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May 24, 2012

Ms. Beth Krogel Roads
Assistant General Counsel -- Legal Counsel, RTO/FERC Issues
Indiana Utility Regulatory Commission
101 West Washington Street, Suite 1500 East
Indianapolis, IN 46204

Wind on the Wires Written Comments
Re: IURC RM#11-05: Indiana Voluntary Clean Energy Portfolio Standard Program

Dear Ms. Roads:

Enclosed are Wind on the Wires written comments on the proposed rule establishing the Voluntary Clean Energy Portfolio Standard, for the Indiana Utility Regulatory Commission's ("Commission") consideration. Our comments address the following five points: [1] clean energy credits should have a shelf life of no more than 2 years; [2] clean energy resources used to meet the Goals should be reviewed under the electricity supplier's integrated resource plan but it does not have to be justified by that plan; [3] utilities should compare their resources to those of third party resource providers (sec. 4-7-6 and 4-7-8); [3] the electric supplier does not need to track incentives received by non-utility companies; [4] thermal energy conversion formula should be limited to waste-to-heat facilities and the form of heat to energy conversion independently verified; and [5] the rule should be clarified that only clean energy credits generated after the effective date count toward the Goals.

STATE OF INDIANA
INDIANA UTILITY REGULATORY COMMISSION

Proposed Rule Establishing	)	
Indiana Voluntary Clean Energy	)	RM #11-05
Portfolio Standard Program	)	

Wind on the Wires' Comments on the Proposed Rule for Voluntary Clean Energy Portfolio Standard dated April 25, 2012

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Wind on the Wires' Written Comments

NOW COMES Wind on the Wires' written comments regarding the proposed rule establishing the Indiana Voluntary Clean Energy Portfolio Standard Program as ("Proposed Rule") published in LSA Document #12-97. We provide these comments to aid the Commission staff in making any final edits to the Proposed Rule, pursuant to the solicitation for written comments prepared by Commission staff and dated April 27, 2012.

Attached to these Written Comments is a redline version of the Proposed Rule. (Appendix A) The edited sections of the attached Proposed Rule reflect the changes discussed herein.

I. Written Comments

1. Clean Energy Credits Should Have a Shelf-Life of 2 Years

Statute for the Voluntary Clean Energy Portfolio Standard Program is silent on the shelf-life of a CEC – neither granting unlimited duration nor setting a fixed duration. The purpose of VCEPS is for Indiana utilities to invest in clean energy resources to replace existing generation resources. Consistent with that intent, the IURC should require the CEC to be generated after 1/1/2012 and should have a shelf-life of 2 years.

Of twenty-nine states that have a renewable energy standard or goal, eight states allow a 3 year shelf-life, six states procure RECs in a way that doesn't allow for a shelf-life, five allow a 2 year shelf-life, four allow a 4 year shelf-life and the remaining 6 states are split among no shelf-life, 5 years and 7 years. (*See* Attachment A) In setting a shelf-life the Commission should consider its purpose and value of CECs. Banking CECs

gives the utility flexibility in complying with the program mandates. The duration a credit can be held should be long enough to prevent a utility from being harmed by seasonality of some resources, but not so long as to allow a utility to game the purpose of the portfolio standard by avoiding the need to invest in new clean energy development. The duration should be evaluated in consideration of the current marketplace for renewable energy, when that energy will be available and when the utility will need to comply with the goals.

A defined shelf-life reduces market risk. When banks look at financing a project they look at the likelihood of CECs being sold. An unlimited shelf-life reduces the likelihood Indiana utilities will need to buy CECs in the future and inhibits a developer from receiving financing. (*See Renewable Portfolio Standards in the States: Balancing Goals and Implementation Strategies*, K.S. Cory, B.G. Swezey (12/2007) at 5; *stating* that it is important to place some finite limit on REC life, otherwise an oversupply of vintage RECs could reduce demand for new production). If there are uncertainties in being able to sell a product the risk of that product increases. Higher risk will yield higher finance charges that will be passed along to Indiana utilities. Therefore, a shelf-life should be set by the Commission.

To comply with a VCEPS Goal a participating electric supplier must procure enough renewable energy so that the average amount of electricity consumed from renewable energy over the goal period exceeds the Goal. (170 IAC 17.1-3-3) The first two goal periods are each six years. This duration gives a utility plenty of time to enter into contracts to deliver enough renewable energy to exceed the average during each goal period.

The statute allows excess CECs to be used in the subsequent Goal Period. To prevent a utility from gaming the purpose of the portfolio standard, a shelf-life of two years would allow the utility to roll-over any CECs it secured in those last two years into the next goal period. In these two years the utility should be procuring more CECs in expectation of having to comply with the increased Goal in the next goal period.

A shelf-life in excess of two years results in an excessive delay between the actual receipt of the clean energy benefits and the time the utility uses the CEC. In addition, an extended shelf-life could complicate record keeping and monitoring/enforcement. Furthermore, if CECs are allowed to have a perpetual shelf-life, utilities could bank CECs and never invest in new clean energy resources. For example, the utility could buy all of the CECs it needs in 2012 and hold onto them until 2025. This could prevent any growth of new clean energy resources to replace existing energy resources.

Thus the Commission should set a shelf-life for CECs of two years from date of creation. See Appendix A for recommended replacement language in 170 IAC 17.1-3-4(d).

2. Remove requirement that the Procurement of Clean Energy be Justified

Rule 4 Sec 2(3)(G) requires clean energy resources be justified through the integrated resource planning modeling process. The statute does not require utilities to justify the need for buying clean energy resources, therefore, such a requirement in the rule is not required. Including such a requirement is contrary to the intent of the statute. The intent of the statute is for the utility to develop a CHOICE Plan that will be used to

supplant energy from baseload generation with energy from clean energy resources up to the CEP goal.

Undeniably, there is a link between the clean energy needed to meet the CEPS and the integrated resource plan of a utility. Since the statute requires the utility to develop a CHOICE plan, it would be beneficial for the utility to evaluate that plan within the context of its integrated resource plan.

Wind on the Wires proposes that the requirement in 170 IAC 17.1-4-2(3)(G) be modified to state that the electricity supplier should "evaluate impact of utility's CHOICE Plan through the IRP modeling."

See Appendix A recommended replacement language in 170 IAC 17.1-4-2(3)(G).

3. Only the Electric Supplier's Incentives Need to be Reported to the IURC so as to Prevent the Electric Supplier from Receiving Multiple Benefits from the Same Clean Energy Credit

Rule 3 Sec. 2(7) requires the electricity supplier identify the federal, state and local incentives being received for any of the projects listed in the electricity supplier's program application plan. This information is neither required by the statute nor needed to evaluate the application. There is no benefit to identifying such incentives.

In addition, this requirement could be construed as requiring the clean energy resource owner to provide the utility a breakdown of the federal, state or local incentives it is receiving. That information is market sensitive information and cannot be disclosed. Moreover, this reporting requirement would curtail the number of clean energy resources that sell energy or CECs to the electricity supplier.

Instead, Wind on the Wires proposes that the requirement in Rule 3 Sec. 2(7) be tied to the limitation in Rule 3 Sec. 3(d)(2), which prevents a utility from receiving the 50 basis point increase to its return on equity for using a resource that the utility already receives an incentive for under a separate state or local program. That requirement prevents Indiana ratepayers from providing multiple state/local incentives to the utility for using a specific resource. Wind on the Wires change makes the reporting requirement in Sec. 2(7) relevant and useful.

See Appendix A recommended replacement language in 170 IAC 17.1-4-2(7).

4. Waste to Heat Conversion

a. Application and Certification of the Energy Conversion Process

In March 2012, provisions were added to the Proposed Rule to convert waste-heat to CECs. (Draft Proposed Rule as of March 1, 2012; see Rule 3 Sec 5). Neither the title nor the language in the rule clearly identify which clean energy resources can use this formula. The formula appears to only be applicable to waste-heat recovery processes (IC 8-1-37-4(a)(14)), thus Wind on the Wires recommends the rule make that clear.

The provisions added in March assume that all waste-heat is from steam or hot water. There are many ways to capture and reuse waste-heat, such as through the use of ammonia or oils that vaporize at temperatures lower than water, or the use of metals to produce energy through heat absorption, or the use of thermoelectric semiconductors. (See Attachment B) Therefore, the IURC should require an application for any resource

seeking to use this formula, with proof of the type of heat to energy conversion system it uses.

The title refers to “thermal energy conversion to clean energy credits.” This title is so broad and general that it could be inappropriately used for other clean energy resources. There are at least three other clean energy resources that are based on thermal energy conversion: the conversion of solid waste energy a, the creation of energy through industrial byproduct technologies (IC 8-1-37-4(a)(13)), and combined heat and power systems (IC 8-1-37-4(a)(20)). The conversion formula would not be appropriate for any of these three clean energy resources unless the resource recaptures the waste-heat in conjunction with a water boiler system. Therefore, the formula should only apply to waste-heat resources and the other three clean energy resources only upon application and proof that the resource use a water boiler system (*infra* section 4.b. below).

Thus, the IURC should require a facility that intends to sell CECs as a clean energy resource defined in IC 8-1-37-4(a)(9), (13), (14) or (20), the facility should have to submit an application to be a waste to heat clean energy resource with a certification that their process is either steam or hot water. If the clean energy resource uses a method other than a boiler system with steam or hot water, such as use of ammonia or oils that vaporize at temperatures lower than water, or use of metals to produce energy through heat absorption, or use of thermoelectric semiconductors, the applicant would go through the 170 IAC 1-6 process. In the 170 IAC 1-6 process, the applicant would be deemed a ‘utility’ for the limited purpose of providing clean energy, and it would submit an application for review and approval by the IURC (pursuant to the thirty-day administrative

filing procedures and guidelines) with a certification that their process is either steam or hot water or it would submit an alternative equation for the IURC to review and approve.

b. Independent Verification of the Waste Heat Recovery Process

There should be independent verification of the waste heat recovery process used by the clean energy resource. Independent verification can be provided by either submitting a copy of the as-built construction plans of the heat to energy conversion system to the Commission with its application to be a waste-energy facility or with its application to be a utility in the 170 IAC 1-6 process. An alternative to as-built construction plans would be a report from an independent inspector. The report would provide details about the type of heat to energy conversion system that was installed and an estimate of the system's BTU to MWh conversion rate.

See Appendix A recommended replacement language in 170 IAC 1-6-1(c), 1-6-2(15), 1-6-3(6), 170 IAC 17.1-3-4 and 17.1-3-5.

5. Limit CECs that Were Generated Prior to the Effective Date

Rule 3 Sec. 4 allows for the use of clean energy resources that are

> in service;
> purchased; or
> contracted for;
> before the effective date of the CHOICE program to apply to the goals.

This language allows an electric supplier to use clean energy credits generated by a clean energy resource *before* the effective date of the CHOICE program toward the goal. The intent of the Voluntary Clean Energy Portfolio Standard Program is that only clean

energy credits or clean energy generated *after* the effective date by clean energy resources that were operating on or after the effective date were to count toward the goal.

Thus, Wind on the Wires proposes that “before the effective date” be replaced with “on or after the effective date . . .” This language is consistent with the intent of the Act and removes the possible interpretation that CECs generated prior to the effective date could be used to meet the goals.

See Appendix A recommended replacement language in 170 IAC 17.1-3-4(c).

II. Conclusion

WHEREFORE, Wind on the Wires recommends that the proposed rule reflect the recommended changes to the rule contained herein.

Respectfully submitted,

_____/s_____
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DATED: May 24, 2012

TITLE 170 INDIANA UTILITY REGULATORY COMMISSION

Proposed Rule
LSA Document #12-97

DIGEST

Amends 170 IAC 1-6-1 through 170 IAC 1-6-3 to allow a clean energy resource to request approval of an alternative equation under the commission's thirty-day administrative filing rule. Adds 170 IAC 17.1 to establish the Indiana voluntary clean energy portfolio standard program, superseding the emergency rule currently in place. Repeals 170 IAC 17. Effective 30 days after filing with the Publisher.

170 IAC 1-6-1
170 IAC 1-6-2
170 IAC 1-6-3
170 IAC 17.1

SECTION 1. 170 IAC 1-6-1 IS AMENDED TO READ AS FOLLOWS:

Rule 6. Thirty-Day Administrative Filing Procedures and Guidelines

170 IAC 1-6-1 Policy and scope
Authority: IC 8-1-1-3; IC 8-1-2-42
Affected: IC 8-1-1-5; IC 8-1-37-4(a)

Sec. 1. (a) This rule is intended to establish thirty (30) day administrative filing procedures for certain requests by a utility for changes in:

(1) its rates;
(2) its charges;
(3) its rules;
(4) its regulations; or
(5) any combination of subdivisions (1) through (4);

that are outside the context of a general rate case and that are not subject to other commission rules establishing specific filing requirements for the subject matter of the filing.

(b) Under IC 8-1-1-5 and as defined in this rule, only noncontroversial filings may be approved under this rule.

(c) **This rule may also be used by a clean energy resource that submits,~~provides thermal energy~~ for approval, ~~of~~ an alternative equation to determine the number of clean energy credits earned for useful ~~thermal~~clean energy produced, pursuant to 170 IAC 17.1-3-5.**

(d) A period of thirty (30) days from the date the filing is received by the commission is the minimum amount of time in which approval of changes to rates and charges may occur under IC 8-1-2-42(a), unless the commission has approved an order prescribing a different time frame. Additional time may be required for reasons including, but not limited to, the following:

(1) Objections under section 7 of this rule.

(2) Failure to follow the procedures as provided in this rule.

(3) Failure to respond promptly to inquiries from:

(A) commission staff; or

(B) OUCC staff.

(4) Complex filings.

(5) Incomplete filings.

~~(d)~~**(e)** The regulatory framework contained in this rule is intended to facilitate expedited consideration of administrative filings that do not require a hearing.

~~(e)~~**(f)** To ensure that a utility's filing under this rule is consistent with the purpose of the procedures in this rule, the commission division will:

(1) review and evaluate the filing; and

(2) recommend to the commission approval or denial;

subject to the provisions of section 8 of this rule. The commission will make the final determination regarding whether the filing is approved or disapproved.

(Indiana Utility Regulatory Commission; 170 IAC 1-6-1; filed Nov 25, 2008, 1:18 p.m.: 20081217-IR-170070829FRA)

SECTION 2. 170 IAC 1-6-2 IS AMENDED TO READ AS FOLLOWS:

170 IAC 1-6-2 Definitions

Authority: IC 8-1-1-3; IC 8-1-1-5; IC 8-1-2-42

Affected: IC 8-1-2-54

Sec. 2. The following definitions apply throughout this rule:

(1) "**Clean energy" has the meaning set forth in 170 IAC 17.1-2-5.**

(2) "Clean energy credit" has the meaning set forth in IC 8-1-37-3.

(3) "Clean energy resource" has the meaning set forth in IC 8-1-37-4(a).

(4) "Commission" means the Indiana utility regulatory commission.

~~(2)~~**(5)** "Commission division" means the technical division of the commission for the industry to which the utility making the filing under this rule belongs.

~~(3)~~**(6)** "Conference" means the official regularly scheduled meeting of the commission at which orders and utility articles are presented for approval.

~~(4)~~**(7)** "Customer" means any:

(A) person;

(B) firm;

(C) corporation;

(D) municipality;

(E) government agency; or

(F) any other entity;

that has agreed, orally or otherwise, to pay for service received from a utility.

~~(5)~~**(8)** "Filing date" means the date a filing under this rule is received and file stamped by the secretary of the commission.

~~(6)~~**(9)** "New rate" means a rate or charge for utility service not currently encompassed by the utility's tariffs.

~~(7)~~**(10)** "Noncontroversial filing" means any filing regarding which no person or entity has filed an objection as provided under section 7 of this rule.

~~(8)~~**(11)** "Nonrecurring charge" means a charge to a utility customer for costs incurred by the utility outside the context of month-to month service, which shall include, but not be limited to, the following:

(A) Customer deposits.
(B) Customer checks returned to the utility due to insufficient funds.
(C) Connect fees.
(D) Reconnect fees.
(E) Tap fees.

~~(9)~~**(12)** "OUCC" means the Indiana office of utility consumer counselor.

~~(10)~~**(13)** "Rate" means base rates and charges incident to the provision of usual and customary utility service on a month-to-month basis.

~~(11)~~**(14)** "System development charge" or "SDC" means a one (1) time fee assessed to new customers of water or sewer utilities to help finance development of utility systems, mainly those dealing with facilities for production, treatment, or storage necessary to serve those new customers. The term includes the following:

(A) Impact fee.
(B) Availability fee.
(C) Capacity fee.

~~(12)~~**(15) "Utility", only for the purposes of this rule, includes a clean energy resource:**

(A) that produces ~~thermal~~energy from a waste to heat resource as defined in IC 8-1-37-4(a)(14); and

(B) is seeking approval of an alternative equation to determine the number of clean energy credits earned for the useful ~~thermal~~clean energy produced.

(16) "Utility articles" means the summary of filings under this rule and the recommendations of the commission division, which are presented to the commission at conference.

(Indiana Utility Regulatory Commission; 170 IAC 1-6-2; filed Nov 25, 2008, 1:18 p.m.: 20081217-IR-170070829FRA)

SECTION 3. 170 IAC 1-6-3 IS AMENDED TO READ AS FOLLOWS:

170 IAC 1-6-3 Allowable filings

Authority: IC 8-1-1-3; IC 8-1-1-5; IC 8-1-2-42
Affected: IC 8-1

Sec. 3. The following types of filings are allowable under the procedures and guidelines of this rule:

(1) Rates and charges for new services.
(2) New rules and regulations of the utility.
(3) Changes to rules and regulations of the utility.
(4) Nonrecurring charges.
(5) Changes to rates and charges so long as the change:
(A) is revenue neutral within a specific rate schedule; or
(B) results in an overall decrease in the revenues of the utility and is done on an across-the-board basis to all classes of customers.
(6) **A request by a clean energy resource, as defined in IC 8-1-37-4(a)(14), for approval of an alternative equation to determine the number of clean energy credits earned for the useful ~~thermal~~clean energy produced.**
(7) A filing for which the commission has already approved or accepted the procedure for the change.
~~(7)~~ **(8)** Any other filing as may be ordered by the commission to be filed under this rule.
(Indiana Utility Regulatory Commission; 170 IAC 1-6-3; filed Nov 25, 2008, 1:18 p.m.: 20081217-IR-170070829FRA)

SECTION 4. 170 IAC 17.1 IS ADDED TO READ AS FOLLOWS:

ARTICLE 17.1. INDIANA VOLUNTARY CLEAN ENERGY PORTFOLIO STANDARD PROGRAM

Rule 1. Applicability

170 IAC 17.1-1-1 Applicability under IC 8-1-37
Authority: IC 8-1-1-3; IC 8-1-37
Affected: IC 8-1-37-6
Sec. 1. This article is applicable to all Indiana electricity suppliers as defined in IC 8-1-37-6.
(Indiana Utility Regulatory Commission; 170 IAC 17.1-1-1)

170 IAC 17.1-1-2 No change in public utility status
Authority: IC 8-1-1-3; IC 8-1-37
Affected: IC 8-1-2-1; IC 8-1-37-4
Sec. 2. This article does not change the:
(1) owner;
(2) operator; or
(3) manager;
of a clean energy resource as defined in IC 8-1-37-4 into a public utility under the jurisdiction of the commission, if the entity is not a public utility under IC 8-1-2-1.
(Indiana Utility Regulatory Commission; 170 IAC 17.1-1-2)

170 IAC 17.1-1-3 No change to other commission processes

Authority: IC 8-1-1-3; IC 8-1-37
Affected: IC 8-1-37
Sec. 3. This article does not replace other commission processes, including, but not limited to:
(1) a proceeding requesting a certificate of public convenience and necessity; and
(2) the commission's rules regarding integrated resource planning.
(Indiana Utility Regulatory Commission; 170 IAC 17.1-1-3)

Rule 2. Definitions

170 IAC 17.1-2-1 Applicability
Authority: IC 8-1-1-3; IC 8-1-37
Affected: IC 8-1-37
Sec. 1. The definitions in IC 8-1-37 and in this rule apply throughout this article.
(Indiana Utility Regulatory Commission; 170 IAC 17.1-2-1)

170 IAC 17.1-2-2 "Application completion date" defined
Authority: IC 8-1-1-3; IC 8-1-37
Affected: IC 8-1-37
Sec. 2. "Application completion date" means the date the commission through its presiding officers notifies the parties of a proceeding under this article that the application submitted by the electricity supplier is complete.
(Indiana Utility Regulatory Commission; 170 IAC 17.1-2-2)

170 IAC 17.1-2-3 "CHOICE" defined
Authority: IC 8-1-1-3; IC 8-1-37
Affected: IC 8-1-37
Sec. 3. "CHOICE" means the comprehensive Hoosier option to incentivize cleaner energy.
(Indiana Utility Regulatory Commission; 170 IAC 17.1-2-3)

170 IAC 17.1-2-4 "CHOICE incentive" defined
Authority: IC 8-1-1-3; IC 8-1-37
Affected: IC 8-1-37-13
Sec. 4. "CHOICE incentive" means the adder to an electricity supplier's return on equity of up to fifty (50) basis points pursuant to IC 8-1-37-13.
(Indiana Utility Regulatory Commission; 170 IAC 17.1-2-4)

170 IAC 17.1-2-5 "Clean energy" defined
Authority: IC 8-1-1-3; IC 8-1-37
Affected: IC 8-1-37-2; IC 8-1-37-4
Sec. 5. In addition to the definition in IC 8-1-37-2, and consistent with the definition of "clean energy resource" in IC 8-1-37-4, "clean energy" means electricity that is conserved by a clean energy resource.
(Indiana Utility Regulatory Commission; 170 IAC 17.1-2-5)

170 IAC 17.1-2-6 "Clean energy resource" defined
Authority: IC 8-1-1-3; IC 8-1-37
Affected: IC 8-1-37-4
Sec. 6. "Clean energy resource" means, in addition to the definition as given in IC 8-1-37-4(a), the generation of electricity using methane recovered from landfills. For the purposes of determining the percentage of clean energy resources that qualify for the goal under IC 8-1-37-12(g), this definition shall be considered part of the statutory list as IC 8-1-37-4(a)(15)(A).
(Indiana Utility Regulatory Commission; 170 IAC 17.1-2-6)

170 IAC 17.1-2-7 "Commission" defined
Authority: IC 8-1-1-3; IC 8-1-37
Affected: IC 8-1-37
Sec. 7. "Commission" means the Indiana utility regulatory commission.
(Indiana Utility Regulatory Commission; 170 IAC 17.1-2-7)

170 IAC 17.1-2-8 "CPS goal period" defined
Authority: IC 8-1-1-3; IC 8-1-37
Affected: IC 8-1-37-12
Sec. 8. "CPS goal period" is the period of time outlined in IC 8-1-37-12(a) in which an electricity supplier must meet a particular goal under this article.
(Indiana Utility Regulatory Commission; 170 IAC 17.1-2-8)

170 IAC 17.1-2-9 "Effective date" defined
Authority: IC 8-1-1-3; IC 8-1-37
Affected: IC 8-1-37
Sec. 9. "Effective date" of the Indiana voluntary clean energy portfolio standard program is January 1, 2012.
(Indiana Utility Regulatory Commission; 170 IAC 17.1-2-9)

170 IAC 17.1-2-10 "Incentive application date" defined
Authority: IC 8-1-1-3; IC 8-1-37
Affected: IC 8-1-37
Sec. 10. "Incentive application date" means the date on which a participating electricity supplier files its incentive application and work papers with the commission.
(Indiana Utility Regulatory Commission; 170 IAC 17.1-2-10)

170 IAC 17.1-2-11 "Integrated Resource Plan", "integrated resource planning", or "IRP" defined
Authority: IC 8-1-1-3; IC 8-1-37
Affected: IC 8-1-37

Sec. 11. "Integrated resource plan", "integrated resource planning", or "IRP" means a utility's assessment of a variety of demand-side and supply-side resources to cost effectively meet customer electricity service needs.
(Indiana Utility Regulatory Commission; 170 IAC 17.1-2-11)

170 IAC 17.1-2-12 "OUCC" defined
Authority: IC 8-1-1-3; IC 8-1-37
Affected: IC 8-1-37
Sec. 12. "OUCC" means the Indiana office of utility consumer counselor.
(Indiana Utility Regulatory Commission; 170 IAC 17.1-2-12)

170 IAC 17.1-2-13 "Program application date" defined
Authority: IC 8-1-1-3; IC 8-1-37
Affected: IC 8-1-37
Sec. 13. "Program application date" means the date on which the electricity supplier files its program application and working papers with the commission.
(Indiana Utility Regulatory Commission; 170 IAC 17.1-2-13)

170 IAC 17.1-2-14 "Regional transmission organization" defined
Authority: IC 8-1-1-3; IC 8-1-37
Affected: IC 8-1-37-9
Sec. 14. In addition to the definition in IC 8-1-37-9, as applicable to electricity suppliers in the state of Indiana, "regional transmission organization" means:
(1) the Midwest Independent Transmission System Operator, Inc., or
(2) the PJM Interconnection, L.L.C.
(Indiana Utility Regulatory Commission; 170 IAC 17.1-2-14)

Rule 3. Establishment of the Indiana Voluntary Clean Energy Portfolio Standard Program

170 IAC 17.1-3-1 Indiana voluntary clean energy portfolio standard program
Authority: IC 8-1-1-3; IC 8-1-37
Affected: IC 8-1-37
Sec. 1. The Indiana voluntary clean energy portfolio standard program is hereby established by this article.
(Indiana Utility Regulatory Commission; 170 IAC 17.1-3-1)

170 IAC 17.1-3-2 Comprehensive Hoosier option to incentivize cleaner energy program
Authority: IC 8-1-1-3; IC 8-1-37
Affected: IC 8-1-27
Sec. 2. The Indiana voluntary clean energy portfolio standard program shall also be known as the comprehensive Hoosier option to incentivize cleaner energy program or CHOICE program.
(Indiana Utility Regulatory Commission; 170 IAC 17.1-3-2)

170 IAC 17.1-3-3 Goals under the CHOICE program

Authority: IC 8-1-1-3; IC 8-1-37

Affected: IC 8-1-37

Sec. 3. The goals under the CHOICE program are as follows:

(1) CPS goal period I: For the six (6) calendar years beginning January 1, 2013, and ending December 31, 2018, an average of at least four percent (4%) of the total electricity obtained by the participating electricity supplier to meet the energy requirements of its Indiana retail electric customers during the base year.

(2) CPS goal period II: For the six (6) calendar years beginning January 1, 2019, and ending December 31, 2024, an average of at least seven percent (7%) of the total electricity obtained by the participating electricity supplier to meet the energy requirements of its Indiana retail electric customers during the base year.

(3) CPS goal period III: In the calendar year ending December 31, 2025, at least ten percent (10%) of the total electricity obtained by the participating electricity supplier to meet the energy requirements of its Indiana retail electric customers during the base year.

(Indiana Utility Regulatory Commission; 170 IAC 17.1-3-3)

170 IAC 17.1-3-4 Requirements necessary to meet a CHOICE program goal

Authority: IC 8-1-1-3; IC 8-1-37

Affected: IC 8-1-37-3; IC 8-1-37-4

Sec. 4. (a) In order to meet any of the goals set forth in section 3 of this rule, a participating electricity supplier must:

(1) obtain during the goal period through:

A) clean energy resources as defined in IC 8-1-37-4; or

B) clean energy credits as defined in IC 8-1-37-3 that are generated by a facility located in a control area that is part of a regional transmission organization;

an amount of megawatt hours at least equal to the percentage amount set forth in the goal;

(2) use clean energy resources located in Indiana for at least fifty percent (50%) of the clean energy obtained to meet the goal; and

(3) not satisfy more than thirty percent (30%) of the goal using any combination of clean energy resources described in IC 8-1-37-4(a)(17) through IC 8-1-37-4(a)(21).

(b) A participating electricity supplier may apply the amount of:

(1) megawatt hours of clean energy; or

(2) clean energy credits;

that exceed the requirements of a particular goal period to the immediately succeeding goal period.

(c) Except as provided for in IC 8-1-37-4(a)(16) and IC 8-1-37-4(21), clean energy resources that have been:

(1) in service;

(2) purchased; or

(3) contracted for;

on or after~~before~~ the effective date of the CHOICE program may apply to the goals.

(d) A clean energy credit must be applied to the Goal within two years of the date in which the energy was generated by the clean energy resource.

(Indiana Utility Regulatory Commission; 170 IAC 17.1-3-4)

170 IAC 17.1-3-5 ~~Useful t~~Thermal energy conversion to clean energy credits for IC 8-1-37-4(a)(14)

Authority: IC 8-1-1-3; IC 8-1-37

Affected: IC 8-1-37

Sec. 5. (a) For clean energy resources under IC 8-1-37-4(a)(14) that use either a steam or hot water system~~that provide thermal energy~~, its' energy may be converted to ~~one~~ clean energy credits that can be sold to a participating electricity supplier~~shall be earned using for every 3,412,000 British thermal units (Btus) of useful thermal energy produced~~.

(b) The useful ~~thermal~~ energy produced by a steam or hot water system~~clean energy resource~~ shall only be ~~the thermal energy~~used for the following:

(1) Heating.

(2) Cooling.

(3) Mechanical work.

(c) The useful thermal energy may be:

(1) measured directly by meter; or

(2) determined:

(A) by the default equation in this section; or

(B) through an alternative equation approved by the commission through its thirty-day administrative filing process in 170 IAC 1-6.

(d) The following default equation may only be used to determine the quantity of clean energy credits generated by clean energy resource systems that use steam or hot water:

$$CECs\ Generated = \frac{Q \times \Delta H}{3.412 \times 10^6} \times (1 - e_L)$$

Where:

CECs Generated = Quantity of CECs generated (MWh)

Q = Quantity of steam or hot water delivery (lbs)

ΔH = Change in enthalpy from point of delivery to end of thermal energy use (Btu/lb)

Default for steam = 830 Btu/lb

Default for hot water = 300 Btu/lb

e_L = Energy loss from point of delivery to point of use (fraction)

Default = 0.15

(Indiana Utility Regulatory Commission; 170 IAC 17.1-3-5)

Rule 4. Application Process to Participate in the CHOICE Program

170 IAC 17.1-4-1 Program application required
Authority: IC 8-1-1-3; IC 8-1-37
Affected: IC 8-1-37
Sec. 1. In order to participate in the CHOICE program, an electricity supplier must file a program application with the commission:
(1) pursuant to the commission's procedural rules; and
(2) pursuant to this article;
no later than two(2) years after the beginning of CPS goal period I or II.
(Indiana Utility Regulatory Commission; 170 IAC 17.1-4-1)

170 IAC 17.1-4-2 Program application contents
Authority: IC 8-1-1-3; IC 8-1-37
Affected: IC 8-1-37
Sec. 2. In order to be deemed complete by the commission, the program application submitted by the electricity supplier must contain at least the following:
(1) Contact information of the electricity supplier.
(2) Total electricity obtained by the electricity supplier to meet the energy requirements of its Indiana retail electric customers during the base year.
(3) A CHOICE plan to obtain clean energy in an amount equal to at least ten (10) percent of the total electricity supplied to its Indiana retail electric customers during the calendar year ending December 31, 2025, which may include the following:
(A) A detailed business plan with annual milestones to ensure a participating electricity supplier will meet the CPS goals.
(B) Identification of the:
(i) owner;
(ii) operator; or
(iii) manager;
of the clean energy resources to be utilized by the electricity supplier.
(C) The type of the clean energy resources to be utilized by the electricity supplier.
(D) Affirmation by the electricity supplier that its CHOICE plan contains not more than thirty percent (30%) of any combination of the clean energy resources listed in IC 8-1-37-4(a)(17) through IC 8-1-37-4(a)(21).
(E) The amount of clean energy anticipated to be produced by kilowatthour per resource type, including the clean energy credits that will be submitted as part of the plan.
(F) A description of any projects to be built under the CHOICE plan, including, to the extent known, the:
(i) scope;
(ii) cost; and
(iii) location;

of the project.

(G) Evaluation of the impact of the utility's CHOICE Plan ~~Justification of the need for the generation~~ through IRP modeling.

(H) If the electricity supplier chooses to use its last IRP model runs, it must demonstrate that there have been no changes in its load forecast or supply mix since the time of the IRP model run.

(I) Other generation options considered as alternatives to the final clean energy resources listed in the CHOICE plan.

(J) Justification that the resources listed in the CHOICE plan will not result in an increase to the retail rates and charges of the electricity supplier above what could reasonably be expected if the application were not approved.

(K) Analysis of ratepayer impact including the following types of information:

(i) An explanation on how the electricity supplier determined the impact on rates of the program application plan.

(ii) Documentation on the impact on rates if the application is approved.

(4) An explanation as to how this portfolio addition fits into the applicant's long-term generation plan.

(5) Identification of CHOICE incentive being requested for each CPS Goal Period if the electricity supplier meets the CPS Goal for that period.

(6) Explanation of the basis for the amount of the CHOICE incentive being requested for each CPS Goal Period.

(7) Identification of incentives that have already been approved or granted by the Commission and ~~currently being received~~ for any of the projects listed in the program application plan~~., including, but not limited to:~~

~~(A) Federal, state, and local tax incentives;~~

~~(B) Federal, state, and local grants; and~~

~~(C) Other incentives received by the supplier, including, but not limited to:~~

~~(i) Shareholder incentives; and~~

~~(ii) Lost margins.~~

(8) If the electricity supplier requests a periodic rate adjustment mechanism for the recovery of costs associated with the CHOICE Program, a detailed explanation and supporting documentation of how the periodic rate adjustment mechanism would work.

(9) Work papers detailing all considerations and calculations in the program application and the program application plan. Each working paper must be:

(A) legible;

(B) paginated; and

(C) specifically identified.

(10) Any supporting written testimony, affidavits, and other evidence the electricity supplier wishes to submit in support of its application.

(Indiana Utility Regulatory Commission; 170 IAC 17.1-4-2)

170 IAC 17.1-4-3 Commission approval

Authority: IC 8-1-1-3; IC 8-1-37

Affected: IC 8-1-37

Sec. 3. (a) The commission shall approve an electricity supplier's participation in the CHOICE Program if the commission finds that:

(1) the electricity supplier's program application is:

(A) complete; and

(B) reasonably complies with:

(i) this article and

(ii) IC 8-1-37;

(2) the electricity supplier submitting the application has demonstrated that the electricity supplier has a reasonable expectation of meeting the goal for CPS goal period III, as provided in Rule 3, section 3 of this article; and

(3) approving the application will not result in an increase to the retail rates and charges of the electricity supplier above what could reasonably be expected if the application were not approved.

(b) If the electricity supplier has requested CHOICE incentives for meeting one (1) or more CPS goals, the commission shall also determine, pursuant to IC 8-1-37-13(b):

(1) whether the CHOICE incentives should be approved; and

(2) if so, in what amount.

(c) In making the determinations in subsections (a) and (b), the commission may also consider other factors it deems relevant.

(d) In making the determination in subsection (b), the awarding of CHOICE incentives shall exclude the contribution toward reaching the CPS Goals of clean energy resources:

(1) that were:

(A) in service;

(B) purchased; or

(C) contracted for;

prior to the effective date of the CHOICE program; or

(2) for which incentives have already been approved or granted by the commission.

(e) Upon approval of the electricity supplier's participation in the CHOICE program:

(1) if the electricity supplier has requested a periodic rate adjustment mechanism to recover the costs of participating in the CHOICE program, the commission shall approve recovery of costs through a periodic rate adjustment mechanism, the details of which shall be outlined in the commission's approval order and which mechanism shall start upon the date of the commission's approval order; and

(2) if the electricity supplier has requested a CHOICE incentive, the commission shall include in its approval order a determination regarding whether the commission is approving the CHOICE incentive and the amount of CHOICE incentive, which the participating electricity supplier shall receive upon:

(A) meeting a CPS goal; and

(B) approval of an incentive application with the commission that:
(i) is complete; and
(ii) contains sufficient supporting documentation.

(Indiana Utility Regulatory Commission; 170 IAC 17.1-4-3)

Rule 5. Status Following Approval of Participation in the CHOICE Program

170 IAC 17.1-5-1 Annual report to commission required
Authority: IC 8-1-1-3; IC 8-1-37
Affected: IC 8-1-37-12

Sec. 1. Beginning in 2014, a participating electricity supplier shall report to the commission not later than March 1 of each year on the following:

(1) The participating electricity supplier's efforts, if any, during the most recently ended calendar year to meet the CPS goal applicable to the most recently ended calendar year.

(2) The total amount of renewable energy supplied to the participating electricity supplier's Indiana retail electric customers during the most recently ended calendar year, including a breakdown of the following:

(A) The amount of clean energy generated by facilities owned or operated by the participating electricity supplier. The participating electricity supplier shall identify each facility by:
(i) name and location;
(ii) total generating capacity;
(iii) total amount of electricity generated at the facility during the most recently ended calendar year, including the percentage of this amount that was supplied to the participating electricity supplier's Indiana retail electric customers; and
(iv) total amount of clean energy generated at the facility during the most recently ended calendar year, including the percentage of this amount that was supplied to the participating electricity supplier's Indiana retail electric customers.

(B) The amount of clean energy purchased from other suppliers of clean energy. The participating electricity supplier shall identify:
(i) each supplier from whom clean energy was purchased;
(ii) the amount of clean energy purchased from each supplier;
(iii) the price paid by the participating electricity supplier for the clean energy purchased from each supplier; and
(iv) to the extent known, the name and location of each facility at which the clean energy purchased from each supplier was generated.

(3) The number of clean energy credits purchased by the participating electricity supplier during the most recently ended calendar year. The participating electricity supplier shall identify:

(A) each person from whom one (1) or more clean energy credits was purchased;
(B) the price paid to each person identified in clause (A) for the clean energy credits purchased;
(C) the number of clean energy credits applied, if any, during the most recently ended calendar year to meet the CPS goal applicable to the most recently ended calendar year; and
(D) the number of clean energy credits, if any, that the participating electricity supplier plans to carry over to the next succeeding CPS goal period, as permitted by IC 8-1-37-12(f).

(4) The participating electricity supplier's plans for meeting the CPS goal applicable to the calendar year in which the report is submitted.
(5) Advances in clean energy technology that affect activities described in subdivisions (1) and (4).
(6) Any other information that the commission prescribes in rules adopted under IC 4-22-2.

For purposes of this section, amounts of clean energy and electricity shall be reported in megawatt hours. A participating electricity supplier's duty to submit a report under this subsection terminates after the participating electricity supplier has submitted the report that applies to the calendar year ending December 31, 2025.
(Indiana Utility Regulatory Commission; 170 IAC 17.1-5-1)

170 IAC 17.1-5-2 Status following approval of participation in CHOICE Program
Authority: IC 8-1-1-3; IC 8-1-37
Affected: IC 8-1-37

Sec. 2. (a) After approval of its participation in the CHOICE Program, the participating electricity supplier is required to follow its CHOICE plan in working toward meeting the CPS Goals.

(b) If a participating electricity supplier decides to change part of its CHOICE plan in a manner that:

(1) does not impact whether the electricity supplier will meet the CPS Goals; and
(2) does not increase the ratepayer impact of its CHOICE plan;

the electricity supplier shall file the changes with the commission through the commission's thirty-day administrative filing procedures and guidelines in 170 IAC 1-6.

(c) If circumstances change and the costs of implementing the participating electricity supplier's CHOICE plan increase or are projected to increase to the point that the resulting rates and charges may no longer be just and reasonable, the participating electricity supplier shall file a petition with the commission requesting a commission determination that the cost of clean energy resources available to the electricity supplier would result in an increase in the rates and charges of the electricity supplier that would not be just and reasonable. The electricity supplier's petition shall include:

(1) a detailed listing of the participating electricity supplier's attempts to comply with its CHOICE plan;

(2) a detailed explanation of the change in circumstances giving rise to the electricity supplier's petition;
(3) a listing of the costs of the clean energy resources available to the electricity supplier; and
(4) the electricity supplier's calculation supporting the conclusion that the increase in rates and charges would not be just and reasonable.

(Indiana Utility Regulatory Commission; 170 IAC 17.1-5-2)

Rule 6. CHOICE Incentive Application Process

170 IAC 17.1-6-1 Incentive application required
Authority: IC 8-1-1-3; IC 8-1-37
Affected: IC 8-1-37

Sec. 1. In order to receive a CHOICE incentive under the CHOICE program, a participating electricity supplier must file an incentive application with the commission:
(1) pursuant to the commission's procedural rules; and
(2) pursuant to this article;
no later than six (6) months after the end of the CPS goal period for which the incentive is being sought.

(Indiana Utility Regulatory Commission; 170 IAC 17.1-6-1)

170 IAC 17.1-6-2 Incentive application contents
Authority: IC 8-1-1-3; IC 8-1-37
Affected: IC 8-1-37-4

Sec. 2. In order to be deemed complete, the incentive application of a participating electricity supplier must contain at least the following:
(1) Contact information of the electricity supplier.
(2) Total electricity measured in megawatt hours that was obtained by the electricity supplier to meet the energy requirements of its Indiana retail electric customers during the base year.
(3) Number of megawatt hours obtained each year of the CPS goal period for which the CHOICE incentive was granted from:
(A) clean energy resources:
(i) listed in IC 8-1-37-4(a);
(ii) as defined in this article; and
(iii) as may be adopted by rule by the commission;
(B) clean energy credits;
(C) Indiana clean energy sources; and
(D) clean energy resources listed in IC 8-1-37-4(a)(16) through IC 8-1-37-4(a)(21).
(4) A copy of the commission order:
(A) approving the electricity suppliers' participating in the CHOICE program; and

(B) determining what CHOICE incentive (if any) the electricity supplier should receive upon attaining each goal.

(5) Detailed explanation and supporting documentation on how the participating electricity supplier met the goal at issue. Supporting documentation may include reports from a third party tracking and trading system.

(6) Detailed explanation and supporting documentation for any variances from the electricity supplier's application plan to complete the goal.

(7) Work papers detailing all considerations and calculations in the incentive application. Each working paper must be:

(A) legible;

(B) paginated; and

(C) specifically identified.

(Indiana Utility Regulatory Commission; 170 IAC 17.1-6-2)

170 IAC 17.1-6-3 Expedited incentive application proceeding

Authority: IC 8-1-1-3; IC 8-1-37

Affected: IC 8-1-37

Sec. 3. (a) The scope of the incentive application proceeding shall be limited to whether the electricity supplier has met the CPS goal.

(b) The timeframe for the incentive application procedures shall be one hundred twenty (120) days from the application completion date, but may be extended upon:

(1) petition for good cause by the:

(A) electricity supplier;

(B) OUCC; or

(C) other intervening party; or

(2) notification by the commission.

(c) Within twenty (20) calendar days of the incentive application date, any party to the proceeding may file with the commission a notice of lack of completeness that the incentive application and work papers do not comply with this article, identifying:

(1) the alleged defect or defects; and

(2) the requirements necessary to cure the alleged defect or defects.

The notice shall be served upon the participating electricity supplier and all other parties to the proceeding.

(d) All filings by the electricity supplier to the commission under this rule shall also be served on the following:

(1) The OUCC on the same day as filed.

(2) Any other party to the proceeding that has filed a written request for the information:

(A) on the same day as filed; or

(B) within five (5) business days of the filing of the written request.

(e) The commission may request additional information it considers necessary:

(1) for the program application to be complete; and

(2) to aid in its review.

(f) The pre-hearing conference shall:

(1) if a notice of lack of completeness has been filed or the commission has requested additional information:

(A) resolve any issues regarding the completeness of the electricity supplier's incentive application and working papers; and

(B) set a date by which the electricity supplier shall cure any defects in its application and working papers;

(2) require that any objection (other than lack of completeness) to the incentive application and work papers be filed no later than forty-five (45) days after the application completion date; and

(3) set an evidentiary hearing date approximately sixty (60) days after the application completion date.

(g) If the incentive application is not complete by the prehearing conference, the commission through the presiding officers shall notify the parties when the incentive application is complete and make any necessary adjustments to the procedural schedule. *(Indiana Utility Regulatory Commission; 170 IAC 17.1-6-3)*

SECTION 5. 170 IAC 17 IS REPEALED.

Summary of REC Shelf-Life by State

States with Portfolio Standards	REC Shelf Life (DSIRE, UCS)	Notes
AZ	none	
CA	none	
CO	5 years	
CT	**2 years**	
DE	3 years	
DC	3 years	
HI	NA	
IA	**NA**	
IL	NA	
MA	3 years	
MD	3 years	
ME		shelf-life appears to be one year, but is dependent cost instead of time
MI	3 years	
MN	4 years	
MO	3 years	
MT		public utility may carry forward the amount by exceeded in either or both of the two subsequent compliance years.
NC	7 years	RECs must be purchased within three years of their generation, and must be retired within seven years recovered from when their cost was recovered.
NH	2 years	Banked RECs must be used before other RECs, starting with RECs that have the oldest issuance date
NJ	2 years	
NM	**4 years**	
NV	4 years	
NY	NA	
OH	5 years	
OR	**None**	RECs may be banked and carried forward indefinitely for future compliance
PA	2 years	
RI	2 years	
TX	3 years	
WA	**3 years**	
WI	4 years	An RRC created before January 1, 2004 may be used for compliance until December 31, 2011, after which it will expire. An RRC generated after January 1, 2004 may be used for compliance up to 4 years after the year in which it was created.

Articles describing methods, other than steam or hot water, that can be used to convert waste heat to electricity or mechanical processes that could qualify as a CEC.

Article #1: Nestle Cutting Costs with Efficient Waste Heat Recovery

- Use of ammonia instead of water in a heat pump.

Article #2 Capturing Waste Heat with Organic Rankine Cycle Systems

- Use of thermal or silicone oil instead of water in a Rankine cycle system.

Article #3: Powering Your Car with Waste Heat

- Use of thermoelectric semiconductors to convert heat to electricity.

ARTICLE #1

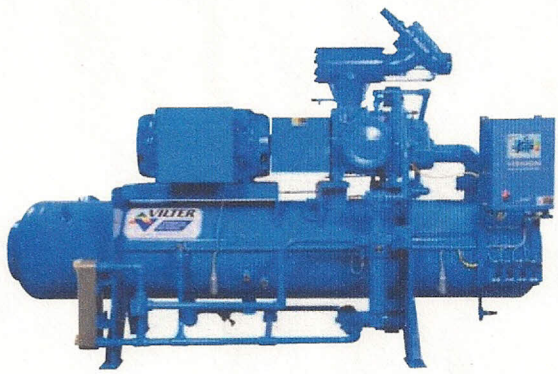
Nestlé cutting costs with efficient waste heat recovery

Result

- Process utility costs cut by $394,000 per year
- Waste heat recovery of 1130 kW
- High coefficient of performance heat pump
- Non-ozone depleting refrigerant with zero global warming impact
- CO2 reduction of 1.1 million pounds per year
- Vilter single screw compressor with ammonia refrigerant achieves increased performance
- 15% higher efficiency than comparable technologies
- Design for 20 years service without costly maintenance

Application

Innovative ammonia heat pump plant utilizing waste heat for energy saving heating and cooling system



Customer

Nestlé's confectionary production facility in Halifax, West Yorkshire, UK

Challenge

Nestlé started looking at its heating and cooling systems as a way to reduce the environmental footprint of its operations. Installing heat pumps to capture waste heat from industrial processes is increasingly popular in Europe, largely because the heat they deliver far exceeds the energy they consume, greatly reducing the reliance on fossil fuels and the need for additional renewable energy sources.

EMERSON
Climate Technologies

Nestlé relies on large refrigeration systems for both chocolate manufacturing and storage and distribution. Refrigeration is needed to cool chocolate, while heat is needed to separate the chocolate from the shaping molds. Nestlé was using one central coal fired steam generation plant, but wanted to find a way to capture waste heat to replace the need for gas fired equipment.

Nestlé wanted the highest coefficient of performance (COP) possible, and a technology solution with low annual operating and maintenance costs. The system needed to use a non-ozone depleting refrigerant with zero global warming impact.

One of the few refrigerants that could meet all of Nestlé's efficiency and environmental requirements was ammonia, an efficient refrigerant (designated as R-717) most commonly used by the food and beverage industry for process cooling and refrigeration. Ammonia does not contribute to ozone depletion or global warming, but has not been commonly used in high temperature industrial heat pump applications. In fact, not long ago the application was deemed impossible by the International Energy Agency's (IEA) Heat Pump Centre, which said there were no suitable high-pressure compressors available to make using ammonia a reality for high-temperature industrial heat pumps. When Emerson Climate Technologies and project partner Star Refrigeration got involved, a solution had to be found that would reduce total energy demand at the Halifax site, using only natural refrigerants to reduce the environmental impact of its manufacturing operations.

Solution

The dual-purpose ammonia heat pump system delivers chilled glycol at 32°F and hot water at 140°F using waste heat, and features Vilter single screw compressors. With the new system, heat can be taken from the 32°F process glycol and lifted to 140°F in one stage for heating. Since commissioning in May 2010, Nestlé Halifax is heating around 14,000 gallons of water each day to 140°F. And this hot water is delivered far more efficiently than from their previous coal-fired steam generator.

The ammonia heat pump solution has cut process utility costs at the Halifax site by over $394,000 per year. In addition, the reduction of gas combustion has reduced CO2 emissions by over 1.1 million pounds per year. The Nestlé system recently won the Industrial and Commercial Project of the Year title at the 2010 RAC awards.
By using ammonia, Emerson's compressor technology solution offered Star Refrigeration a refrigerant that has a good environmental profile (non-ozone depleting and zero global warming impact), delivers higher temperatures and provides superior performance benefits from its consumed resources than competing technologies.

In addition, the balanced radial and axial force design of the single screw compressor reduces stress on the unit's bearings, resulting in very low operating and maintenance costs while delivering a performance unachievable with any other type of compressor.

Resources

Learn more about the Vilter single screw compressor at:
EmersonClimate.com

ARTICLE #2

Print

Capturing Waste Heat with Organic Rankine Cycle Systems

By Robert Crowe, Contributor | January 24, 2011

ORC companies compete for U.S. marketshare.

Texas, USA -- Waste heat and low-temperature geothermal are hot sources of renewable energy that get a boost from Organic Rankine Cycle (ORC) systems.

In Brisbane, Australia, a 240-kW ORC unit at a timber plant will soon harvest heat from an existing biomass burner and generate electricity to power kilns for drying lumber. Similar ORC systems are becoming killer add-ons for other heat-based renewable energy plants, including concentrating solar and utility-scale geothermal systems.

"People are realizing now that, if you throw away heat, you're throwing away money," said David Paul, international business development manager for Pratt & Whitney, which designed the system for the Gympie Timber Company in Australia.

Typical geothermal systems generate electricity when water-based steam at high temperatures powers turbines. An ORC system uses a different fluid, such as thermal oil or silicon-based oil, which powers turbines at lower temperatures than those required for steam. ORC power plants have been known to generate power from geothermal sources with temperatures as low as 73.3°C (165°F) in Alaska. Utility-scale geothermal plants with steam turbines typically require water temperatures in excess of 350°F.

The ability to use lower temperature fluids make the ORC systems ideal for harvesting heat from industrial exhaust systems. They are typically configured with the following components:

- Heat source – This can be a geothermal water well, exhaust from an industrial facility, or heat from a biomass furnace or concentrating solar power system.
- Thermal oil – This intermediary component transfers heat from the source to the ORC unit.
- Rankine cycle – Oil from the thermal oil system warms oil in the ORC unit, creating temperatures high enough to power a turbine.

Pratt & Whitney is among the growing number of companies trying to introduce ORC en mass to the United States market. ORC systems have been generating heat and electricity with woody biomass sources for 20 years overseas. Europeans have embraced combined heat and power (CHP) ORC plants (such as the one in Australia) because they can operate with at to 85 percent efficiencies.

"When you look at the stacks on a nuclear plant or coal plant, they're releasing all that excess heat into the atmosphere, so they're only 20 to 30% efficient," said Bob Larson, CEO of Pennsylvania-based 1st Renewable Energy Technologies. "An ORC captures that excess heat, making 85% efficiencies possible."

Europe has 120 to 150 ORC CHP plants with capacities of multiple megawatts. Many use waste wood as biomass feed sources. Larson said environmental concerns, coupled with high fuel costs, jump-started Europe's investments in ORC plants in the 1980s. His company has formed a partnership with Maxxtech AG, one of Europe's leading ORC manufacturers, to target the American market, where cement plants and other industrial facilities have been capturing waste heat for years.

Paul said Pratt & Whitney has received a notable increase in inquiries about ORCs as waste heat has become a hot topic over the past year. The company, a division of United Technologies, recently sold a unit to the city of Albany, New York. Similar systems are also marketed by geothermal heavyweight Ormat Technologies Inc.

Challenges remain in expanding ORC use in the United States, especially when retrofitting at industrial plants. In many configurations, the ORC itself is only 50% of the total installation costs, which include heat transfer equipment and condensers to cool the systems.

"A lot of times there have to be incentives in place [to make the economics work]," Paul said.

Incentive programs have helped his company's ORC business expand to in India, Thailand and Indonesia.

Pratt & Whitney spokesman Bryan Kidder said its systems run $1,000 to $2,000 per kW. Larson said his CHP ORC systems can cost $925 kW compared to $5,000 to $7,000 per kW for other forms of renewable energy.

Larson envisions a time when Americans might install relatively small (2 to 5 MW) distributed ORC plants that provide heat and power to regional districts while operating independently of large transmission lines. He believes smaller, distributed plants are more efficient and could take advantage of ORC technology more sustainably.

"There's talk about 50 MW biomass plants in the U.S., but you kind of shoot yourself in the foot if you need to truck in biomass from 100 miles out just to fuel [the plant]," he said. "Smaller plants allow for more sustainable forestry."

http://www.renewableenergyworld.com/rea/news/article/2011/01/capturing-waste-heat-with-organic-rankine-cycle-systems

RENEWABLE ENERGY WORLD.COM

ARTICLE #3

Close Window

technology review
Published by MIT

Wednesday, May 25, 2011

Powering Your Car with Waste Heat

New thermoelectric materials will be tested in BMW, Ford, and Chevrolet vehicles by the end of summer.
By Prachi Patel

At least two-thirds of the energy in gasoline used in cars and trucks is wasted as heat. Thermoelectrics, semiconductor materials that convert heat into electricity, could capture this waste heat, reducing the fuel needs of the vehicle and improving fuel economy by at least 5 percent. But the low efficiency and high cost of existing thermoelectric materials has kept such devices from becoming practical in vehicles.

Now researchers are assembling the first prototype thermoelectric generators for tests in commercial cars and SUVs. The devices are a culmination of several advances made independently at thermoelectric device-maker BSST in Irwindale, California, and at General Motors Global R&D in Warren, Michigan. Both companies plan to install and test their prototypes by the end of the summer—BSST in BMW and Ford cars, and GM in a Chevrolet SUV.

BSST is using new materials. Bismuth telluride, a common thermoelectric, contains expensive tellurium and works at temperatures of only up to 250 °C, whereas thermoelectric generators can reach 500 °C. So BSST is using another family of thermoelectrics—blends of hafnium and zirconium—that work well at high temperatures. This has increased the generator efficiency by about 40 percent.

At GM, researchers are assembling a final prototype based on a promising new class of thermoelectrics called skutterudites, which are cheaper than tellurides and perform better at high temperatures. The company's computer models show that in its Chevrolet Suburban test vehicle, this device could generate 350 watts, improving fuel economy by 3 percent.

Fabricating skutterudites, which are cobalt arsenide compounds that are doped with rare earth elements such as ytterbium, is a time-consuming, complicated process, and incorporating them into devices is difficult, says GM scientist Gregory Meisner. The crucial challenge is making good electrical and thermal contacts. The large temperature gradient across the device puts mechanical stress on the contact-thermoelectric interface. Plus, joining the different materials introduces resistance that heats up the contact, degrading the device. "By a suitable choice of materials, you can affect resistance," he says. "The challenge is in arriving at the right formula for materials—both the semiconductor thermoelectric and the contact."

Another key challenge will be integrating the device into vehicles. The researchers have already tested a bismuth telluride generator in an SUV. "Right now, the device is just inserted into the exhaust system," Meisner says. "A section of pipe is cut out and the device, which looks like a muffler, is inserted. We need to design something that's more integrated into the vehicle system rather than an add-on device."

Both BSST and GM researchers also need to find ways to make larger volumes of the new materials cheaply. Meisner cautions that it might be at least another four years before thermoelectric generators make it into production vehicles.

naturalnews.com printable article

Originally published June 26 2011

Emerging green technology to capture 'waste' heat and turn it directly into electricity

by Jonathan Benson, staff writer

(NaturalNews) Researchers from the University of Minnesota's (UM) College of Science and Engineering are working with a new alloy material that they say is capable of turning waste heat -- like the kind emitted from vehicle exhaust pipes or from air conditioning units -- directly into electricity. Though still in its infancy, the technology has the potential to revolutionize the way heat is recycled, and it may one day offer individuals the ability to recycle an unlimited amount of heat into free energy.

"This research is very promising because it presents an entirely new method for energy conversion that's never been done before," said Richard James, head of the research team and professor of aerospace engineering and mechanics at the college. "It's also the ultimate 'green' way to create electricity because it uses waste heat to create electricity with no carbon dioxide."

Published in the new scientific journal *Advanced Energy Materials*, the findings explain how the scientists developed their new multiferroic alloy, known as Ni45Co5Mn40Sn10, which involves heat absorption caused by rapid transformations between solid states, which in turn produces electricity. Or to put it more simply, the unique alloy material absorbs heat when it morphs, and in generates electricity.

Multiferroic processes are not necessarily new, but the kind developed by the UM scientists minimizes a process called hysteresis, which basically infers the loss of heat energy during its conversion to electricity. By minimizing hysteresis, the scientists were able to capture and conserve breakthrough amounts of energy from their unique process.

"This research crosses all boundaries of science and engineering," added James. "It includes engineering, physics, materials, chemistry, mathematics and more. It has required all of us within the university's College of Science and Engineering to work together to think in new ways."

Sources for this story include:

http://www.eurekalert.org/pub_releases/2011-06/uom-uom062211.php

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