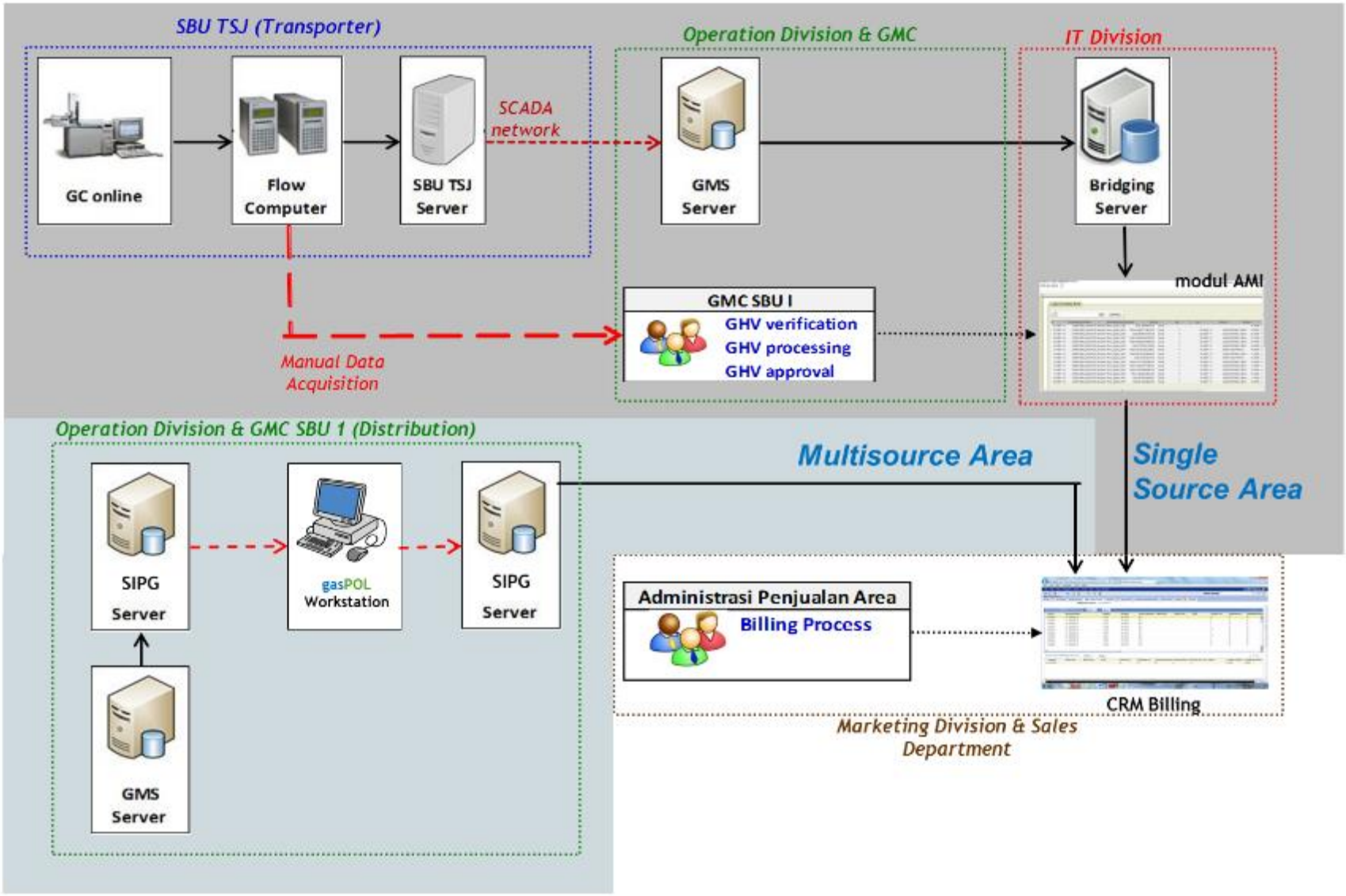
Sample	Reference Point GCV (Btu/scf)	GCV from simulation (Btu/scf)	% Difference
A	1020.295	1019.438	-0.084%
B	1020.475	1020.368	-0.010%
C	1021.630	1025.437	0.373%
D	1018.670	1017.097	-0.154%



OIML (*International Organization of Legal Metrology*) published a recommendation No. R-140 in 2008 for level of accuracy of:

- Class A (power plant): ± 0,6%
- Class B (industry): ± 1,25%
- Class C (recidential): ± 2%

Method: Integration with Billing Application



Results

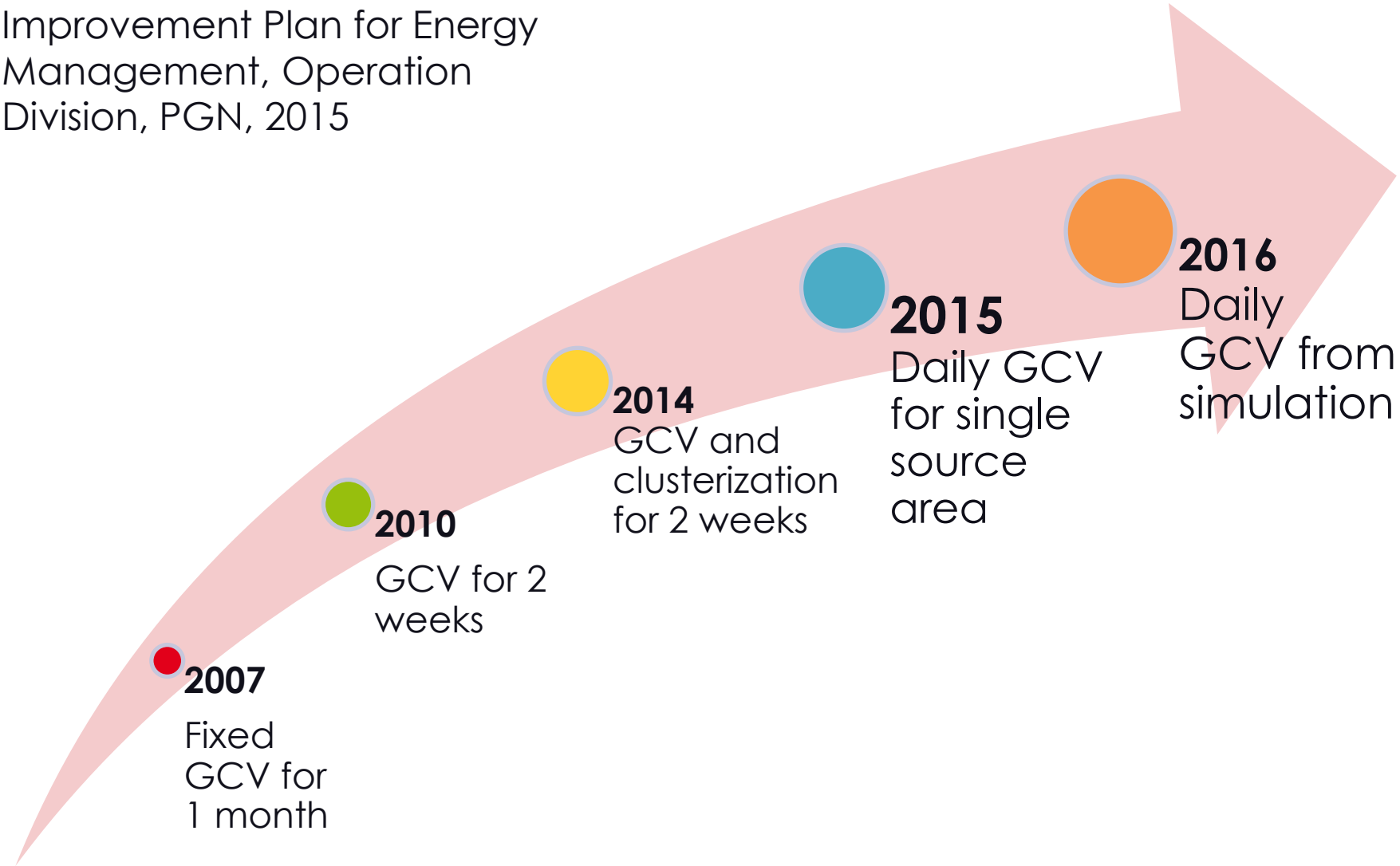
- The results show that the amount and quality of input and ouput data are sufficient for billing processes requirement and valid for:

Parameter	Min	Max
GCV (Btu/scf)	900	1120
CO_2 (% mole)	4	26
Specific Gravity	0,5	0,9

- The offline simulation model make it easier for correction for any error data input, modification for any new customer and for traceability.
- The basic requirement for constructing gas quality tracking with pipeline simulation for billing purpose are sufficient software, well tuned model and a proper relevant data acquisition.

Results: Road Map of Implementation

Improvement Plan for Energy Management, Operation Division, PGN, 2015



Conclusion

- Gas quality tracking tools provide a cost effective method for managing diversified quality of gas supply in distribution grids
- Daily determination of calorific value based on pipeline simulation could allocate a correct energy billing for each customer in a dynamic distribution system and mitigate the business risk caused by diversified gas quality.
- The daily energy billing approach has not only resulted in excellent transparency of business processes but also provides a good basis for promoting natural gas as precise and sustainable energy.

Thank You

For further information:

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