April 4, 2011

TV TechCheck

NAB NATIONAL ASSOCIATION OF BROADCASTERS

The Weekly NAB Newsletter for Television Broadcast Engineers

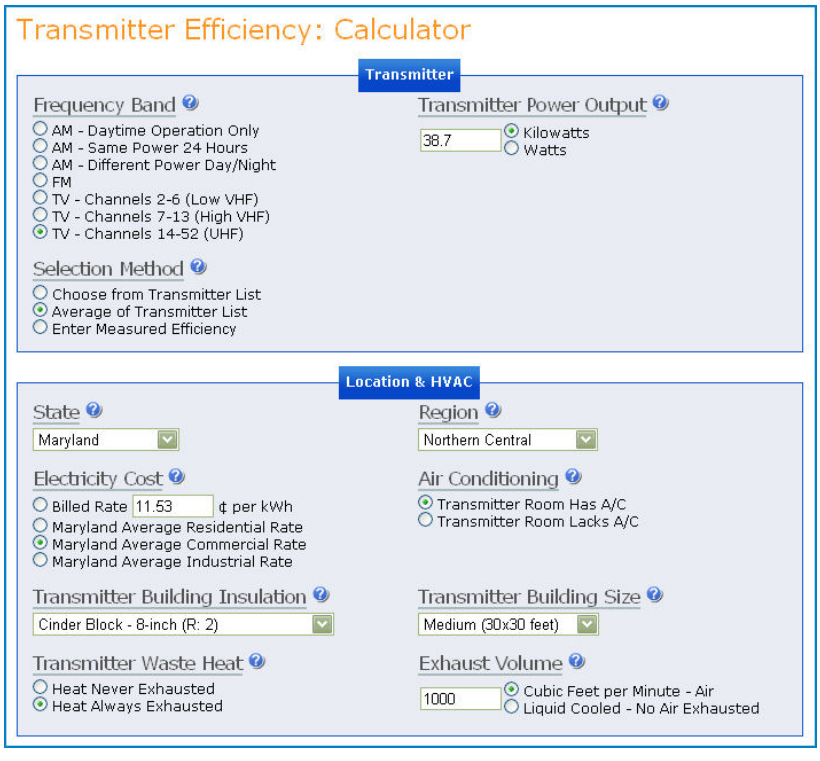
The Transmitter Efficiency Calculator

NAB TECHNOLOGY ADVOCACY PROGRAM FASTROAD Flexible Advanced Services for Television & Radio On All Devices

NAB FASTROAD today unveiled a new, Internet-based Transmitter Efficiency Calculator that broadcasters can use to predict approximate transmitter system energy costs both for present operations and for the "what if" evaluation of prospective, future purchases. With funding from the NAB FASTROAD technology advocacy program, this Web tool was developed by the broadcast engineering consulting firm of Cavell, Mertz & Associates (CMA, Manassas, Va.), and builds upon the data presented in a FASTROAD-funded Transmission Efficiency White Paper authored by CMA and released earlier this year.

The FASTROAD Transmitter Efficiency Calculator is useful for planning of AM, FM and DTV transmission facilities, both analog and digital. The database that serves as the engine for the Calculator utilizes data provided by equipment manufacturers, which may be expanded in the future as manufacturers provide additional information.

Transmitter site power consumption and costs may be quickly and easily approximated using the Calculator based on the answers to a series of simple questions relating to the broadcast transmitter configuration, geographical location, the building structure in which the transmission equipment is housed and the on-site cooling capabilities. One possible set of input parameters for a UHF DTV station are shown in the screen capture at right.



In addition to the input parameters, the results of the Calculator depend upon a set of assumptions regarding transmission facilities including:

- The database that serves as the engine for the Calculator utilizes data provided by transmitter equipment manufacturers and is by no means complete. As an example, there is presently no manufacturer-provided data available for VHF television transmitters;
- For the efficiency calculations, the manufacturer's stated efficiency of the transmitter is used, no matter the power output selected. Therefore, if a 20 kW transmitter is rated as 88% efficient, and it is being operated at 10 kW, the Calculator makes the assumption that the transmitter is still 88% efficient at 10 kW, which may or may not be the case;
- A typical air-conditioner efficiency (SEER=10) is utilized to determine HVAC power consumption. Actual efficiency may vary;
- Due to wide variations in heating fuel types, fuel costs and heating system configurations, the cost of heating was ignored;

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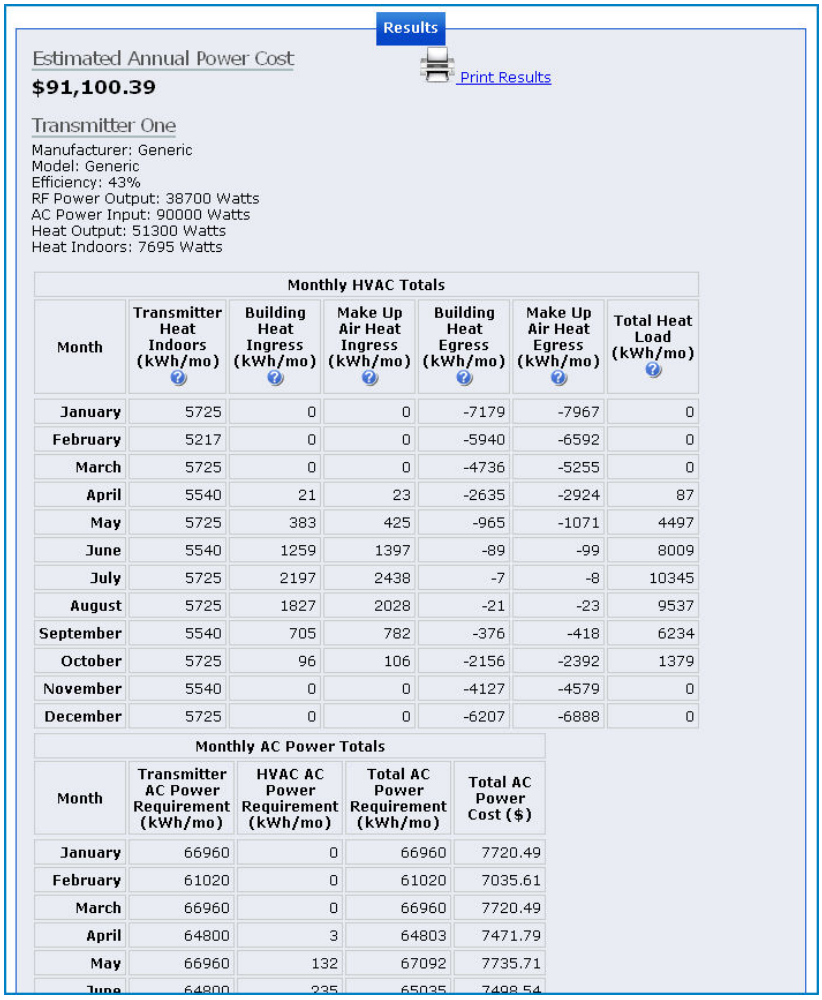
- Only one radio or television transmitter is located in each building;
- The transmitter building is located on a ground-level, concrete slab;
- Roof insulation has the same R-value as wall insulation;
- FM IBOC stations using high-level combining have a 10 dB combiner. Other combiner types will result in more or less reject load heat, which may become a factor in cooling calculations;
- If transmitter heat is exhausted, 85% of the transmitter's heat leaves the building;
- Climate considerations are based on historical records of monthly heating and cooling degree-days, which, in turn, are based on daily mean temperatures. While these estimates consider the regional differences in climate, they are not known to be precise.

The Calculator results for the input parameters shown in the first screen capture (above) are shown in the second screen capture (at right). This Calculator's strength comes from the ability to generate consistent and repeatable results. Therefore, while the assumptions and simplifications may impact bottom-line accuracy, results are believed valid when making "what if" comparisons of different transmitters and scenarios.



Results

Estimated Annual Power Cost

$91,100.39

Print Results

Transmitter One

Manufacturer: Generic
Model: Generic
Efficiency: 43%
RF Power Output: 38700 Watts
AC Power Input: 90000 Watts
Heat Output: 51300 Watts
Heat Indoors: 7695 Watts

Monthly HVAC Totals

Month	Transmitter Heat Indoors (kWh/mo)	Building Heat Ingress (kWh/mo)	Make Up Air Heat Ingress (kWh/mo)	Building Heat Egress (kWh/mo)	Make Up Air Heat Egress (kWh/mo)	Total Heat Load (kWh/mo)
January	5725	0	0	-7179	-7967	0
February	5217	0	0	-5940	-6592	0
March	5725	0	0	-4736	-5255	0
April	5540	21	23	-2635	-2924	87
May	5725	383	425	-965	-1071	4497
June	5540	1259	1397	-89	-99	8009
July	5725	2197	2438	-7	-8	10345
August	5725	1827	2028	-21	-23	9537
September	5540	705	782	-376	-418	6234
October	5725	96	106	-2156	-2392	1379
November	5540	0	0	-4127	-4579	0
December	5725	0	0	-6207	-6888	0

Monthly AC Power Totals

Month	Transmitter AC Power Requirement (kWh/mo)	HVAC AC Power Requirement (kWh/mo)	Total AC Power Requirement (kWh/mo)	Total AC Power Cost ($)
January	66960	0	66960	7720.49
February	61020	0	61020	7035.61
March	66960	0	66960	7720.49
April	64800	3	64803	7471.79
May	66960	132	67092	7735.71
June	64800	235	65035	7498.54

The Transmission Efficiency Calculator, the full text of the CMA White Paper, entitled "Power Efficient Broadcast Facility Transmission Design," and information on the NAB FASTROAD technology advocacy program are available at www.NABFASTROAD.org. Comment and feedback on the Calculator are encouraged and can be directed to David Layer, senior director, advanced engineering in NAB's Science and Technology department. The Calculator will be discussed at the 2011 NAB Show in the NAB Broadcast Engineering Conference (April 9-14, 2011, Las Vegas, Nev.) on Thursday morning, April 14 as part of the "Green Technology" session.

ADVERTISEMENTS

FCC to Conduct Training for Consultants on Communications Towers and Environmental/Historic Preservation Compliance

The Federal Communications Commission (FCC) is conducting a session for consultants on Tuesday, June 21, 2011 at their headquarters in Washington, DC on Communications Towers and Environmental/Historic Preservation Compliance. Training will be provided by staff from the FCC, USDA Rural Utilities Service, NTIA, FEMA and the Advisory Council on Historic Preservation.

For additional information contact Steve DelSordo and to register contact James Swartz who are both at the FCC. To attend the session you must preregister.

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