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SNOWFARMING –
YOUR GUARANTEE FOR A SECURED SEASON START

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- Snowfarming snow storages
- Early snow production with immediate active protection
- Ice and glacier conservation
- Glacier reparations
- Protection of permafrost
- Rebuilding of permafrost
- Artificial glaciers and ice caves

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Snowfarming means in effect to store snow during the summer time, to maintain it and continue to process it in autumn

Winters of less snow are very hard for tourist regions in Alpine valleys and show, how dependent upon the precious «White» also higher located ski resorts are.

Since a few years SSC SWISS SNOW CONSULT develops and researches most efficient technologies and equipments for Snowfarming, so that snow can be stored during summer time.
How it goes on: By the end of winters, mighty piles of technical and natural snow get deposited on the slopes in suitable locations and get covered with one or several insulating and reflecting coverages.

This isolating coverage protects the underlying snow against melting. The herewith conserved snow provides as a basis for the preparation of cross-country ski trails, ski slopes or ski jumps at the beginning of the following winter. Snowfarming makes largely possible an all-weather and an early start into the winter season or is a snow guarantee for a day X for a sports event.

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Snowfarming – the costs

The costs for storing and covering 1m3 of snow are approximately the same as for the production of 1m3 machine made snow.

If there are falling big quantities of natural snow, then the snow does not have to be produced before storing it, what in fact would be the most efficient way.

If the snow for storage is produced with snow guns at very cold temperatures in January and February, on that basis the costs for the snow production are relatively favourable. It pays off because the temperatures are often marginal in autumn so that the costs for the production of 1m3 snow will be more expensive.

A change of snowmaking strategy is more and more happening

The needed snow for the coming season is more and more produced in the winter (January/February) before and not anymore in fall before of the winter season.

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The additional costs for snow storage will be compensated by the following facts:

1. The start of the winter season is exactly projectable at a certain date
2. An opening event ceremony or sports event with all the side effects brings big returns
3. Through early resort opening, guests are motivated to buy season tickets
4. A huge PR effect is happening, combinated with a cleverer marketing
5. High presence in medias (TV, radio, social media)
6. Training possibility on real snow for juniors or sale of training time blocks or commercial public skiing
7. The estivated snow does not have to be produced in autumn (production costs per m3 snow = from € 1.00 to € 3.00)

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The loss of snow during summer is depending on many factors:

1. Altitude about sea level of storage location

2. Impact of sun radiation in hours per day

3. Geographical exposition of storage location
   - ➡ North and East = very good
   - ➡ South and West = if possible avoid!

4. Shady location with less sun are perfect locations

5. A drainage in the ground below the snow storage will be helpful to get melting water out

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The loss of snow during summer is depending on many factors (continuation):

6. Choice of protection material:

   It is absolutely necessary that the snow can breath through the used protection material.
   Water will melt and evaporate and creates an evaporation cooling.
   If the snow can't breath, there will be an ice layer between the snow pile and the protection material, what will cause a bad snow quality with pieces of ice.

7. How many layers of protection fleece will be used and how strong the sun reflection of that material is

ALL SUNLIGHT THAT IS NOT REFLECTED IS GOING INTO THE COVERED SNOW AS HEAT

Under calculation of all above points and the available budget and the provided labour input, it will be decided how many layers of protection material will be placed.

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Early snow production and immediate protection

At the normal machine made snow production in early autumn with normal snow guns or with the snow production of snow factories or plus temperature snow machines already in September, the snow must be covered immediately right after the production in order to protect the snow from melting through warmer periods of time in October, November and December.

The snow will be uncovered from fleece before basic preparation with grooming machines in regard to the slope opening date.

Short time autumn protection for:

- **Sun, rain, atmospheric heats, warm winds and pollution**

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In general

In average we calculate a loss of 15-30 % during summer time.

This is depending on material and how many layers are used to cover the snow.

New research projects for snow storage are also used with special insulating materials between two layers of fleece.

The calculation of needed volume of snow in the end of the winter must respect and add these 15-30 % to the covered volume.

The protection fleeces are used in average for 3-5 years and after this time, they must be changed because of dirt or air pollution.

The covering material must be as white as possible to give as much reflection as possible.

With all these points we know today with 100 % security, snow can be stored during summer!

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Example for the calculation of the needed snow volume:

Length of slope 1000m, width 40m, height of snow 0,7m;
means 40x1000x0,7 = **28 000m3** snow is needed

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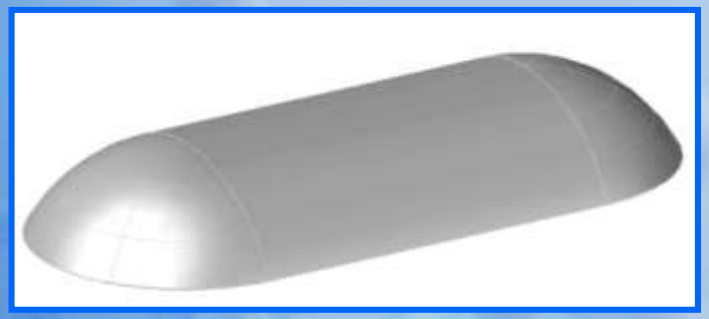
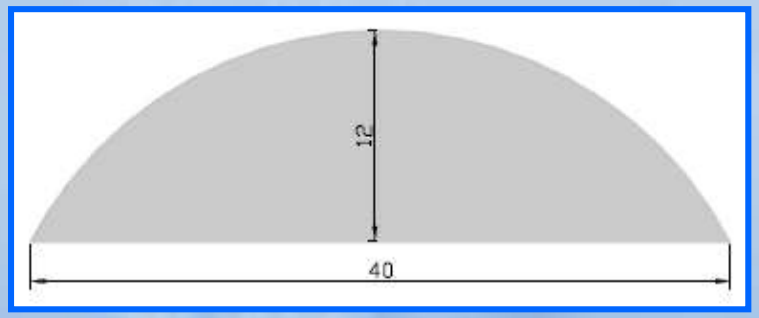
Snow storage / example





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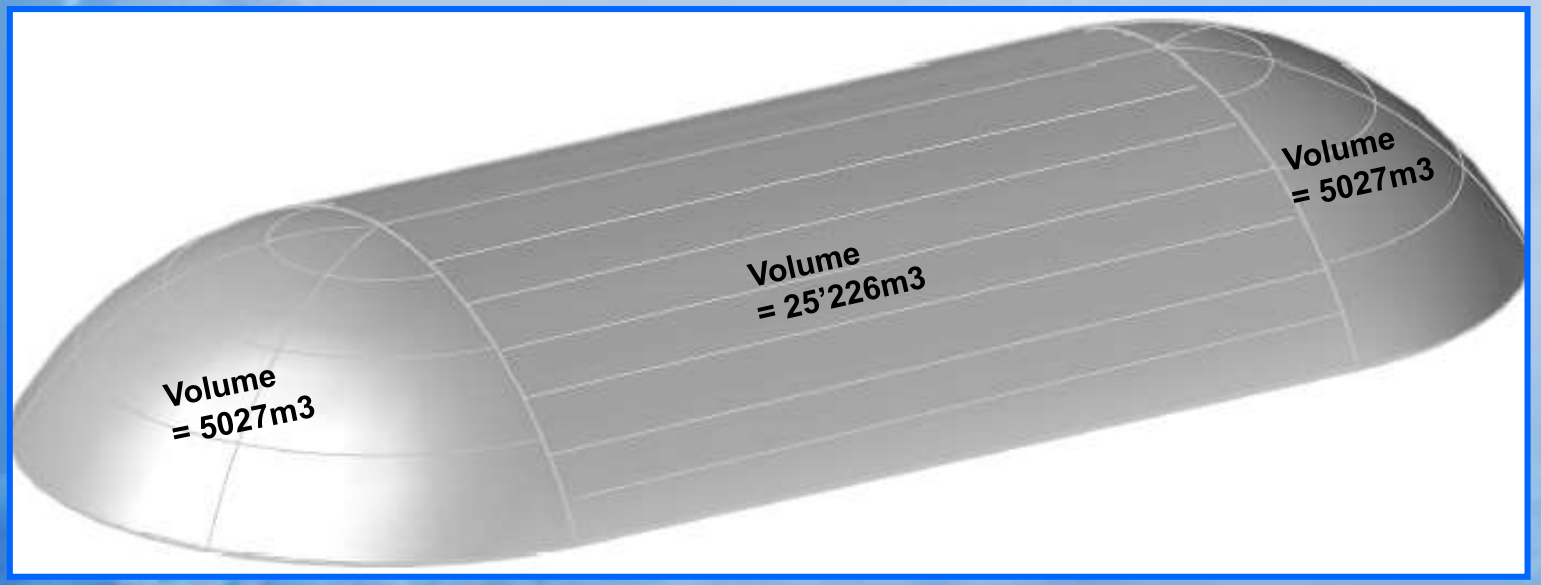
Calculation of snow storage snow volume / example



- For slope production needed snow volume: 28'000m3
- + consideration of snow melting during the summer + 26% = 7'280m3
- Total needed snow volume: 35 280 m3 (28'000m3 + 7'280m3)

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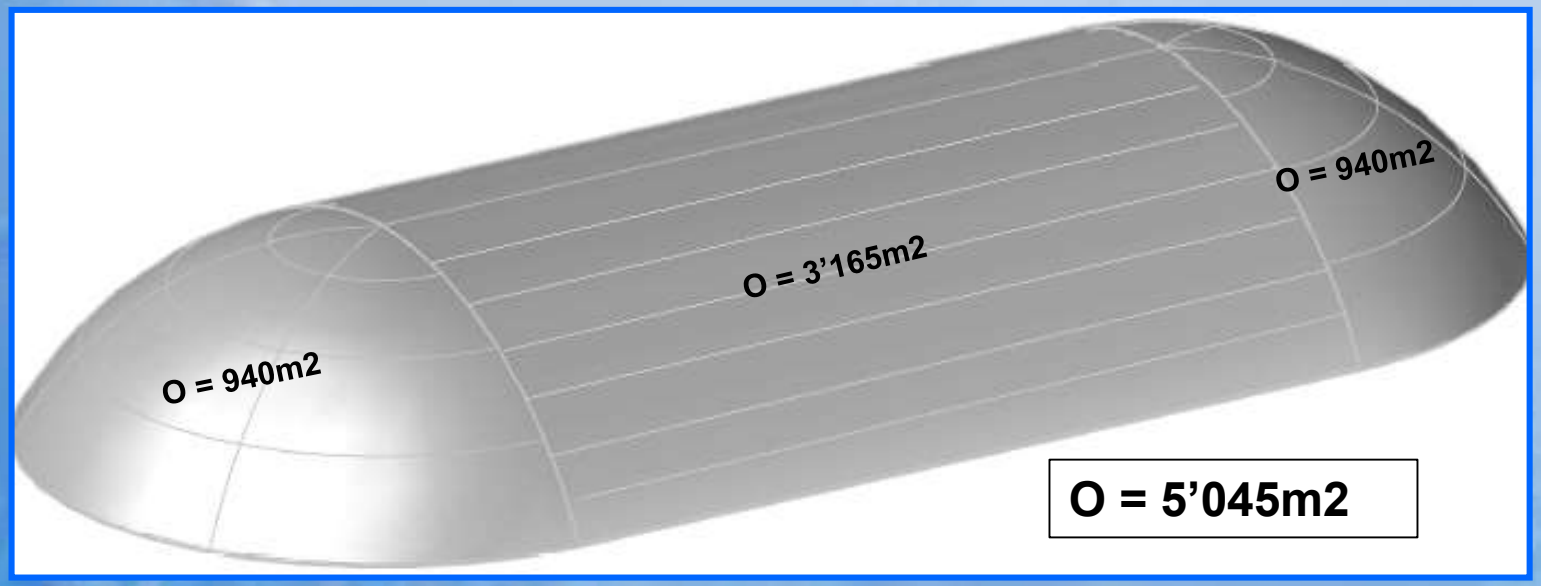
Surface of snow storage and needed coverage material / example



- **If this snow storage is covered with 1 layer of fleece, in minimum 17 rolls of fleece à 6 x 50m are needed.**
- **If this snow storage is covered with 2 layers of fleece, in minimum 34 rolls of fleece à 6 x 50m are needed.**

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Project Zermatt, Switzerland, 2018

High mountain snow storage at 2’900m. above sea level, approx. 15’000 m3

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Project Zermatt, Switzerland, 2018

Snow storage 15’000m3, enough for a slope with 850m length, 35m width and 0,5 m height

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Project Zermatt, Switzerland, 2018

SSC high mountain-windbreak system for wind speeds up to 200 kmh

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Project Zermatt, Switzerland, 2018

SSC security net for layed fleeces

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Project Zermatt, Switzerland, 2018

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fleece connections

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Project Zermatt, Switzerland, 2018

Laying of
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Project Zermatt, Switzerland, 2018

Ballast rolls for protection fleeces

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Snow storage Snowfarming

The last years have shown, that the temperatures for a technical snow production in November and December are often not sufficient for producing the needed snow.

Since the Olympic Games in Sochi, SSC SWISS SNOW CONSULT has intensively confronted the planning, processing and constructing of snow storages and executed and supported Europe-wide different projects.

Many ski resorts are meanwhile working with this technology and store the in spring produced snow during the summer time for the beginning of the next season.

If the over summer time stored snow is correctly covered and maintained, in autumn appears a surprising good and resistant snow quality and the season beginning for slopes and cross-country ski trails in October or November already are no more a rarity.

Here are some reference projects in Europe:

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Project Ruka, Finland

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Project Livigno, Italy

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Project Folgefonna, Norway

Glacier repair, approx. 20’000m2 covered glacier maintain the Folgefonna-glacier at valley station since many years

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Project Folgefonna, Norway

In the end of the summer, the protection effect is significantly visible. The covered glacier is up to 4m higher.

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Project Folgefonna, Norway

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Project Folgefonna, Norway

Difference after 1 day:
15-18 cm melted

Difference after 9 days at an average outside temperature of 15-25°C: 70 cm melted

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extensive glacier protection

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Project Geilo, Norway

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Project Geilo, Norway

Season opening September 23, at +15°C

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Project Geilo, Norway

500m training slope and Snowpark, approx. 30’000m3 snow

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Project Sjusjøen, Norway

Biathlon stadium, approx. 20’000m3 snow

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Project Sjusjøen, Norway

Biathlon stadium, approx. 20’000m3 snow

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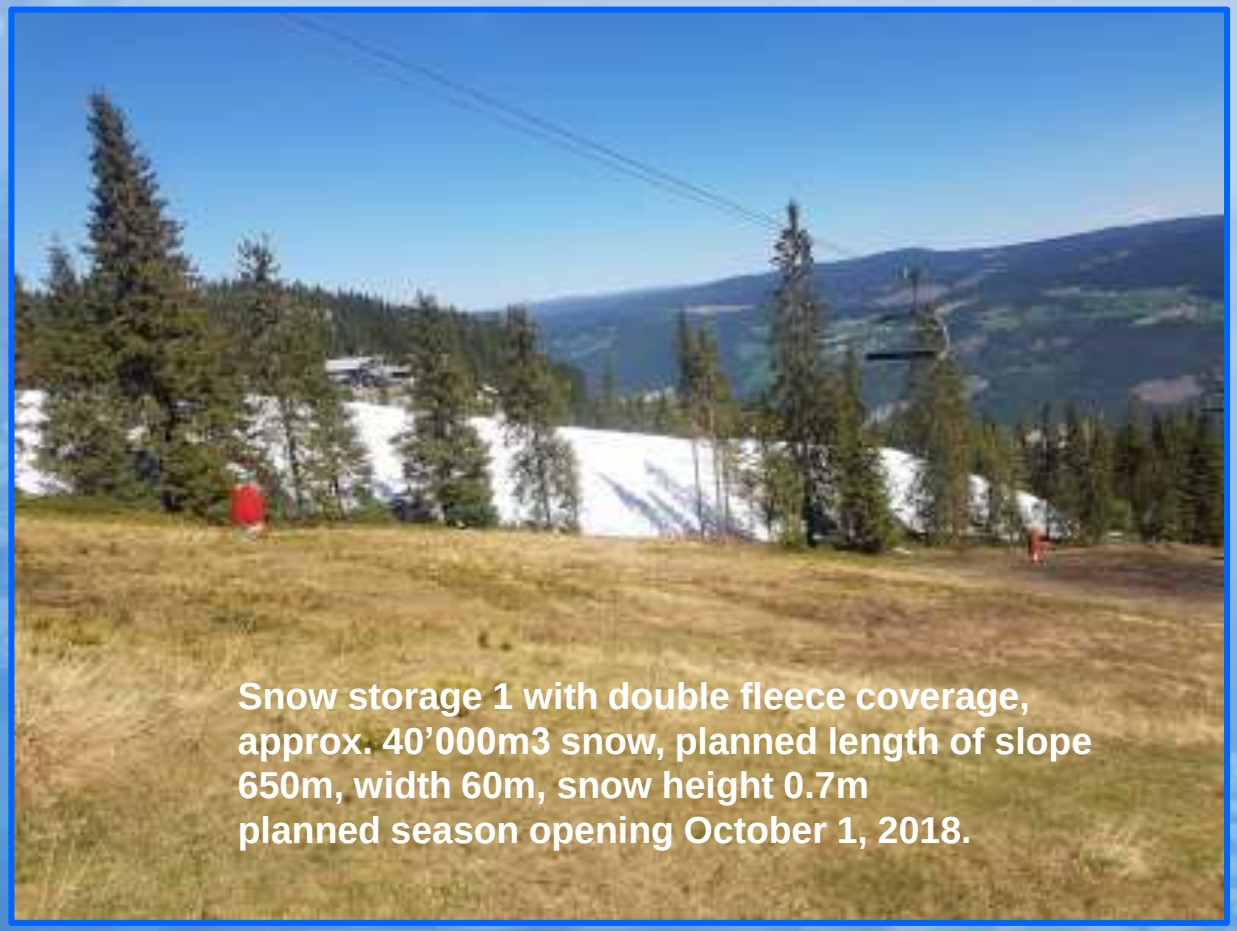
Project Kvitfjell, Norway



Snow storage 1 with double fleece coverage, approx. 40’000m3 snow, planned length of slope 650m, width 60m, snow height 0.7m planned season opening October 1, 2018.

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Project Kvitfjell, Norway

Snow storage 2 with single fleece coverage, approx. 18’000m3 snow

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Project Rosa Khutor, Russia

Experience from Rosa Khutor during Olympic preparation.

8 snow storages with total 436’000m3 snow

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Project Rosa Khutor, Russia

Experience from Rosa Khutor during Olympic in Sochi.

8 snow storages with total 436’000m3 snow

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Project Idrefjell, Sweden

Several snow storages with total approx. 100’000m3 snow

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Your competence partner for:

- Snowfarming and snow storages
- Early snow production with immediate active protection
- Glacier protection and glacier repair
- Permafrost-protection projects
- Artificial glaciers and ice caves

Contact us non-binding and and profit from our Europe-wide experiences with these new technologies.

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