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# 2009 Model Wind Turbine Competition

## April 3, 2009

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### What is the Model Wind Turbine Competition?

Given a set of specific materials to work with, students use their skill and ingenuity to design and construct a working model wind turbine. The turbine needs to be solidly constructed and be able to generate electrical power.



### The Challenge

Mixed teams of four students (from the same school) will design and construct a model wind turbine. Design and construction will be judged by a panel of expert judges. Turbine voltage-generating capacity will be measured electronically and competitively in a progressive play down. Students will be given the materials to construct the turbine, and will have approximately 4 hours of building time.

### Who is it geared for?

Grade 9 students who are up to the challenge. Those who participate will have a great time! The experience helps develop new skills, in addition to strengthening their leadership, teamwork, and problem solving ability.



### Wind Power

Wind power is the fastest growing energy source in the world. In early 2006, world wind capacity reached 59,322 MW. According to the World Energy Council, if the current growth rate continues, global capacity will reach 150,000 MW by 2010.<sup>1</sup> Canada's wind energy market experienced its second best year ever in 2007. A total of 386 MW of new wind energy capacity was installed in 2007, increasing Canada's total by 26%. Canada now has 1,846 MW of installed wind energy capacity. 2007 was the third consecutive year of record setting growth, establishing wind power as one of the largest sources of new electricity supply for the country.<sup>2</sup>

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<sup>1</sup> Canadian Wind Energy Association, [www.canwea.ca](http://www.canwea.ca)

<sup>2</sup> Global Wind Energy Council, [www.gwec.net](http://www.gwec.net)

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## What is the cost?

Each team is responsible for a \$75.00 team entrance fee which includes:

- 1—3.5 volt hobby motor
- 3 Paper, regular bond, 8.5" x 11" sheets
- 4 Poster board, 22" x 28", sheets
- 1 Balsa wood, 4" x 36" x 1/8" sheet
- 1 Balsa wood, 4" x 36" x 1/16" sheet
- 1 Particle board, 12" x 12" x 3/4", piece
- 1 Tube adhesive
- 1 Roll masking tape
- 3 Wood propeller mounts, circles, 1.75" diameter
- 1 Retractable utility knife
- 1 Pair scissors
- 1 Geometry set
- 1 LED



**Note:** No other tools or materials will be allowed in the construction of the model wind turbine.

**Lunch** will be provided for student participants only.

## Awards

- Best Design
- Best Construction
- Highest Voltage

## Tentative Schedule for the Day

- |                       |   |
|-----------------------|---|
| • 8:30 am — 9:00 am   | Arrivals and Registration                         |
| • 9:00 am — 9:15 am   | Announcements and Instructions                    |
| • 9:15 am — 10:30 am  | Turbine Construction                              |
| • 10:30 am — 10:45 am | Break (Advisors may consult with team)            |
| • 10:45 am — 12:00 pm | Turbine Construction                              |
| • 12:00 pm — 12:45 pm | Lunch (Provided). No advisor contact              |
| • 12:45 pm — 1:30 pm  | Final Touch Ups / Turbine Design and Construction |
| • Judging             |   |

**Send completed registration forms and team entrance fee before 4:00 p.m on March 11, 2009 to:**

**Saskatchewan Applied Science Technologists and Technicians (SASTT)**

**363 Park Street**

**Regina, SK S4N 5B2**

**Phone: (306) 721-6633**

**Fax: (306) 721-0112**

**Email: [info@sastt.ca](mailto:info@sastt.ca)**

**Website: [www.sastt.ca](http://www.sastt.ca)**



# Model Wind Turbine Competition Sponsors

The Saskatchewan Applied Science Technologists and Technicians (SASTT), Skills Canada Saskatchewan, the Saskatchewan Institute of Applied Science and Technology (SIAST), SaskTel, and the Cornwall Centre, have collaborated to sponsor a competition focused on wind energy. Grade 9 students across Saskatchewan have an opportunity to use their knowledge, skills, leadership, teamwork, and ingenuity to design and build a working model wind turbine in a one-day competition.



The **Saskatchewan Applied Science Technologists and Technicians (SASTT)** is a 43 year old self-governing body that protects the public by regulating the profession of applied science and engineering technology. Professional Applied Science Technologists (A.Sc.T.), and Certified Technicians (C.Tech.) work in disciplines such as Biological Sciences, Biomedical, Building (Architectural), Chemical, Civil, Electrical, Electronics, Environmental, Forestry, Gas & Petroleum, Geomatics (Surveying), Industrial, Mechanical, Metallurgical, Mining, Instrumentation, and Water Resources. [www.sastt.ca](http://www.sastt.ca)

Who is **Skills Canada Saskatchewan**? Skills Canada Saskatchewan is a not-for-profit, charitable organization that works with youth, parents, communities, industry and government to increase awareness of the rewarding careers available in skilled trades and technology.



[www.skillscanadasask.com](http://www.skillscanadasask.com)



The **Saskatchewan Institute of Applied Science and Technology (SIAST)** is a leader in superior education, focused on students and lifelong learning - a catalyst for advancing the social and economic prosperity of Saskatchewan.

[www.siastr.com](http://www.siastr.com)

**SaskTel** is the leading full service communications provider in Saskatchewan, offering competitive voice, data, dial-up and high speed internet, entertainment and multimedia services, security, web hosting, text and messaging services, and cellular and wireless data services over its digital networks.



[www.sasktel.com](http://www.sasktel.com)

Details for the 2009 Model Wind Turbine Competition are:



- **Cornwall Centre (beside SaskTel)**
- **Friday, April 3, 2009**
- **8:30 am — 4:00 pm**  
2101—11th Avenue  
Regina, SK  
[www.cornwallcentre.ca](http://www.cornwallcentre.ca)

# Model Wind Turbine Competition

## *The Challenge*

Four Grade 9 students from the same school will design and construct a working model wind turbine. The students will be given specific materials to construct the wind turbine and will have approximately **four hours** of building time at the competition site. However, teams may **not** pre-construct a model wind turbine and bring to the competition.

The model wind turbine will need to be solidly constructed and able to generate electrical power, which will be measured. Wind simulation will be created by a fan situated at a measured distance from the wind turbine being tested.

Model wind turbines will be judged in three categories: (a) design; (b) construction; and (c) voltage-generating capacity. Each wind turbine design and construction will be judged by a panel of expert judges. Turbine voltage-generating capacity will be measured electronically and competitively in a progressive play down. Three trophies will be awarded — one for each category.

## *Teachers*

Teachers, the advisors are allowed to provide guidance and advice **before** the competition starts and during one 15-minute break. The challenge is designed to test problem-solving skills and involves a broad base of curriculum including:

- Turbine and blade design research
- Wind power/energy and geographical constraints
- Electricity generation theory and practice
- Construction principles: structure and strength
- Adhesives and bonding
- Leadership
- Teamwork
- Time Management

## *Eligibility*

A maximum of **twelve** (12) teams can be accommodated for this competition.

- Schools may enter **one** (1) mixed team of four Grade 9 students each. If there are not 12 entries from different schools by the deadline, a second team may be entered.
- Team registration is on a first-come, first-serve basis.
- Each team must have one teacher / advisor.
- Teams must be comprised of students from the same school.
- Teams must be mixed (at least one person on the team must be of the opposite gender).

## *Specifications*

- Each team will choose a team name to be included on the Registration Form.
- Each team will be assigned a team number for the duration of the competition.

## *Tools and Materials*

These tools and materials will be supplied by the sponsors:

<u>Item</u>	<u>Quantity</u>
• 3.5 volt hobby motor	1
• Paper, regular bond, 8.5" x 11" (21.6 cm x 27.94 cm), sheets	3
• Poster board, 22" x 28" (55.9 cm x 71.1 cm), sheets	4
• Balsa wood, 4" x 36" x 1/8" (10.2 cm x 91.4 cm x .32 cm), sheet	1
• Balsa wood, 4" x 36" x 1/16" (10.2 cm x 91.4 cm x .16 cm), sheet	1
• Particle board, 12" x 12" x 3/4" (30.5 cm x 30.5 cm x 1.92 cm), piece	1
• Tape, masking, roll	1
• Adhesive, tube	1
• Propeller mounts, wood, circles, 1.75" (4.45cm) diameter	3
- Slotted, 4-blade	
- Slotted, 8-blade	
- Blank	
• Utility knife, retractable	1
• Scissors, pair	1
• Geometry set	1
• LED	1

**(Note: No other tools or materials will be allowed in the construction of the model wind turbine.)**

## *Design and Construction Rules and Regulations*

1. Each team must bring TWO COPIES of the model wind turbine design sketch or blueprint.
2. The design must show evidence of originality and not just be something captured from a website.
3. The quality of the sketch or blueprint will be an evaluation factor.
4. Students will receive the standard list of materials and equipment on competition day and construct the project for judging in the afternoon.
5. A sample design will be on display at the competition.
6. Teams may choose to appoint a Team Leader, but teamwork, participation by all team members, and time management will be evaluated.

## *Judging Criteria*

### **Design**

1. Evidence of originality
2. Quality of wind turbine sketch or blueprint
3. Appropriately-labelled components

### **Construction**

1. Adherence to design
2. Structural soundness
3. Economic use of materials
4. Quality of construction
5. Leadership, participation and teamwork

## Power (Voltage Generation)

1. Highest voltage generated under test conditions.
2. Where a tie occurs, the quality of construction will be judged as the tie breaker.

## Voltage Generation Test Procedure

1. The model wind turbine is positioned on a 30"x 8' table, 24" from a three-speed, 16" (40.6 cm), oscillating pedestal fan, which stands 44" (112cm) high, but is extendable to 53" (135 cm). Manual support or touching of the turbine during the test period is **not** allowed. Materials will be provided to prevent the base from sliding.
2. A digital voltmeter is attached across the load device.
3. The fan is turned on and stepped through the three speeds in 20 second intervals.
4. The highest voltage reading at each speed is recorded. The highest aggregate score at the three speeds will win the category.
5. The model wind turbine must survive the entire one-minute test intact to be eligible to win in this category.
6. There will be a play down among the 12 teams to determine the ultimate winner in this category.

## *On the Competition Day*

1. Team members should expect to arrive at the **Cornwall Centre**, by **8:30 a.m.** on competition day (Friday, April 3, 2009).
2. Lunch will be provided for student participants only. If students feel they require additional sustenance, it is recommended they bring it with them (e.g. granola bars, fruit, juice boxes, etc.). Lunch is not provided to teachers / advisors.
3. An information package will be provided to all participating schools upon arrival and registration.

## *Schedule for the Day*

### Time

8:30 am — 9:00 am  
9:00 am — 9:15 am  
9:15 am — 10:30 am  
10:30 am — 10:45 am  
10:45 am — 12:00 pm  
12:00 pm — 12:45 pm  
12:45 pm — 1:30 pm  
1:30 pm

### Activity

Arrivals and Registration  
Announcements and Instructions  
Turbine Construction  
**Break** (Advisors may consult with team)  
Turbine Construction  
Lunch (Provided). No advisor contact  
Final Touch Ups / Turbine Design and Construction  
Judging

## *Awards*

- Best Design — Trophy sponsored by SASTT
- Best Construction - Trophy sponsored by Skills Canada Saskatchewan
- Highest Voltage - Trophy sponsored by SIAST

**DEADLINE for registration forms is 4:00 p.m. on March 11, 2009. These forms may be faxed or mailed to:**

**SASTT, 363 Park Street, Regina, SK S4N 5B2. Fax: (306) 721-0112. Phone: (306) 721-6633. Contact SASTT for additional information.**

**2009 Model Wind Turbine Competition**  
**Friday, April 3, 2009**  
**Registration Form**

**FORMS AND FEES (\$75.00 per team) MUST BE SENT TO THE SASTT OFFICE  
BY MARCH 11, 2009.**

**Complete this form to its entirety. Incomplete or illegible forms will not be processed.  
All payments must be made to SASTT.**

**PARTICIPANT INFORMATION**

I AM A: (Check One) PARTICIPANT \_\_\_\_\_ ADVISOR \_\_\_\_\_

NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

CITY: \_\_\_\_\_ POSTAL CODE: \_\_\_\_\_

PHONE: \_\_\_\_\_ HOSPITALIZATION NUMBER: \_\_\_\_\_

EMAIL: \_\_\_\_\_

EMERGENCY CONTACT'S NAME: \_\_\_\_\_

EMERGENCY CONTACT'S PHONE: \_\_\_\_\_

SCHOOL NAME: \_\_\_\_\_ SCHOOL PHONE: \_\_\_\_\_

ADVISOR'S NAME: \_\_\_\_\_

TEAM NAME: \_\_\_\_\_

**CONDITIONS OF PARTICIPATION AND ATTENDANCE**

**CODE OF CONDUCT**

SASTT, SIAST, SaskTel, the Cornwall Centre, and Skills Canada Saskatchewan and all of its provincial and territorial members are dedicated to ensuring that everyone who attends in the 2009 Model Wind Turbine Competition event has an enjoyable experience with maximum attention paid to safety and comfort. Therefore, the sponsors have established a mandatory "Code of Conduct". It is with this spirit of being a proud participant in this event that I agree to follow these rules of professional conduct.

1. My conduct shall be exemplary at all times.
2. I will, at all times required, wear my identification badge / tag.
3. I will attend activities to which I am assigned and registered and will be on time.
4. I will adhere to the dress code and safety regulations at all times as required.
5. I will spend every moment in my assigned area.
6. I will respect all public and private property.
7. I will refrain from the use of alcoholic beverages and drugs (except prescribed medication).

## CONDITIONS OF PARTICIPATION AND ATTENDANCE....(Con't)

The participant acknowledges that his / her chaperone is responsible for the participant from the participant's departure point until the return of the participant to his / her original point of departure. It should be noted that your assignment is voluntary and, as such, you agree to abide by the official SASTT, SIAST, SaskTel, the Cornwall Centre, and Skills Canada Saskatchewan and all of its provincial and territorial members' "Rules and Regulations" and "Conditions of Participation" or forfeit your personal rights to attend and participate in the 2009 Model Wind Turbine Competition. Violators may be sent home at their own expense. Proper notification of the violation and action taken will be sent to the organization responsible for the participant. In addition, the participant shall be responsible for any costs incurred by the Model Wind Turbine Competition on behalf of the participant.

### Liability Release

I / We hereby agree to release SASTT, SIAST, SaskTel, the Cornwall Centre, and Skills Canada Saskatchewan and all of its provincial and territorial members, its representatives, agents, servants and employees from liability for any injury to the named persons, resulting from any cause whatsoever occurring to the named person at any time while attending any SASTT, SIAST, SaskTel, the Cornwall Centre, and Skills Canada Saskatchewan and all of its provincial and territorial members activities, including travel to and from these activities. I / We hereby confirm that I am responsible for my health and that I acknowledge my / our responsibility to ensure that I / we protect myself / our child from any allergies (food or otherwise) or health concerns which may affect my / their ability to participate in the 2009 Model Wind Turbine Competition event. I / We hereby agree to release SASTT, SIAST, SaskTel, the Cornwall Centre, and Skills Canada Saskatchewan and all of its provincial and territorial members, its representatives, agents, servants, and employees from liability resulting from medical conditions, including medications, allergies, disabilities and the like which may affect my ability to participate and / or which results in illness or death while attending any SASTT, SIAST, SaskTel, the Cornwall Centre, and Skills Canada Saskatchewan and all of its provincial and territorial members activities, including travel to and from these activities.

### Medical Acknowledgement

I / We hereby acknowledge that I am medically fit and I have no medical conditions that would interfere with my attendance at the 2009 Model Wind Turbine Competition and acknowledge my responsibility to disclose any medical condition that could compromise my safety or the safety of others while I attend or participate in the 2009 Model Wind Turbine Competition. I / We do voluntarily authorize SASTT, SIAST, SaskTel, the Cornwall Centre, and Skills Canada Saskatchewan and all of its provincial and territorial members to obtain emergency medical treatment and diagnostic procedures for the named person as deemed necessary in reasonable medical judgment. I / We agree to indemnify and hold harmless SASTT, SIAST, SaskTel, the Cornwall Centre, and Skills Canada Saskatchewan and all of its provincial and territorial members for any and all claims, demands, actions, rights of action, and / or judgements by or on behalf of the named person arising from or on account of said procedures and / or treatment rendered in good faith and according to accepted medical standards.

### Release of Information / Photos

I / We understand and agree that any information pertaining to my participation in SASTT, SIAST, SaskTel, the Cornwall Centre, and Skills Canada Saskatchewan and all of its provincial and territorial members' activities may be sent to other organizations; i.e. media, schools, organizations, my local Member of Parliament and / or Member of the Provincial Parliament, etc. I / We agree that still photographs and videotapes of me taken during the course of SASTT, SIAST, SaskTel, the Cornwall Centre, and Skills Canada Saskatchewan and all of its provincial and territorial members' activities become the property of SASTT, SIAST, SaskTel, the Cornwall Centre, and Skills Canada Saskatchewan and all of its provincial and territorial members and may be used and reproduced by SASTT, SIAST, SaskTel, the Cornwall Centre, and Skills Canada Saskatchewan and all of its provincial and territorial members in the promotional materials and bulletins. I / We also understand that SASTT, SIAST, SaskTel, the Cornwall Centre, and Skills Canada Saskatchewan and all of its provincial and territorial members may communicate with me or with my parent or guardian if I am under the age of majority.

*Having read and understood completely SASTT, SIAST, SaskTel, the Cornwall Centre, and Skills Canada Saskatchewan and all of its provincial and territorial members' "Code of Conduct, Liability Release, Medical Acknowledgement, and Release of Information / Photos" and, by signing the SASTT, SIAST, SaskTel, the Cornwall Centre, and Skills Canada Saskatchewan and all of its provincial and territorial members' Registration Form, I do hereby agree to follow the procedures and practices described.*

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Date

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Signature of Participant

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Signature of Guardian

**\*\*NOTE: FULL PAYMENT OF THE \$75.00 TEAM ENTRANCE FEE IS DUE WITH SUBMISSION OF THE REGISTRATION FORM.**