



4th Annual Model Wind Turbine Competition

WIND POWER is the fastest growing energy source in the world. In 2006, the total installed wind power capacity worldwide reached 74.2 gigawatts (GW), which represented a massive increase over the previous decade.¹ Although a relative newcomer to wind farm development, Canada's energy industry has grown rapidly since 2000, with installed capacity increasing by an average of 51% annually. Canada's current installed capacity is 1,492 megawatts (MW).²

The Province of Manitoba invested in a 99MW wind farm at St. Leon in 2005, which resulted in the installation of 63 wind turbine generators which have sufficient power to serve approximately 35,000 homes. The province plans to develop 1,000 MW of wind power over the next decade and to invest up to \$2 billion in the industry.



Accordingly, Skills Canada Manitoba (SCM), the Certified Technicians and Technologist Association of Manitoba (CTTAM) and Red River College (RRC) have collaborated to establish a competition focused on wind energy. Grade 9 and 10 students across Manitoba 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 during National Technology Week, which runs from November 1 - 5, 2010. The essential details for the competition are:



- Monday, November 1, 2010
- 9:00 a.m. - 3:00 p.m.
- Red River College
Notre Dame Campus
South Gymnasium

¹ Global Wind 2005 Report, <http://gwec.net>

² Canadian Wind Energy Association, <http://www.canwea.ca>

The Challenge

Four Grade 9 or Grade 10 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 **2 hours** of building time at the competition site. However, teams may **not** pre-construct a model wind turbine to use during 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:

Teacher 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 **sixteen (16)** teams can be accommodated for this competition.

- Schools may enter **one (1) mixed** team of four Grade 9 or Grade 10 students each. If there are not 16 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 comprise students from the same school.

- Teams must be mixed teams (at least one person on the team must be of the opposite gender).
- Completed Registration forms are required by 4:00 p.m. on **October 22, 2010**. These may be faxed or mailed to (204) 927 - 0258 (Fax) or Skills Canada Manitoba 31 - 1313 Border Street, Winnipeg, MB R3H 0X4 (Mail).

⇒ 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 will be supplied by the sponsors:

<u>Item</u>	<u>Quantity</u>
• Small DC motor with mounted LED.....	1
• 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 base, 12" x 12" x 5/8" (30.5 cm x 30.5 cm x 1.58 cm), piece..	1
• Tape, masking, roll.....	1
• Adhesive, tube.....	1
• Wood, circles for propeller hubs, 1.75" (4.45 cm) diameter.....	3
~ One Slotted at 30 degrees, 4-blade	
~ One Slotted at 30 degrees, 8-blade	
~ One Blank	
• Utility knife, retractable.....	1
• Scissors, pair.....	1
• Geometry set.....	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. Students may use the supplied material in whatever manner they see fit to achieve their design.
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 3' x 8' table, 36" from a three-speed, 20" high velocity fan. Manual support or touching of the turbine during the test period is not allowed. Weights 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 of approximately 12, 16 and 22 kilometres per hour 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 teams to determine the ultimate winner in this category.

On the Competition Day

1. Team members should expect to arrive at the Red River College South Gym, Notre Dame Campus, by 9:00 a.m. on competition day (November 1, 2010).
2. Lunch will be provided by Skills Canada Manitoba 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 but may be pre-purchased for an additional \$7.50. (payment is due with submission of registration forms.)
3. Evaluation forms will be provided to all participating schools upon arrival and registration in the information package.

Schedule for the Day

<u>Time</u>	<u>Activity</u>
9:00 - 9:30 a.m.	Arrivals and Registration
9:30 - 9:45 a.m.	Announcements and Instructions
9:45 - 10:45 a.m.	Turbine construction
10:45 - 11:00 a.m.	<i>Break - Advisors may meet with team</i>
11:00 - Noon	Turbine construction
Noon - 12:45 p.m.	Lunch (Provided)
12:45 - 1:30 p.m.	Final Touch-Ups/Turbine Design and Construction Judging
1:30 - 2:30 p.m.	Voltage Generation competition play down
2:30 - 3:00 p.m.	Awards presentations

Awards

- *Best Design* - Skills Manitoba Trophy
- *Best Construction* - Certified Technicians and Technologists Association of Manitoba (CTTAM) Trophy
- *Highest Voltage* - Red River College Trophy

For additional information contact:

Skills Canada Manitoba
(204) 927-0250 or skillsmb@mts.net

2010
4th Annual
Model Wind Turbine Competition
Monday, November 1, 2010
Registration Form

Please note that this event will be held in the South Gym at Red River College, Notre Dame Campus, Winnipeg

FORMS AND FEES (\$80 per team) MUST BE SENT TO THE SKILLS OFFICE BY **October 22, 2010**
Complete this form to its entirety. Incomplete or illegible forms will not be processed. All payments must be made to Skills Manitoba, 31-1313 Border Street, Winnipeg, MB, R3H 0X4

PARTICIPANT INFORMATION

I AM A: (CHECK ONE) PARTICIPANT _____ ADVISOR _____
MALE _____ FEMALE _____ DATE OF BIRTH (MM/DD/YEAR) _____
NAME: _____
ADDRESS: _____
CITY: _____ POSTAL CODE: _____
PHONE: _____ MEDICAL NUMBER _____
EMAIL _____
EMERGENCY CONTACT'S NAME: _____
EMERGENCY CONTACT'S PHONE: _____
SCHOOL: _____
ADVISOR'S NAME: _____
ADVISOR'S E-MAIL ADDRESS: _____
TEAM NAME: _____

VOLUNTARY INFORMATION

NATIVE ANCESTRY: (PLEASE CHECK ONE)
REGISTERED/STATUS FIRST NATION _____ NON-STATUS FIRST NATION _____
MÉTIS _____ INUIT _____
ARE YOU AN IMMIGRANT TO CANADA? YES _____ No _____
IF YES, WHAT IS YOUR COUNTRY OF ORIGIN? _____

CONDITIONS OF PARTICIPATION AND ATTENDANCE

Code of Conduct

Skills Canada Manitoba and all of its provincial and territorial members are dedicated to ensuring that everyone who attends a Skills Canada Manitoba event has an enjoyable experience with maximum attention paid to safety and comfort. Therefore, the Skills organization has established a mandatory "Code of Conduct." It is with this spirit of being a proud participant in a Skills 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 Skills Canada Manitoba 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 2010 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 Skills Canada Manitoba and all of its provincial and territorial members, its representatives, agents, servants and employees from liability for any injury to the named person, resulting from any cause whatsoever occurring to the named person at any time while attending any Skills Canada Manitoba 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 Skills Canada Manitoba events. I/WE hereby agree to release Skills Canada Manitoba 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 Skills Canada Manitoba 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 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 Model Wind Turbine Competition. I/WE do voluntarily authorize Skills Canada Manitoba 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 Skills Canada Manitoba and all of its provincial and territorial members for any and all claims, demands, actions, rights of action, and/or judgments 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 Skills Canada Manitoba 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 Skills Canada Manitoba and all of its provincial and territorial members' activities become the property of Skills Canada Manitoba and all of its provincial and territorial members and may be used and reproduced by Skills Canada Manitoba and all of its provincial and territorial members in promotional materials and bulletins. I/WE also understand that Skills Canada Manitoba 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 Skills Canada Manitoba and all of its provincial and territorial members' "Code of Conduct, Liability Release, Medical Acknowledgement, and Release of Information/Photos, and, by signing the Skills Canada Manitoba and all of its provincial and territorial members' Registration Form, I do hereby agree to follow the procedures and practices described.

Date

Signature of Participant

Signature of Parent/Guardian

****Note: Lunch for advisors is not included but may be pre-ordered for \$7.50.**

Please note that payment is due with submission of registration forms.

Pre-order lunch? Yes _____ No _____