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Smart spending for radio

How can radio managers run their operations "lean yet strong" in 2025?

Paul McLane
Editor in Chief

The premise of this ebook is that we are in a challenging time for radio, and that although radio engineers and technology managers may not be able to control ad sales or consumer tastes, they can control how efficiently they operate their plants.

We've asked leading engineers to discuss their approach to this challenge.

We wanted to know about their budget planning process, about how financial pressures have evolved in recent years and the kinds of practices they use. We asked about the conversations they have with their teams about finding efficiencies, about the role that third-party services play, and how they manage things like spare parts inventory. What technologies in the market can help with these problems? And we invited them to share technical tips to help our readers.

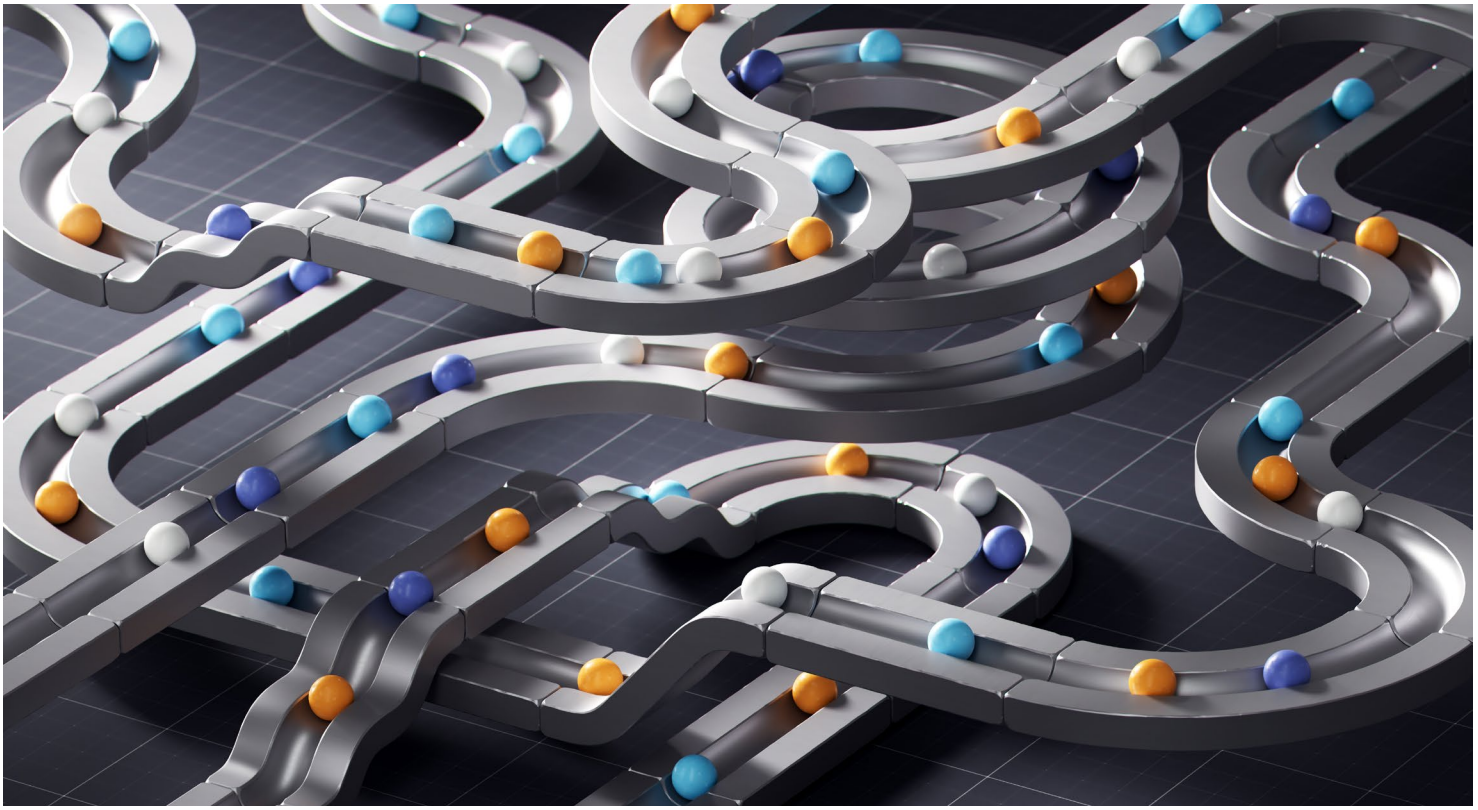
My thanks to Joe Tymecki, Tim Neese, Cris Alexander, Kevin Trueblood, Geary Morrill, Paul Tinkle and John Whyte for sharing their expertise.

I invite you to comment on their ideas and submit your own via a letter to the editor. Email me anytime at radioworld@futurenet.com.

THIS ISSUE

Running an efficient plant is a matter of mindset

Kevin Trueblood: Every dollar must carry maximum value and return



Kevin Trueblood is the associate general manager of technology and operations for WGCU Public Media and the owner of KTrue Media Services, both based in Fort Myers, Fla. He also is the president of the Society of Broadcast Engineers.

How can managers run radio technical operations as efficiently as possible?

Kevin Trueblood: To me, running an efficient plant is more of a mindset than it is selecting the right equipment. The approach is to keep your operations as flexible as possible, with every purchase being considered for maximum value and return.

A couple of webcams can take your morning show from just an audio show to a video podcast that can open up new revenue opportunities. You may not be able to run a full AoIP plant, but even just a couple of "nodes" or "blades" can give you a great deal more flexibility to distribute and route audio in your facility, and it gives you the tools to control it all remotely.

How have budget pressures changed over the past decade or so?

Trueblood: You have to do more with less. Budgets get smaller while costs go up. For engineers it means you may have to delay capital purchases, take on additional stations or territory, and get creative with your solutions because doing a proper fix may not be doable. More and more, what were temporary repairs become permanent because the budget isn't there to fix it properly.

But this goes back to my previous statement that every dollar being spent needs to carry maximum value and return, so plan wisely.

What best practices can you suggest for engineers when it comes to a maintenance program and the management of equipment lifecycles?

> **Even with an older transmitter you can train a camera on the front to help you identify different meters and faults, which can be helpful to understand why it won't restart.**

Trueblood: An ounce of prevention is worth a pound of cure. Spending $500 to maintain your AC unit twice a year sounds like a lot, but it costs way more than $500 to have a tech dispatched at 5 p.m. while you're off the air due to an overheated transmitter caused by a busted AC unit. Similarly, that 10-year-old laptop still works, but runs unsupported operating systems that present security risks, and it takes longer to do things than a modern laptop would.

How can a user extend the life of older transmitters?

Trueblood: Keep them clean! Take an hour, shut it down, and wipe down and vacuum the insides. Inspect elements for fatigue or damage. Replace air filters. Keep the building clean, cool and free of pests. And actually listen to the station! Check the audio quality, and scan the band for spurs or other interference that may be incoming or outgoing from your site.

Right
Kevin Trueblood

Do remote monitoring and automation create efficiencies in reducing the number of site visits; how?

Trueblood: They absolutely do. Modern transmitters will let you remotely drill down to very specific parameters such as PA voltages, fan speeds and temperatures. So instead of a general "fault" you have a pretty good idea of what the problem is before you get to the site. Similarly, having cameras will let you visually confirm status, circumstances or faults.

Even with an older transmitter you can train a camera on the front to help you identify different meters and faults, which can be helpful to understand why it won't restart. This gives you have a better understanding of what tools and parts you will need to correct a problem before you set foot at the site.

Combined, being able to take readings and visual confirmations from afar can reduce the needed site maintenance visits and reduce the time spent on site during trouble calls.

How can a broadcaster create reliable disaster preparedness or business continuity plans while limiting expenses of creating redundancies?

Trueblood: Even if you don't have a budget for backups or redundancy, just having a plan in place for what you will do in the event of a disaster or catastrophic failure will put you ahead and get you back up to full speed faster. Remember, the asset you'll have to plan for the most isn't your transmission facility, it's your people. Who will do what and when, where people will work and reside, what they will eat, and how they will communicate is crucial to a successful recovery. Because without the people, you will have nothing to broadcast.

Other thoughts?

Trueblood: Remember that good ideas come from anywhere! Keep up with trade publications, your local SBE chapter and even social media groups. I'm learning new and creative solutions every day that can save money and help us grow as an organization.

Creativity is essential in today's budgeting process

Consultant Tim Neese offers practical advice to managing costs

Tim Neese is president of MultiTech Consulting Inc. He has been a broadcast engineer for more than 35 years, as a maintenance engineer, a director of engineering for a group, a consultant and a business owner.

Left
Tim Neese

RW Tim tell us about your approach to this important topic.

Tim Neese: Managing a technical operations budget in today's broadcast marketplace is challenging and can be time-consuming.

One approach I often see taken is "across-the-board" line-item cuts to an operating unit. Granted, it's a quick and easy way to help balance the budget. In my opinion, it's also analogous to using a hedge trimmer when the proper tool is a pruning shear.

Indiscriminate cuts may solve the immediate need, but almost invariably cause unintended future cost overruns. For instance, a 15% cut to all line items in an engineering budget impacts preventive maintenance. In the short term the savings appear beneficial, but the long-term costs far outweigh the immediate benefit. In my experience, carefully tailored line-item cuts are much more beneficial.

On the opposite side of the balance sheet, engineers often overlook opportunities to generate revenue such as leasing space or hosting co-location tenants. That additional revenue can help offset cuts. Creativity is essential in today's budgeting process.

RW Can you suggest best practices for a maintenance program and the management of equipment lifecycles?

Neese: First, scheduled preventive maintenance is critical. For instance, keeping air filters clean or changed is much cheaper than repairing or replacing components that are damaged by a buildup of dirt or overheating.

Second, routine thorough inspections of equipment and facilities often uncover issues when they are minor and can be mitigated with simple repairs. Contrast that with issues that go unnoticed or unaddressed and often result in cascading failures. The cost difference can be staggering.

Third, this may seem simple, but follow the manufacturer's recommended maintenance schedule and judiciously apply recommended updates and adjustments. While some updates may only add or improve features, others correct issues that may affect the lifespan of system components. Pay special attention to transmitter and console firmware updates.

Fourth, maintain consistent proper operating temperatures in rack and transmitter rooms. An adage that has been around for ages goes "If you're uncomfortable, the equipment is uncomfortable."

I have found that to be true and impactful to equipment's lifespan, with one caveat: Keeping the temperature regulated and comfortable is fine, but going overboard is costly. For instance, it may feel good to keep a rack room extremely cool, but does it really need to be that cold?

If the equipment specifically requires it, then yes, great. If not, raising the room temperature by just 2 or 3 degrees will help lower the electric bill. Conversely, keeping the room at too high of a temperature may save on the electric bill but significantly shorten the equipment's lifespan.

RW How can we extend the life of older transmitters while still meeting compliance?

Neese: In my opinion, one of the most important things you can do is keep any transmitter clean, inside and out. Older tube-type transmitters particularly tend to accumulate ionized dirt at an astounding rate. Routine cleaning helps prevent dirt from forming an undesirable path between components with voltage potential and

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ground. Preventing those pathways greatly reduces the possibility of an arc-over and pricey repairs.

Often overlooked is the need to check and keep all hardware tight. The constant vibration of larger blower motors and fans in older transmitters can dislodge hardware and lead to insulators or other components becoming loose, again, providing the potential for short circuits or mechanical failure. A few minutes of time can prevent devastating damage, down time and expensive repairs.

If you have a tube-type transmitter, proper filament management will help extend the life of your tubes and generally provide a "heads up" when a tube is reaching the end of its life.

In regard to compliance, remember that the transmitter met all applicable specifications when it was built and hopefully was proofed for compliance when it was installed. A properly maintained transmitter should continue to meet all applicable specifications throughout its entire lifespan.

What technologies are available to help radio broadcasters improve power efficiencies?

Neese: For AM broadcasters with solid-state transmitters, modulation-dependent carrier level technology can really help with power consumption. Many facilities that implement MDCL recognize a 25% or greater reduction in transmitter power consumption. Some report as high as a 50% reduction. While MDCL isn't necessarily right for every AM broadcaster, a majority can benefit.

Are your tower lights burning continuously? Operating tower lights during daylight hours when not specifically required to do so impacts a budget on two fronts: first, the excess power being consumed, and second, the shortened lifespan of the bulbs or LEDs.

In theory, the lifespan will be shortened by almost half, necessitating replacement on an accelerated schedule. Maintain a properly operating, FAA-approved type photocell to engage and disengage tower lighting — it is a straightforward way to help keep costs in check.

Don't discount the operating costs of common equipment like video monitors. They are everywhere in today's facilities.

I've been in radio studios that utilize 10 or more monitors, all of which were necessary during the live morning show, but the majority of which were unused but still fully active the remaining 19 hours of the day. At a conservative consumption of 20 watts per monitor, it's equivalent to two 100-watt light bulbs burning continuously. That may not seem like a lot until you consider that the same facility has four air studios, all with identical monitor arrangements. If you do the math, it quickly adds up!

Consider turning off monitors when not needed, or at the very least allowing them to go to sleep (not just a screen saver), which generally reduces power consumption by 80 to 90 percent.

Do remote monitoring and automation create efficiencies in reducing the number of site visits?

Neese: I'm a firm believer in visiting transmitter sites and remote facilities on a regular schedule. Inspecting equipment in person using one's five senses is unarguably best practice.

However, with remote monitoring technology and site connectivity having progressed exponentially in the last 10 years, I believe the amount of time between visits can generally be extended.

For some, the costs associated with visiting transmitter or remote facilities is minimal, for instance when the site is around the corner from the studios and driving there is a 10-minute trip.

For others, the cost is considerable. One of my clients' satellite-fed facilities is an all-day drive from their studios. In cases like those, remote monitoring and control isn't just convenient, it represents considerable cost savings. Reliable internet connectivity, while still an issue for some, has become less so over time. And as services like Starlink continue to be developed and deployed, availability will continue to advance and costs will continue to drop.

In my example case, the monthly cost of reliable internet connectivity is less than half the cost of the fuel consumed to visit the site! And that's without the cost of wear and tear on a vehicle and travel expenses for personnel.

In my experience, the key to making remote monitoring and control a cost-savings tool is to implement the technology thoroughly throughout the remote facility. After all, it doesn't do much good to be able to monitor status and metering if you can't also take corrective action when something goes awry.

Most modern equipment offers Ethernet connectivity or at the very least alarm/metering outputs and control inputs that can be interfaced with remote monitoring and control equipment.

Monitoring devices such as uninterruptible power supplies, strategically placed temperature sensors, sound-level sensors and fuel-level indicators, to name a few, can alert you to trends before they become issues.

When possible, I also recommend installing as many network-accessible cameras as feasible. Beyond their well-established use for security, cameras focused on the front and back of an equipment rack or transmitter can greatly assist with remotely assessing status, etc. If remote olfactory sensors were readily available, I'd recommend those too!

While in-person visits are desirable, keeping tabs on a facility via remote monitoring and control can help control costs.

> **"If remote olfactory sensors were readily available, I'd recommend those too!"**

Supply chain issues bring new complications

Engineering expertise becomes all the more precious in such circumstances

Geary Morrill, CPBE, AMD, DRB, CBNE, is vice president of the Society of Broadcast Engineers and chair of its Education Committee. He has been intimately involved with radio broadcasting as an owner/operator, air talent, sales representative and broadcast engineer.

"Individual markets in a region will have unique needs, and be in different positions fiscally," he said. "The trick is to address both when formulating a plan."

He notes that outside factors often come into play.

"For instance, with transmitters, challenges in raw material supply chains have greatly increased the price of power tubes, while their useful service life seems to be decreasing," he said.

"In many instances, rebuilt 'finals' had been employed as a budgetary consideration. Now, timelines stretch into months for some types; and warranties that had been based on 'hours in service' are shifting to 'time since delivery regardless of use.' These factors accelerate the timeline for solid-state conversion, yet it's difficult to amortize such acquisitions when revenues don't support ROI."

In such circumstances, he said, seasoned engineers who can troubleshoot to the component level become invaluable, often extending the useful life of large assets. But he notes that many experienced engineers are aging out of the workforce each year.

We asked if Morrill has heard of stations changing signal patterns to help contain power costs.

"I know of at least one instance when this was the case. A nighttime directional AM station with an FM translator chose to file for non-directional nighttime operation," he said.

"With the daytime operation being non-directional as well, it eliminated the expense of maintaining a directional array. And since the majority of nighttime listening was already occurring on the translator, it was a logical decision."

Another area of interest in this ebook has been keeping the cost of tower leasing under control.

"When an initial asset sale on vertical real estate takes place, the initial objective is often a cash infusion to the seller," Morrill said.

"In order to maximize that price, there is typically an initial term with lease payments advantageous to the purchaser, and a master lease agreement encumbering all properties in the asset agreement.

"In subsequent terms, negotiations to bring lease payments in line with comparable structures in a geographic area may be successfully achieved, with variable length agreements for different subgroups in the original purchase agreement. Attention needs to be paid to windows of opportunity specified in the original agreement to do so, otherwise an automatic renewal may occur limiting or eliminating such negotiations."

When it comes to choosing between hiring a full-time engineer or using a contractor, Morrill says the most important factors are the vintage of equipment and the revenue generated by the market.

"Typically, a contract arrangement will involve a retainer that includes a set number of hours weekly or monthly at the facilities. In a situation with more mature facilities, the budgeted hours can be consumed quite quickly. Market management will tend to plan on the retainer hours being sufficient."

Another factor is whether backup transmission facilities are present. If not, and if the tolerance for downtime is minimal, Morrill says a full-time engineer will provide the best chance of minimizing it.

Left
Geary Morrill

Stay just under the point of diminishing returns

"It's a brave new world, and we have got to change our mindsets"

Cris Alexander, CPBE, has been director of engineering of Crawford Broadcasting Co. for 41 years. He is a Radio World contributor and past technical editor of RW Engineering Extra. He is also managing partner of Au Contraire Software Ltd., which produces AM/FM allocation and design software and database services.

Cris our premise is that engineers may not be able to control revenue or consumer tastes, but they can control how efficiently they operate their plants. What's your approach?

Cris Alexander: The trick here is finding the point of diminishing returns and staying just under that point.

This exercise takes many forms and differs between studio, transmitter and other parts of the broadcast infrastructure. It is also very much dependent on market, format and situation.

In some of our markets, for example, we invest in state-of-the-art off-site auxiliary transmitter facilities because the situation is super competitive and airtime is that valuable. In other locations, we take a more measured approach and use the former main transmitter as the aux with a dedicated aux antenna on the main and only tower.

How does your budget process work?

Alexander: We start with a full capital assets inventory update every August and September. We maintain this inventory in a relational database, and each item has an asset ID number with a sticker affixed to the asset identifying it as property of Crawford Broadcasting with the asset's ID number.

Within the inventory is a table of equipment that contains replacement cost and useful life for each make/model. The information from the inventory database is, for each market, linked and pulled into an Excel spreadsheet

Right
Cris Alexander gets hands-on with a problem.

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that lists all the items in the cap rotation. Five-year columns are provided, and dollar amounts appear in the appropriate year column for each item that will come up for replacement that year — the year purchased plus the useful life.

That provides us with the subsequent year's scheduled replacement budget plus projections for the four years that follow.

Once that is done, we send that schedule to our market engineering managers so that they know what will automatically be in the budget for the coming year.

They're given a window of time, usually a month, to ascertain other capital needs for the year. They then submit their list of requests, which include item name, cost and a full justification.

I look at each request and may approve it, request more information or deny it based on any number of factors.

What discussions do you have with your team about efficiencies in operating the plant?

Alexander: We watch and track electricity usage closely, paying particular attention to kilowatt-hours and demand.

Whenever there's a jump from the same month in prior years, I notify the engineering manager in the market and ask him or her to account for that. Sometimes we find that a photocell on a tower is broken and the tower lights are running 24 hours a day. Other times we have found a stuck relay in an HVAC system causing the heat strips to be energized even while in the cooling mode.

There's almost always a ready explanation for a jump in utility usage, and we seek to immediately correct the issue when we become aware of it.

Utility usage is our No. 1 expense, running from a few hundred dollars a month at low-power sites to over

> **“There is almost always a ready explanation for a jump in utility usage, and we seek to immediately correct the issue when we become aware of it.”**

I prepare a draft budget that includes scheduled items plus any approved scheduled items, and I send that draft budget to the CFO and president.

We meet, usually in November or December, and go through the budget for each market line by line. I come away with a final budget that is published to our engineering managers.

How have budget pressures changed in radio in the last 10 years?

Alexander: Declining revenue in the radio industry overall has definitely had an impact. We look much more critically at budget requests than in years past. Our engineering managers understand this and avoid asking for things that are not really necessary.

In years past we might purchase a piece of test equipment or whatever that would be nice to have and make our work easier. Today, we would be more likely to borrow a piece of test equipment from another market that already has it.

Also, we've taken a hard look at useful life figures for equipment and extended them. We used to place a 15-year U/L on transmitters, mostly because of replacement parts availability, or lack thereof beyond that point. Now we use 20 years, and we may purchase some spares of critical items like power supplies and keep them on the shelf.

$10,000 at high-power sites. Running the aux into the dummy load for a period of time while the main is on the air at full power can result in an increase of $1,000 or more in the utility bill, so we're careful not to do that.

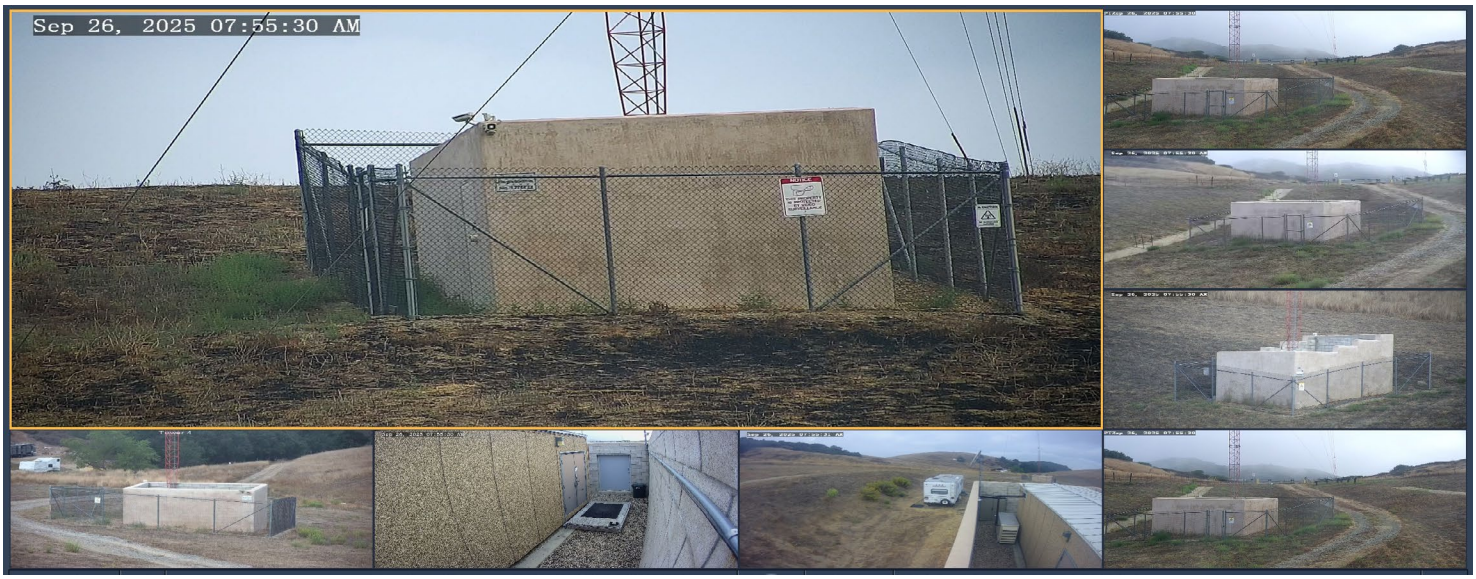
At high-power AM sites, we employ MDCL, which saves us one or two thousand dollars per month. If we have to operate on the aux and it doesn't have MDCL capability, we operate it at 50% power so that we don't kick that demand meter.

How do you decide if it's best to employ a full-time engineer vs. a contractor?

Alexander: Sometimes it's a function of who's available. There may be no available full-time qualified engineers in an area, and the cost of moving someone from out of market is prohibitive.

Other times we may not have enough work to justify a full-time engineer. And still other times it can be determined by what resources we have in place.

In one of our West Coast markets, for example, we have a very sharp operations manager who is not an engineer but can easily take care of the AoIP studio infrastructure himself. That leaves just the transmitter site, at which he also does some site maintenance work, and we employ a contract engineer for the transmitter site only. That works out great.



Above
Video from one of Crawford's site monitors. High-resolution monitoring helps limit unnecessary trips.

In most other markets, we have an engineering manager and one or two other engineers to take care of the cluster. In those larger clusters there is no way to get by with a contract engineer.

How would you go about estimating power cost savings of, say, replacing an older transmitter, or deciding between air and liquid cooling?

Alexander: That is a fairly easy equation. The straight AC power consumption of a transmitter for a given TPO is a known figure. The difference between the AC power input and RF output can be assumed to be lost as heat into the transmitter room or building, and HVAC must be designed and sized to deal with that on a BTU/hour basis.

If you can move the waste heat dissipation outside, as you can do with a liquid-cooled system, that has a big impact on HVAC size and BTU/hour figures. A liquid-cooled transmitter requires some additional infrastructure, which impacts the capital cost of the transmitter. It would be a fairly easy exercise to weigh the added capital cost against the power savings over the useful life of the transmitter and come up with an answer as to whether it would be worthwhile to go with liquid cooling.

But there are complicating factors. For example, if your auxiliary transmitter is or will be your former main air-cooled transmitter, you will have to keep sufficient cooling in place to deal with its waste heat. That results in inefficiencies that can be hard to quantify.

An oversized HVAC system will not be as efficient as a properly sized system, and it will short-cycle, which results in greater wear and tear on the compressors and fan motors as well as thermal stresses on equipment. That would, in my estimation, be a significant offsetting factor against the power savings of a liquid-cooled transmitter with outdoor heat exchangers.

With many broadcasters selling towers, more stations presumably lease. How do they keep costs from getting out of control over time?

Alexander: We haven't gone that route and continue to own most of our sites, but clearly the key is in negotiating the lease at the time of divestiture and taking the long view.

That means capping increases at a certain low value and minimizing common-area maintenance (CAM) liability. A 3% capped escalation will result in almost a 35% increase over 10 years, and that's significant. Tower owners like to spread the love with their tenants when it comes to tower and site maintenance, and this can result in annual CAM charges that equal a month or two of rent.

All that can be dealt with when the deal is made to sell the tower. It's better in many cases to take a fixed reduction in sale price than to have an open-ended escalation in annual rent/CAM charges. Those are the gifts that keep on giving.

Do stations change signal patterns with the idea of containing power costs?

Alexander: I haven't heard about anyone doing that, but it does make sense.

It's not a difficult exercise to determine the point of diminishing returns with respect to population coverage. As broadcasters, we're conditioned to produce the biggest coverage footprint that we can, but in this day and age, that doesn't make a lot of sense in many situations.

Consider a 100 kW station serving a city. Run the population within the protected contour and see how that compares with the city population. Now reduce the power to 50 kW and run the pop again. Not much change? Drop it to 25 kW and repeat.

You can do this and find that point where the population served really starts to drop off. Your maximum

efficiency in terms of power transmitted and population served is just north of that point. The reality is that anything more is mostly cows and chickens, and you're wasting capital and operating costs to provide them with a listenable signal. Of course there may be other factors, such as needing more power for building penetration in built-up areas, and that would need to come into the equation. But in many cases, particularly in small and medium markets, less power and coverage may translate to more bottom-line profit.

What practices can you suggest for a maintenance program and management of equipment lifecycles?

Alexander: A lot of this has to come from experience and empirical data. How long does a transmitter remain reliable? How about a file server or computer? Are there other influencing factors that can drive that useful life number? Over my 48 years in this business, I've learned to guesstimate U/L, though sometimes I miss badly!

I mentioned that parts availability affects transmitter U/L and how you can extend that by preemptively purchasing certain critical spares, such as power supplies.

Vendor switching power supplies, popular in just about every piece of broadcast gear these days, are the No. 1 item that will fail and for which there may not be a ready replacement available.

Computers and servers, I've found, will start acting up after six or seven years. I've found that the thermal compound between the CPU and heat sink many times turns to powder in that time period, which can cause systems to blue screen and permanently damage the CPU.

And of course there seems to be a finite number of read/write cycles to any mechanical or solid-state drive. So we preemptively replace computers and servers at five years. That keeps us out of trouble.

Other equipment, such as consoles or control surfaces, can be highly variable and situation/use dependent. You watch and learn.

How can you extend the life of older transmitters while still meeting compliance?

Alexander: The No. 1 issue I've seen with older tube-PA transmitters in auxiliary service is caused by moisture. The exhaust is almost always ducted outside, which means the stack and PA tube are exposed to outside air and humidity. The exterior of that ductwork is exposed to conditioned air.

The result is often condensation in the stack and PA area, with predictable results. Adding motorized louvers to close off the exhaust duct from the outside environment will help, as will insulating the exposed ductwork indoors. Also, running the transmitter periodically will help de-gas the tube and show up any issues.

Older transmitters in regular on-air service need to be kept clean, inside and out. Change filters regularly and make sure they're breathing clean air. Keep an eye on stack temperatures and temperature differentials.

And keep critical spares on hand. One of the biggest challenges these days is PA tubes. Rebuilds are scarce and expensive, and new tubes are ridiculously expensive, upwards of $5,000 for a new 4CX15,000A.

> **"Vendor switching power supplies, popular in just about every piece of broadcast gear these days, are the No. 1 item that will fail and for which there may not be a ready replacement available."**

We do keep corporate-level spares, mostly of power modules, but each station or site has a full set of recommended spares purchased with the transmitter. A key factor is replacing spares as they are used without fail. And we preemptively purchase vendor power supplies, not from the transmitter manufacturer, so that we're ready when (not if!) the originals fail.

What else should we know?

Alexander: We have had to change our thinking. In the past, we might well have made purchases and acquisitions on a "cool to have" basis, and we had revenues to cover that. We might have occupied "Class A" space in prestigious leaseholds.

But things have changed and continue to change. It's a brave new world, and we have got to change our mindsets to adapt. This is true at every level, but especially at the management and corporate levels. It's all about efficiency. We may not be able to increase revenues, but we can reduce expenses, at least to a point, to maintain a healthy bottom line. That takes effort, creativity and different thinking.

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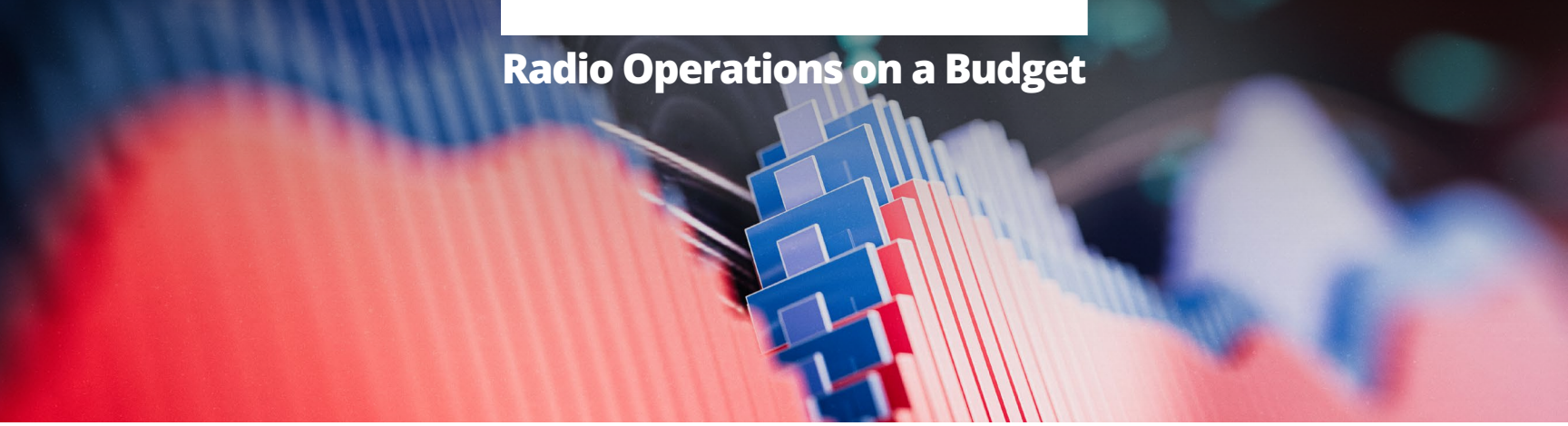

Managing cost of ownership

John Whyte of Nautel provides a vendor's perspective

Writer

John Whyte

Head of Marketing & Product Strategy, Nautel

It seems that all of us in broadcasting are being asked to do more with less. From power bills, operations, and staffing to capital budgets, cost constraints are everywhere.

I thought it might be useful to share a vendor's perspective — how companies like Nautel are working to help you tackle these challenges and stretch your investment further.

Transmitter efficiency

On the FM side, efficiency gains are getting harder to find. Once you're designing around the latest power supply and FET technologies, you're generally looking at efficiencies in the low to mid 70% range. On the AM side, things look better: Efficiencies of 86–90% are achievable, and the newest MDCL modes really are game changers — delivering dramatic power savings while maintaining good audio quality and coverage. (You can try our MDCL calculator: https://www.nautel.com/am-mdcl-savings/)

Rack and floor space savings

Every rack unit and square foot matters — especially when space comes at a premium. Vendors are addressing this in two ways.

At Nautel, we were early to integrate external functions like RDS, streaming and audio processing directly into the transmitter, cutting down on extra boxes and cabling.

There's also been a trend toward more compact transmitters, particularly in the 3–10 kW range. Small formats do pose the question of what is right for your organization and how small is too small. We've tried to maintain a commom sense approach to size for our compact transmitters to ensure that service can occur without knuckle scrapes.

We also are mindful to ensure airflow can be provided with modest temperature rise, a key contributor to long transmitter service life.

Staff efficiency

In many operations today, there may be many tasks where a team of two would be preferred but only one engineer is staffed to do the work.

That's why we pay close attention to practical details like single-lift weight for power modules and compact transmitters — things that help you get the job done when you're on your own.

Long service life

In a world where too many products feel disposable, transmitters can't afford to be. They represent major capital investments with long payback cycles.

We've always believed in conservative design and robust component choices that extend operational life. If you can get even an extra five years out of a transmitter, your total cost of ownership drops dramatically — and we build with that in mind.

The intangibles

Cost of ownership isn't only about parts and energy. It's few about trust, longevity and support.

When you invest in a long-life product, you're also investing in the manufacturer's ecosystem — parts availability, technical expertise and even the way the vendor sets themselves up for long-term financial stability. There's an old saying: When you're off the air in a panic, nobody's thinking about the great deal they got at purchase time. Reliability and continuity matter most in those moments.

These are just a few of the areas where we, as vendors, are working to reduce broadcasters' cost of ownership. At Nautel, we're also investing heavily in software-defined implementations that remove hardware layers and simplify operations.

If you have thoughts or ideas to share on how we can help further, I'd love to hear from you at john.whyte@nautel.com.

Paul Tinkle says take care of your gear and it will take care of you

"We can use our transmitters and antennas to save lives"

Paul Tinkle is president and GM of Thunderbolt Broadcasting, which owns four FMs, one AM and seven translators in Tennessee. He is a lifelong broadcaster who has held positions from board op to ownership. A member of Tennessee Radio Hall of Fame, he is a past chairman of the Tennessee Association of Broadcasters and former member of the NAB board.

How do you start your planning process?

Paul Tinkle: I have attended approximately 30 NAB Shows and that's where I go looking. I have colleagues that tell me some of the new gadgets, transmitters and other "toys" that make radio better.

What typical operating costs need to be considered?

Tinkle: The electric bill seems to climb faster than others. Go meet with the electric company and have them come look at the power meter; there's a possibility there might be an issue.

Insurance has gone up substantially over the past five years. Wages have gone up, insurance for employees and equipment, towers and so forth.

Left
Paul Tinkle

My engineer passed away two years ago. At home, I have a good man who is able to manage digital issues; however there will always be a need for a "go to" engineer.

Every broadcaster needs a backup plan. I purchased a backup new transmitter with low wattage but it keeps us on the air.

How have budget pressures changed in radio in the last 10 years?

Tinkle: The equipment is better. The sad part is that a lot of our equipment is sitting on the shelf since we went all-digital. We're about to come off copper and move to IP phones. Costs are not set in stone, but we have a lot of phones. We'll trade some of it, which makes it more affordable.

Do you keep a worksheet or template document?

Tinkle: Before my engineer passed away I developed a manager's sheet that ensures the readings are read at the transmitter site, the generator, the tower lights, etc. Everything on the sheet holds me accountable.

Pay attention to your transmitter. For example I put a label on the front to remind myself every week that the transmitter was built in 2005. It makes me more aware of the possibility that something might be wearing out.

Maintain spare parts. And always buy the "spare parts" bag when you buy a transmitter. They'll come in handy for sure.

How can broadcasters keep tower lease costs under control?

Tinkle: The answer is being nice to the owner of the tower. I looked at the costs of putting up a new tower, and they were just out of sight.

The bottom line is that we're pretty much stuck, especially if you're a small-market station.

Suggestions to keep a site operating efficiently?

Tinkle: Three years ago I installed a new cooler at one of our sites, and that's going to keep that transmitter happy.

I also had to put a wall unit in for a 6 kW. It works so much better — as long as we keep dust out of the transmitter world.

> **"Our IT person and I are able to solve smaller problems. When our engineer comes, he comes loaded with just about everything in the truck."**

How do you decide whether it's best to lease or buy a particular piece of equipment?

Tinkle: I have only leased a piece of equipment one time. Own it if you can. If not, pay your bills on time.

How do you decide if it's best to employ a full-time engineer vs. using a contractor?

Tinkle: For us it is not necessary right now. We have a great relationship with my out-of-town engineer, and he can be here within six hours. Our IT person and I are able to solve smaller problems. When our engineer comes, he comes loaded with just about everything in the truck.

The transmitter and its related infrastructure are big power consumers.

Tinkle: I believe if you take care of your equipment, it will take care of you.

Truth be told, keep your transmitter site clean. Keep dust out of the equation. Change the filter. Open the door and suck out the dirt. Best tool you can have is a vacuum cleaner.

And don't play with the knobs. Every engineer wants to turn the knobs. If it's working correctly leave it alone.

We have a spare tube for all our FMs; and as I understand it, the tube market may be dwindling. Owners may have to bite the bullet unless they can find the parts.

Visit your sites weekly. In my world, a walk-through takes 15 to 30 minutes. Maintain an engineer's sheet to record that you inspected the transmitter and generator and that other systems like phones are working.

Take pictures of any work you've done. Be regular. And don't skip even the smallest of details. Radio is the backbone — keeping people alive. We can use our transmitters and antennas to save lives.

Every cost deserves a very careful look

Public media's funding crisis escalates the sense of urgency

Vermont Public was created in 2021 by the merger of Vermont Public Radio and Vermont PBS. It airs 38 signals from 27 sites, including 15 full-power radio stations and 15 FM translators, programmed with news or classical music, as well as three full-power TV stations and several TV translators.

Joe Tymecki is senior vice president of engineering and technology. He talked with us about budgeting and the sense of urgency resulting from the end of federal funding in public media.

Left
Joe Tymecki

RW It must be challenging to approach budget questions following a merger.

Joe Tymecki: Yes, and with IT under our purview, there's even more to wrangle.

On the surface we're one company, but in some cases we're still operating as two technical plants — with our networks, our private LANs, our terrestrial fiber circuits and Windows domain controllers. We're working to address that, one project at a time.

Then in August we had to lay off 13 people and eliminate two other open positions, due to the federal funding situation. Every one of those people was contributing, everyone was already super busy. But income and outgo were starting to diverge badly.

In our workflows we make extensive use of shared documents. We use a Google spreadsheet, a legacy from the radio side that has existed for 14 years. Our new fiscal year starts in July but we already have a tab on the sheet for the next fiscal, and sometimes two years out.

Everyone in technology and every manager has access to that sheet. I tell them, "If you think of something, don't mention it to me in the hallway. Write it on the list, and at budget season I will circle back to discuss what you need, whether it's new lenses for the Sony field camera or chargers for electric cars in the parking lot. Tell me what it is that you want to do and if you have even a wild-ass guess as to what it will cost." This might involve IT, studios, compliance with FCC rules and so on.

RW That provides a starting structure.

Tymecki: Then I or Kira Parker, the chief engineer of transmission, or Frank Alwine, chief engineer of studios, will discuss it with our facilities person. This applies mostly to capital items, but it also includes expense items. It gives us an early idea on whether we're going to need, say, a million dollars this year or $300,000.

Then we have a big round of winnowing to focus on what's important. Do we need to replace our mountaintop ATVs or our site generators? Are there pieces that we can punt until next year?

We consider ourselves as being in the content delivery business, so that's our north star: How can we help our people do their jobs internally to meet that goal?

Anticipated service life is tracked in our accounting system. Everything's always fully depreciated though. Honestly we don't really replace things on a schedule. We replace based on need.

Until recently we had an old Harris tube transmitter from the late '70s or early '80s still in backup service. It couldn't do HD Radio, and it could barely do 1,800 watts, but that was enough to keep us on the air in an emergency. We should have replaced it 15 years ago, and we finally got around to it.

Often what drives the decision is not that something stops working but that we can't get support for it anymore. For example in TV master control, we had playout servers that were still highly functional but no longer supported by the manufacturer. The TV engineers were going to eBay

and buying ingest and playout blades that others had decommissioned, just to try to keep servers on the air. Even the manufacturer couldn't get parts; Sony had apparently stopped making a key chip.

That's when we say, "I guess we have to replace it."

How do you track and forecast costs like power, site, rent, maintenance?

Tymecki: We use a popular cloud-based accounting system; and we do a monthly dump to Excel because we like its spreadsheet tools. As we approach the end of a fiscal year we have a good idea of how we'll end up, and we can start populating next year's numbers.

Vermont is a small state, so there isn't an open market for utilities like electricity and natural gas. But if we know that a given utility is planning a 2% increase we can build that in.

The accounting system manages purchase orders; and we use a different system to manage external credit card purchases. We now tag our spending to the 27 sites so we know what each site is costing us.

Kira, our transmission chief engineer, makes much use of internal tagging. And it's not just major recurring costs like power. If we stop at a local Ace Hardware to buy parts to shore up an ice bridge — well, those kind of things add up. If we have to get a tower crew to repair or replace tower lights, we can tag that to a site too.

External costs like data networks are more unwieldy. For instance there are a couple of bandwidth providers in Vermont. In some cases we have parallel fiber lines going up the same mountain, one to the TV transmitter side of the building, one to the radio side.

This reminds me to share a cost-saving suggestion. When you sign a three-year contract, they usually won't call you when the term is up, so you just keep paying that rent, whether it be $300 or $800 a month.

But whenever I've gone back to a provider to renew a contract, they inevitably will say, "Yep, the rate's lower now." Especially at sites where we have multiple providers, the situation is extraordinarily competitive. It's the same with our internet connections at the studio facilities — suppliers are tripping over each other to try to get our business.

In fact I called one of our big fiber providers and said, "I need a list of every circuit we have with you." I had a good idea but wanted to know what they thought we had — the contract dates and monthly payments. And about half of them had expired. Without even dropping a note, our salesperson, said, "I can absolutely get you better rates on all these."

Sure, switching fiber providers is a pain. Half of our network is on an MPLS-like system. Those are a little more difficult to change over or reconfigure, and we prefer not to make extra work for ourselves if we can avoid it. But those are the kind of things we look at on the utility side.

Do you have discussions with your team about finding efficiencies and extra dollars?

Tymecki : Jeff Mahaney, my counterpart at Maine Public, has a Maine farmer mentality about new spending. He asks: "Is what you're proposing to do worth laying somebody off for?"

Especially since our layoffs, we ask everyone to look at every expense in that light. We're down to saving hundreds. Not that we were flush with money in the past, but now we might look at a data switch that's getting full and old, and if it's still supported, we're not going to replace it unless there's an immediate risk or a lack of support.

Over the summer we discussed raising the set point of the air conditioning at our sites. Some of them are very well air conditioned, and even on a 96-degree day, which we get now in Vermont, the sites will be 65 degrees inside. We have a lot of Nautel equipment, so we talked with Jeff Welton, who told us the transmitters will be perfectly happy in the low 70s. So we took that advice.

We're also taking steps back from HD Radio. We put a new classical station on the air two years ago and had HD Radio on it for about a month, but the importer/exporter failed, and we just left it off. We took the transmitter and repurposed it to a site where we still need HD so we can keep an analog translator going.

Similarly, when we bought a small station from a local college, we decided not to do HD because of the cost. We're not abandoning HD yet, but we're not growing the HD footprint.

Both Nautel and GatesAir now put the importer/exporters in a single box. If you're doing HD2 and HD3, you have to get the audio to your site separately. In the past we put the importers at the studio, and it would send the MUX over the data line. You can't do that anymore unless you buy a second box, and it becomes a kludge. We didn't want to buy another pair of codecs to get the audio to the site. In the end, is that a lot of money? No, but 3600 bucks is 3600 bucks.

> **Everything's always fully depreciated ... Honestly we don't really replace things on a schedule. We replace based on need.**

Tracking Expenses

Below is a sampling of recurring expenses that Vermont Public tracks, in descending order:

- Salaries / Benefits
- Rent
- Outside services (I.T., TV master control, other consultants)
- Electricity
- Capitalized equipment
- Interconnect (Fiber / data circuits)
- Non-capitalized equipment
- Maintenance (vehicles, site / building, equipment repair)

Are more of your bills now for monthly services rather than one-time hardware purchases?

Tymecki: For traffic and billing, our TV and radio systems are cloud-based now, as are the accounting systems.

We use an out-of-house IT provider for our deep networking — firewall management, subnets and so on. Also, we're now emphasizing computer security over convenience. That is a recent and major philosophical shift. We're using a cybersecurity awareness provider for in-house training and testing to see how susceptible people are to phishing attacks.

Also, we don't have a TV master control anymore; we shut that down early last year. It is now hosted by Centralcast in Syracuse, N.Y., a wonderfully run operation. All of our program storage and automation are there. They have ports to our cloud-based traffic system, and the over-the-air ATSC is fed back to us over a fiber line. We have multiple backup provisions in case of backhoe fade.

Operationally, this was a huge change. We can't just run down to master control anymore and say, "Hey, can you pull this show and put this one on?" We have to work through their processes. And we did eliminate personnel; we don't have people sitting in master control anymore.

We also have a membership data system that is cloud-based; and of course the big item in the cloud is email. Until the merger, radio still hosted its own servers and phone systems. Now we've migrated to the same VoIP provider that television uses, and put everybody on a cloud-based email provider.

We were never current on Windows server upgrades anyway; it would have taken a full-time person just to stay on top of those. Now you're not lying in bed at 2:30 in the morning wondering whether you're missing a security patch.

Calculations of total cost come into play with decisions about transmitter purchases.

Tymecki: On our big station, WVPS, we had a Nautel NV30 that had been on the air for years. And our backup transmitter only made around 5 kW rather than the 24.8 kilowatts needed on the output.

When it came time to purchase a full-power backup, it was the start of COVID and money was tight. We chose a liquid-cooled transmitter. All of our large TV transmitters are liquid-cooled. And I told our board that we shouldn't be paying money to make radio waves that heat the room and then paying more money to move that heat outside.

Separately, when we recently needed lower-power 1 or 2 kW transmitters, we shopped to buy efficiency. We went with Nautel for those.

And not to harp on HD Radio, but it makes transmitters inefficient. Classical WVER-FM in Rutland only has a 1,000-watt transmitter now but the power consumption probably dropped 20% just by not having HD on there. Because the transmitter is more efficient, we were able to pull out our VS2.5 and put in a lower-power analog-only unit. We didn't need that step up in size because we weren't doing HD.

If there's anything we can do to move the needle even a little bit, we should.

Other tips or thoughts?

Tymecki: We have sites that before the merger were owned by the radio company and sites that were owned by TV.

In Bennington we own the radio site, while television rents a site on the other side of town. We're paying $20,000 a year on that, so now we've applied to move that translator onto our radio tower. Yes, it's going to cost to get a tower crew, and we've done the engineering for it. But at worst, this project will pay for itself in less than two years. And it'll make maintenance easier.

Also, we're rethinking past practices. At Vermont Public Radio they managed like Sherwin Williams — they wanted to cover the earth with signals. This meant we had a lot of translators and translator CPs. But back then, listeners didn't have smart speakers, they didn't have great cell service, they didn't have reasonable WiFi at home.

All that has changed. So now we have to consider whether maintaining a 10-watt translator in a corner of the state is worth $18,000 a year in rent. Certainly someone will be upset if we take it off. But with the kind of financial crisis we're in, we have to take a very careful look.

> **"If there's anything we can do to move the needle even a little bit, we should."**