

Billing Goes Digital at Seattle Steam:

A step forward for customers and company

Stanley Gent, President and Chief Executive Officer, Seattle Steam Co.

Started in 1893, Seattle Steam Co. has grown as dynamically as the community it serves. From a single steam plant serving 27 buildings, the system has expanded to include two state-of-the-art production plants connected by 18 miles of pipeline to more than 190 customers in the heart of the city's business district. The company provides a vital energy source in a cost-effective and environmentally responsible manner.

To increase its operational efficiencies and maximize customer satisfaction, Seattle Steam recently entered the digital world. It established a new billing data management system that allows the company to communicate effectively with customers and to generate and distribute invoices in a timely, efficient manner. This system offers Seattle Steam's customers online billing information in a customized format that can provide them with valuable insight on how they use energy.

The Goal

After 116 years of reading meters and processing the data by hand (giving it to accounting in handwritten notebooks!), Seattle Steam thought it might be time to put sales data into a form that could be used by all who needed it. From automatic generation of invoices, to technical review

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of monthly sales data, to providing historical usage data to customers, it was time to move into the brave new world of digital information.

It seems that computers have been a part of business forever. However, small business only started going digital in the late 1980s or early '90s. For many companies, the first impetus to take the leap was their accounting requirements. The backroom operation, where bills are generated, is a natural place to start such a system migration, and so it was at Seattle Steam.

Initially it was assumed that, with a customized accounting system, all the company had to do was provide the accountant with the monthly meter data. It turned out, however, that there were new questions and opportunities to explore: What happened to the use data after the invoices were generated? How were the invoices checked? How was

usage data analyzed? Why was the data inaccessible, locked in the accounting database? Was it possible to access data in a more open manner? Why was no one allowed access 'in case things got screwed up!'?

The basic concept was simple: create a database that holds all relevant customer information and allow it to interact with all data users who can then generate their own reports as needed. The overriding goal: make the database easily accessible to all users, especially the customer.

The Process

As always, the devil was in the details. The rigidity of Seattle Steam's first-generation accounting system proved to be too much of a challenge. There was no point in trying to adapt or amend an antiquated system not geared for sharing data. A new solution would need to be found. The accounting department took on the task of determining the best-practice small business accounting programs available on the market. Conducting an in-depth review, the department narrowed the field, vetting programs for their ability to allow the exchange of data to and from the accounting database to an Internet-based system. Peachtree accounting software emerged as the preferred solution. Critical data can be imported from and

exported to Peachtree, allowing an independent database program to interact with the accounting software.

At the same time, Seattle Steam's management team turned to G.H. Michaels Associates LLC (GHMA) to determine the new database requirements. The firm was hired in 2005 to design the database and complete the data management makeover. GMHA's long-term utility data management background as well as extensive district energy history made the firm a logical choice.

The task of designing Seattle Steam's data management system was easier said than done. There are complexities unique to the steam business that must be addressed in any good database design. Much thought would be required to design a system that could meet present needs with an eye toward the future.

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One issue that had to be considered, for example, was how to track and store meter data. All meters owned by Seattle Steam have a unique number. Meters can move between customers or in and out of storage, be removed for calibration or repair, etc. Clearly, customer data could not be stored using the same meter number. The solution was to give each customer location a 'socket' to plug into. A customer could have one or more sockets. Then meters could be tracked and controlled, even while in storage. The idea of creating meter sockets, linked to customer sites, was a key breakthrough in system design based on real-world needs.

There were other criteria that had to be considered. For instance, as of today, monthly on-site reading of customer meters is the norm, but in the not-too-distant future Seattle Steam plans on acquiring hourly data automatically. This will be a significant step in helping the company and its customers better understand their day-to-day energy requirements and use. Having hourly data will make Seattle Steam even more responsive to its

Energy management for utilities and customers

UtilityStudio is a customized data-driven Web platform that not only serves as the billing engine for utilities such as Seattle Steam, but also provides end-users (in this case, Seattle Steam customers) with the data necessary to understand and efficiently and proactively manage all of their energy resources. (See fig. 1.) The platform enables both Seattle Steam and its customers to develop energy baselines and implement intelligent alarms to assure optimal usage across energy type.

The platform also allows Seattle Steam to use its energy data (electric, gas, water, steam) to identify any billing anomalies and operational inefficiencies that may occur. It can also use the data accessed through UtilityStudio for bill audits and analysis; budgeting; forecasting; energy usage, comparison and analysis; and most recently, carbon tracking. Reporting/graphing tools enable customers to see, compare and analyze energy use by the month and the year – and in the future, by the hour.

Applications include end-user cost, usage and metering reporting; utility billing systems; utility customer portals; curtailment program management and administration; real-time pricing program administration; and Web-based client interfaces for energy consultants.

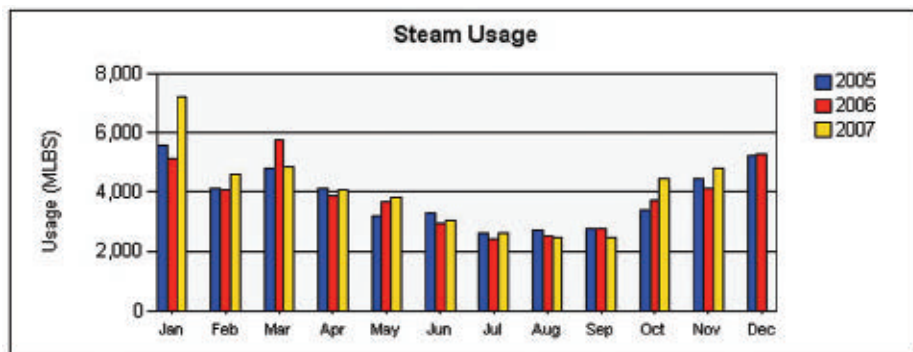
customers while allowing them to become more knowledgeable and efficient in their operations. It was therefore essential that the database be built with enough flexibility to accommodate hourly data when it too becomes a reality.

In addition, the database would have to be able to store and report on heating degree-day data. Customers traditionally like to match energy usage with heating degree-days, as this gives them a good snapshot of how efficiently they are using energy. Not all customer meters are read on the same day, however. Customers requested that degree-day data be able to match their billing cycle. Because meter

reading is completed manually, billing cycles can also vary each month based on the availability of staff for meter reading. The level of complexity involved here, unique to Seattle Steam's method of operation, required foresight and careful database design.

Once GMHA had designed the database, the final piece of the puzzle was to make it totally Web-enabled so that multiple levels of users for each customer could easily and securely access the data. GMHA's Internet-based platform, UtilityStudio.com, provides a fully Web-based presentation of energy information and gives Seattle Steam the tools needed to

Figure 1. Customers can see graphed data or download actual data in Excel format.



manage all aspects of the data flow – from meter reading to customer billing. The platform gives customers convenient and secure access to their account information and energy use. A user’s name and password determines a customer’s unique view of the data.

UtilityStudio’s components fall into five categories: graphical and tabular real-time reporting, interval data management and presentation, data input screens for invoice or meter reading data, a complete suite of data interface tools for hardware- or software-based data sources, and roles-based security (i.e., passwords determine what views users see and whether the views are read-only or whether users are allowed to add and change records). The platform is ‘branded’ for Seattle Steam, which means customers enjoy a simple, clean and seamless user experience.

After a brief discussion between Seattle Steam’s team and GHMA, the goals of the system were set and final specifications were agreed on. The platform was customized to Seattle Steam’s specifications as follows:

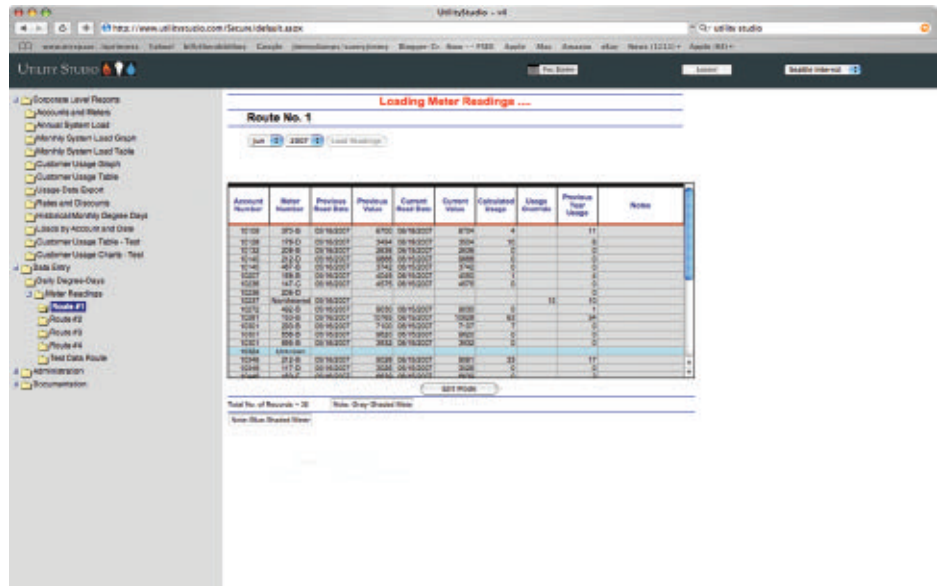
1. Web-based user interface with SQL (structured query language) server back-end database.
2. Ability of meter readers to enter data directly online.
3. Various levels of user authorization to accommodate diverse user requirements.
4. Web portal for customers, providing views of their historical usage and costs, and the ability to print any invoice and export data to other programs.
5. Flexible reporting capability.
6. Expansion capability to allow enhancement of features as necessary.

The Engine

The engine of the system is the billing cycle process, which starts once the meter data are recorded for the month (fig.1). Presently meter reading is still a manual process. Seattle Steam envisions that as technology improves and costs come down, this too will become an automated feature of the system. From a software standpoint, the platform already has the capability to interface with real-time data collection devices.

The billing cycle can be summarized as follows:

Figure 2. Sample UtilityStudio Screen Showing Meter Data Input File.



1. **Start the billing cycle.** This happens just before the meter reads are entered for a month. There is a review of accounts, sites and the meter report to ensure they are up-to-date. The system administrator, Seattle Steam’s accountant, then ‘creates’ the virtual monthly invoices. Invoice creation takes about 45 seconds. This releases the program to accept data for that month.
2. **Enter meter readings.** Meter readers access dedicated meter reading screens

- to enter data. Special circumstances can be noted online. The screen also lists the previous year’s readings for comparison to help identify anomalies.
3. **Upload previous balance file.** On the date when the company ‘draws the line’ on payments for the previous month, critical data are exported from the accounting program and the ‘previous balance’ file is uploaded to the platform. Now the software can determine if late charges



Seattle Steam’s distribution crew currently reads all customer meters on site each month, but in the future, the company plans to gather that data hourly and automatically. From left to right on the job are Pat Lester, Al Vickers, Sean Morrow and Charlie Munson.

Source: Seattle Steam.

Courtesy Seattle Steam. Photo Landry Photography.

should be applied to the invoices.

4. Review and approve the invoices.

The meter reader supervisor and the accountant use the invoice administration screen to review and approve invoices.

5. **Issue invoices.** A single Adobe Acrobat (pdf) file containing all of the approved invoices for the calendar month is generated. The file is printed and the invoices distributed.

6. **Download the accounting data.** Once the invoices are distributed, the pertinent accounting data are downloaded from the platform and imported into the accounting program, finishing the monthly billing cycle.

Note that when the meters are read, the data are input by the reader on that day. Data are automatically compared to degree-day corrected forecast usage. If it is outside (plus or minus 10 percent) of forecast, the program flags the reading for review by the supervisor.

The Results

After Seattle Steam's data management system was commissioned and tested, it was placed into service in early 2006. It has worked flawlessly. System maintenance and upgrades occur seamlessly. Simple data export features allow data to be analyzed by Seattle Steam and its customers. The company's new invoicing process is smooth, streamlined and accurate. The process is so efficient that invoices have been going out on the first day of the month as opposed to days and sometimes weeks later using the manual system. This is good for Seattle Steam and for its customers.

The new data management system includes these significant features:

1. Automatic generation of monthly invoices with the push of the print button.
2. Financial data from the invoices downloaded directly to accounts receivable.
3. Automatic flagging of monthly data outside a preset variance.
4. Meter management with the use of meter numbering and meter slot identification.
5. One-step rate setting.
6. Customer access through the company Web site to show historical consumption data, degree-days and other metrics such as consumption per degree-day and cus-

tomized reports, if desired.

7. Off-site secure data storage and management.

8. Freedom from major computer hardware purchases.

9. Ability to view all aspects of the system from any location with Internet service.

Seattle Steam has taken a major step forward in its billing data management, utilizing the best technology available today. The company's system has had a very positive impact on its customers and its business administration. Seattle Steam expects to continue to provide the best service it can, in the most efficient and cost-effective way possible. The company is pleased with the results so far.

The company is already preparing to address the next hurdle: how to get beyond manually reading the meter. Right now, the cost of the last connection in the customer's facility is the limiting factor. Seattle Steam is looking for an innovative, low-cost solution that makes sense for all parties. It anticipates finding that solution in the near future. The goal is to make the complete billing process from meter to invoice fully automated.

Seattle Steam likes to let its customers have the last word. When customers visited the company's Web site they were asked to review their building steam information and then report how they felt about the company's service. In 2007, 67.6 percent of users indicated they had "checked the Web site, found the information to be useful and plan to use it again."

That's just what Seattle Steam was hoping to hear! 



Stanley Gent joined Seattle Steam Co. as president and chief executive officer in 2004. He previously was president of Comfort Link, a district cooling company located in Baltimore, Md. During the 1990s, when he was employed as vice president of engineering and development for Chicago-based Unicom Thermal Technologies, Gent became a leader in the development of a variety of district cooling systems.



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