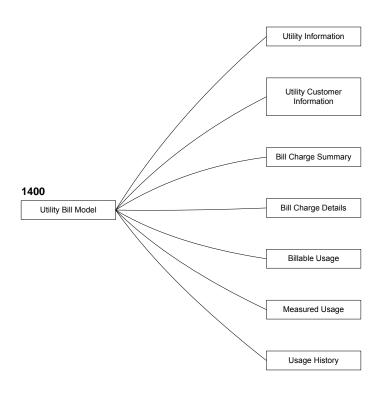
Figure 14. Utility Bill and Rate Structure Model



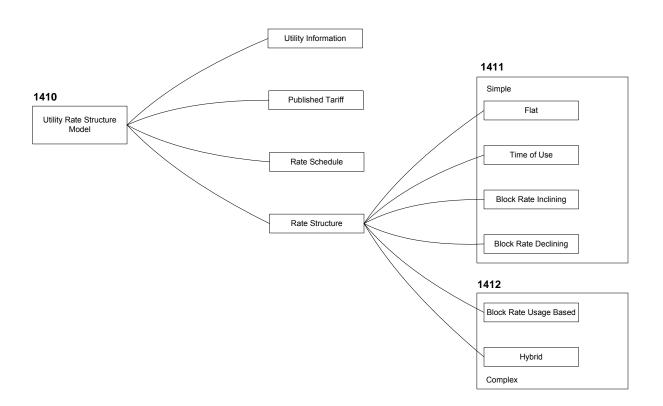


Figure 15. Bill Engine 115 Overview

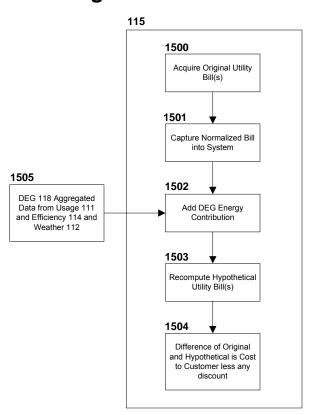


Figure 16. Utility Bill Acquisition Overview

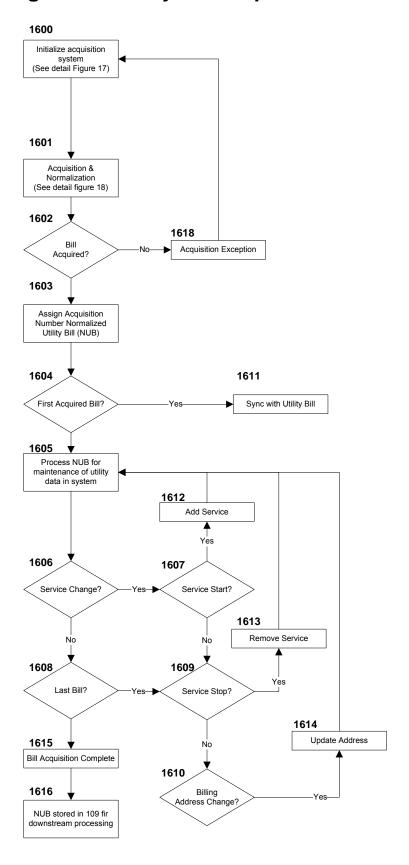
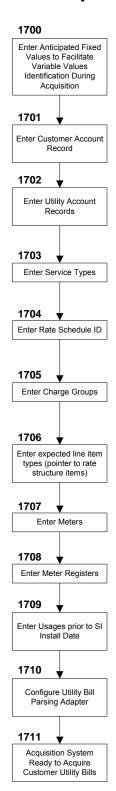
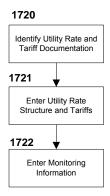


Figure 17. Initialize Acquisition System





208

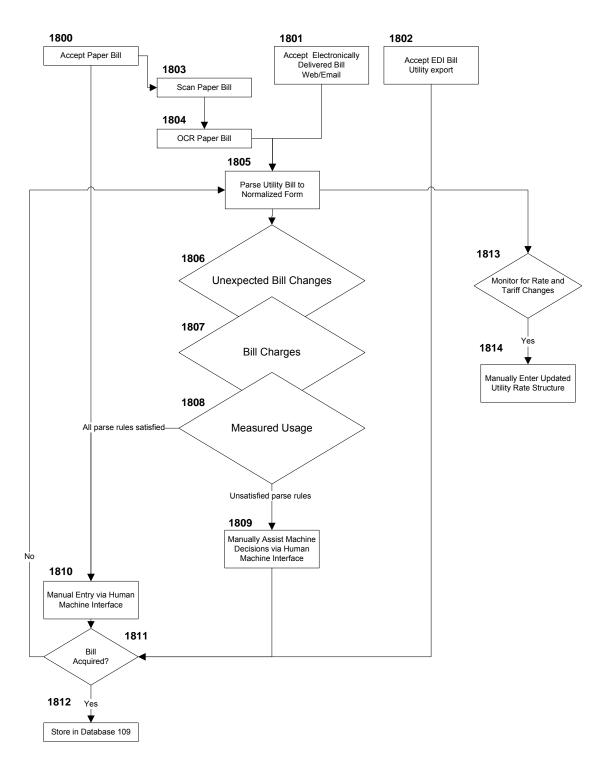


Figure 19. Example Normalized Utility Bill

1900

Utility 1

Utility N

Privious Payments	~ 1.7 1.1.	ie Normaliz		(01				SNUB 22	176315
West Chester PA USA 19382-2004 West Chester PA USA	Customo	er Account Reco	rds						
West Chester PA USA 1982-904 West Chester PA USA	Customer Ut	ility Account Number ==							
West Chester PA USA 1982-904 West Chester PA USA	Dilling Ad	ldusus.			Samiaa	Address			
West Chester PA USA 1982-5004 West Chester PA USA					service	Address			
Charge Summary	Cineta			Exercise and the second second			i.		
Period From 2008-09-33 To 2009-10-05 Bill Issued 2009-10-06 Due: 2009-10-28	west ches	er FA USA 19362-3004			weston	ester FA USA			
Prior Bilance Previous Payments 2501	Charge	Summary							
Prior Balance Previous Plyments 201	Period From	2009-09-) 3 To 2009-10-05	Bill Issued 2009-10-0	6 Due: 2009-1	0-28				
Pervious Psyments	Charges								
Adjustments Balance Forward									2501
Current Charges 200 1410 1421	Adjustment	s							2301.
Total Due 2566 25								gas	1610.
Charge Details Charge Description Quantity Rate Amount		iges						electric	
Commercial Service Commercial Service Generation Supply Natural Cas Supply Charge 1374 CCF 0.57779 dollars 793.88		t Penalty: Amount:							0-63686
Commercial Service Generation Supply Natural Gas Supply Charge 1374 CCF 0.57779 dollars 793.88	Charge	Details							
Distribution			7/2	(628)		Quantity	Rate	Amount	
Distribution Commercial Service Distribution Charges 1374 CCF 0.37185 dollars 519.17	gas	Commercial Service	Generation/Supply		Supply Charge	1374 CCF	0.57779 dollars	793.88	
Palancing Service Charges 1374 CCF 0.0416 Anlaws 66.17			Distribution						
Tax Sales Tax Adjustment 1.52 91.17									
Sales Tax Adjustment 1.52						1374 CCF	0.08269 dollars	113.62	
Sales Tax			Tar		•				
Commercial Service			- 44		justment				
Commercial Service Generation Supply Generation Charges 4080 kWh 0.05000 collars 269 45				0					
O O O O O O O O O O			0						
Distribution	electric	Commercial Service	Generation/Supply	Generation C	harges harges				
Distribution Charge					110				
Transition Charge			Distribution.			2120 kWh	0.03640 dollars		
Transmission Transmission: Charge 4080 kWh 0.02170 collars 88.54									
Transmission Transmission Charge 2120 kWh 0.01290 collars 27.35									
Transmission Charge 4089 kWh 0.00380 collars 1550 σ Tax State Tax Adjustment -2.33 Sales Tax 54.11 σ				0					
0 Tax State Tax Adjustment -2.33 Sales Tax 54.11 0			Transmission		-				
Tax State Tax Adjustment -2.33 Sales Tax 54.11					ner (\$100 kg PV)	77.00 W 200			
0			Tax	State Tax Ad	justment				
0								54.11	
			0011	v					
			0					Total	harce
	Dillabla	Llagge							
Billable Usage		INCOME MODELLA	2	81		School III			52500
Billable Usage						Quar			10
Service Rate Schedule Description Quantity To	gas electric				Total CCF Used Total kW Billed				
Service Rate Schedule Description Quantity To gas Commercial Service Total CCF Used 1374 CCF							6200 kWh		
Service Rate Schedule Description Quantity: To gas Commercial Service Total CCF Used 1374 CCF electric Commercial Service Total kW Billed 26.5 kW		ed Usage							
Service Rate Schedule Description Quantity: To gas Commercial Service Total CCF Used 1374 CCF electric Commercial Service Total kW Billed 26.5 kW	Measur								
Service Rate Schedule Description Quantity To gas Commercial Service Total CCF Used 1374 CCF electric Commercial Service Total kW Billed 26.5 kW Total kWh Used 6200 kWh	Est.? Pri		Identifier	Register	Description	Units Prior Pr	esent Factor	Total	
Service Rate Schedule Description Quantity: To gas Commercial Service Total CCF Used 1374 CCF electric Commercial Service Total kW Billed 26.5 kW Total kWh Used 6200 kWh Measured Usage Est.? Prior Read Read Read Register Description Units Prior Present Factor Total	Est.? Pri								
Description Quantity To	Est.? Prie Rea		027870434	027870434	Total CCF	CCF 4665	54 47485 1	831	



Figure 20. Utility Bill Capture Process

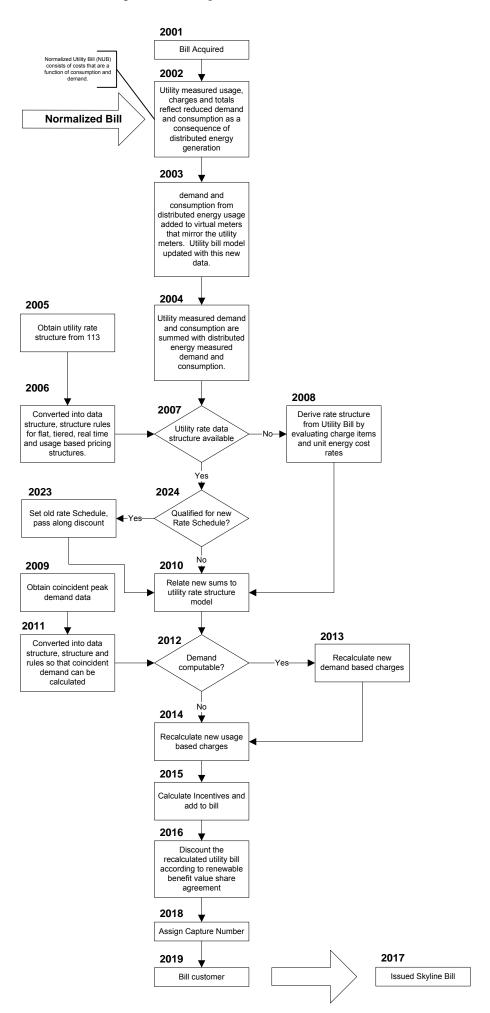


Figure 21 High Level Overview of Billing Computation

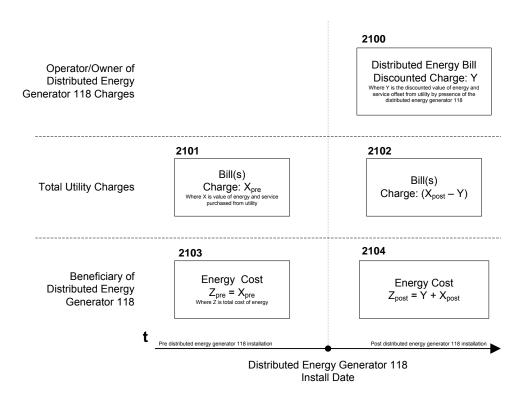


Figure 22 Recomputing Utility Bill

2101

Flat Rate Structures and Tariffs

- (1) Cost_{utility} = Rate_{flat} x Total Energy_{utility}
- (2) Value_{deg} = Rate_{flat} x Total Energy_{deg}

<u>Key</u>

deg - distributed energy generator tou – time of use hypo - hypothetical

2102

Time Of Use Rate Structures

- (3) $Cost_{utility} = \sum_{i=0}^{\infty} (Rate_{tou i} \times TOU i Energy_{utility})$
- (4) Value_{deg} = $\sum_{i=1}^{\infty} (Rate_{tou i} x TOU i Energy_{deg})$

2103

Block Rate Structures – Inclining or Declining

- (5) $Cost_{utility} = \sum_{i=0}^{2} (Rate_{block i} x Block i Energy_{utility})$
- (6) Value_{deg} = \(\sum_{\text{plant brights}} \sum_{\text{plant brights}} \sum_{\text{plant brights}} \sum_{\text{plant brights}} \text{x Block i Energy}_{\text{utility}} \)

2104

Block Rate Structures - Total Usage Rate

- (7) Rate_{initial} = $F(Total Energy_{utility})$
- (8) Cost_{utility} = Rate_{initial} x Total Energy_{utility}
- (10) Rate_{new} = $F(Total Energy_{utility} + Total Energy_{deg})$
- (11) Value_{deg} = (Rate_{new} x (Total Energy_{utility} + Total Energy_{deg})) Cost_{utility}

Separate blocks not depicted for clarity

2105

Computing hypothetical utility bill

- (12) $Cost_{hypo} = Value_{deg} + Cost_{utility}$
- (13) Cost_{actual} = ((Value_{deq}) x discount rate) + Cost_{utility}