

Report by Colin Norton on Renewable Energy Use

A Study Visit to Slovenia

October 10-17 2011

Funded by the Leonardo da Vinci programme and promoted by ARCH (Archnetwork – Libby Urquhart) and arranged by Vitra Cerknica (Bojan Žnidaršič) as host partners in Slovenia.



Plate 1. The participants Colin Norton, John Whitfield, Fiona Stewart, John Ross (left to right). This picture also demonstrates the art of Slovenian wood stacking!

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Report on visit to Slovenia with respect to Renewable Energy

1. Introduction.

Slovenia has placed itself in an enviable situation in the use of renewable energies and quality of lifestyle. There are several reasons why this should be the case.

- a. There is a very strong tradition in Slovenia of work to provide energy, e.g. log cutting for domestic and industrial use coupled with extensive forests (Plate 2).
- b. The country also has a strong rural culture coupled with a modern approach to European integration. (Plate 3 gives an impression of rural agricultural activity).
- c. Slovenia has an important history of architectural practice as is evidenced in the city of Ljubljana while Plate 4 illustrates an example of the work of Jože Plečnik at Črna vas (The Church of St Michael in the marshes built 1925-1939).
- d. There is a 'can do' attitude evidenced by the novel approaches taken to renewable energy and Governmental policy.
- e. The renewable energy source of preferred use in Slovenia is wood taken from the country's abundant forests (60% of land area). Several other renewable energy sources are used including heat pumps and solar energy.



Plate 2. Modern log built house (which does not meet current insulative standards due to the lack of insulation within the logs) showing large wood stack under the canopy). More information at <http://nep.vitra.si/ukrep.php?h=polona&id=57>



Plate 3. Traditional agricultural practices in Slovenia.



Plate 4. The church of St Michael in the Marshes by Jože Plečnik 1925-1939 at Črna vas. (The design was modernist arts and crafts but utilised materials available in part to reduce costs. Jože Plečnik was a Slovenian architect of international repute with works to his credit throughout both Slovenia and central Europe. His works continue to be studied avidly by architects today).

In Scotland the tradition of working for energy has largely died out with homeowners and small businesses generally reliant on centrally provided power or fuel. The renewable energy sources of Scotland are quite mixed including wind energy, tidal energy, solar energy, heat pump derived energy and wood energy. While the energy possibilities in Scotland are broader there is a lack of policy consistency although we have numerous renewable energy projects to be proud of including a wood energy heated University campus, a large wood energy heated commercial horticultural nursery, significant offshore energy installations, numerous windfarms as well as many small scale private projects. The most significant 'take home' message from Slovenia is 'self belief' that we can improve our energy situation on a small scale rather than relying on larger governmental level projects.

This report examines numerous projects in Slovenia (mostly included in the portal NEP Slovenia <http://nep.vitra.si>) including manufacturing of energy saving houses and supplies, the industrial use of renewable energy, businesses undertaking renewable energy installations, self build renewable energy systems, domestic mixed energy systems in new houses, older house retrofitting of renewable energy systems, restoration of historic houses with renewable energy systems, power calculations for renewable energy systems, future energy options for renewable energies in Slovenia, alternative energy possibilities for Slovenia and benefits to the participant and his nation. The study of these projects forms, by basis of example, a strong inference of different approaches which Scotland might take particularly at the local level in terms of business start ups, new strategies, commercial and private use of renewable energies. There follow a series of appendices covering cultural and travel aspects including our accommodation, traditional food provided, the Vitra offices, Ljubljana visit, other locations visited using maps and the agenda of visits.

2. The manufacture of energy saving houses and supplies.

Several factories were visited which produced buildings or building supplies with energy conservation at their heart. Whole houses were constructed at Riko Hiše (Plate 5 shows the factory)(Riko houses with Bojan Luksic) including a very high standard of insulation. The houses are prefabricated in the factory with precision tooling including CNC machines (computer numerical control - wood shaping under computer control). There was a flow pattern through the factory to the end point where completed sections of the houses were finished. All houses were built to order resulting in 'peak and trough' demand through the year. Heavy reliance was placed upon spruce trees, quality of insulation and reconstituted wood fibre from larch for additional insulative purposes. These houses also contribute to the export market, particularly to Italy with some exports to other former communist countries.

With Designer Philippe Starck (<http://www.starckwithriko.com>) house are being built in the Cotswolds and London, United Kingdom. Plate 6 shows a Riko Hiše under construction in the factory.



Plate 5. The Riko Hiše factory from the outside.



Plate 6. Riko Hiše under construction showing finishing stages for gable end, with Bojan Lukšič and Bojan Žnidaršič and two construction staff at the factory.

The factory also produces modular housing in a pre-constructed form (Plate 7).



Plate 7. House module produced by Riko Hiše with Bojan Lukšič to left of picture.

With Greek investment, Fibran XPS (Plate 8 with Fibran XPS host Marjeta Vide Lutman) manufactures high quality insulation and also holds tutorials for builders and linked trades to maximise insulation with particular emphasis on external insulation, ground insulation, roof insulation and avoidance of heat loss through thermal bridges. Plate 8 shows the factory in external view.



Plate 8. The Fibran factory at Sodražica with Marjeta Vide Lutman and Bojan Žnidaršič.

The manufacturing plant was similar to a German precision factory with a high level of automation and comparatively few workers and Plate 9 shows detailing of construction using Fibran at ground level.



Plate 9. Model showing detailing of construction using Fibran XPS at ground level.

Okna Šemrl (<http://nep.vitra.si/ukrep.php?h=%C5%A1emrl&id=109>) manufactures insulative windows to a very high quality. These are shown in section in Plate 10.



Plate 10. High quality insulative windows produced by Okna Šemrl showing some of the styles available.

These windows are produced on a highly mechanised production run with very close attention to quality control and rival windows produced in any advanced country. While the quality was very high, reliance on Russian Larch seemed quite important although this is not a hard wood. Larch is one of the best lasting of the softwoods

with a high level of natural preservative in addition to the treatments given at the factory. Much of the production is for Slovenian end customers although the company does export where suitable transport options exist. Plate 11 shows part of the production with mouldings produced by CNC machine.



Plate 11. Part of the window production facility with mouldings produced by CNC machine.

The factory uses sawdust created from waste to heat the premises Plate 12.



Plate 12, The boiler 220 kW used to heat the Okna Šemrl factory using self generated wood waste.

3. The industrial use of renewable energy in Slovenia.

Several examples of renewable energy use in industry were shown. In Postojna (Urban Pinter) showed an example of a district heating system using wood chip to heat several municipal buildings and potentially several blocks of flats. Plate 13 shows the plan of the extent of the local heating scheme being shown by Urban Pinter. The building (Plate 14 and the boilers shown in Plate 15) was situated several hundred metres from the buildings to be heated but was on an open site to allow easy access for deliveries of the large supplies of wood chips needed to run the system. The flats were of the communist era and did not have full heating controls and were to be retrofitted with the new system for heating.



Plate 13. The local heating plan for municipal buildings and other housing using wood waste.



Plate 14. The wood waste heating plant for part of Postojna.



Plate 15. The wood burning plant in the municipal area of Postojna.

A Technical School including a forestry school

<http://nep.vitra.si/ukrep.php?h=sgl%C5%A1&id=37> shown by Headmistress Cvetka Kernel) had a 500 kW boiler heating system using wood chip fuel (shown by Cvetka Kernel) with bulk supplies supplied by external contractors (Plate 16). The school had also received competitive grant funding for the upgrade. Of interest was the fact that money saved by the school could be used to reinvest in the school. Plate 17 shows the wood chip burning plant while Plate 18 shows the supply chamber for the wood chips.



Plate 16. The Secondary Forestry and Woodwork School in Postojna (SGLŠ) with wood heating plant.



Plate 17. The chip burning plant at SGLŠ.



Plate 18. The wood supply chamber at SGLŠ with Newspaper reporter, Bojan Žnidaršič and Head teacher.

The team held a conference with the Head Teacher, Head of English Language and a newspaper reporter (Plate 19).



Plate 19. Conference with the Head Teacher, Head of English Language and a newspaper reporter at SGLŠ.

Several businesses working with wood products were able to heat their premises using wood waste from their production lines. These included Okna Šemrl which heated its window production plant through waste as did a pallet producing plant (<http://nep.vitra.si/ukrep.php?h=kunc&id=56>) shown in Plates 20 and 21.



Plate 20. Pallet production plant with waste wood heating.



Plate 21. Machinery for the manufacture of pallets.

Gostilna Turk a hotel /Inn shown by Zidor Zelen

(<http://nep.vitra.si/ukrep.php?h=zelenc&id=55> Gostilna Turk at Hotedršica Plate 22) used large (160kW) wood chip boiler, solar collectors and air heat recovery from the hotel (Plate 23). Of additional interest was the use of some of the heat to warm a small insulated (double skinned polyethylene separated by an air fan) polythene tunnel house to produce vegetables for the hotel (Plate 24). Plate 25 shows the team entering the boiler room.



Plate 22. Gostilna Turk at Hotedršica with some clients.



Plate 23. Air heat recovery from the Gostilna Turk at Hotedršica.



Plate 24. Air fan system to separate layers of polyethylene to give a thermal barrier in polythene tunnel house to produce vegetable for the hotel Gostilna Turk at Hotedršica.



Plate 25. The team entering the boiler room at the hotel Gostilna Turk at Hotedršica.

A small restaurant / distiller was visited which used wood heat (dinner in Kmetija T'Dolenj, Janko Kotnik, Laze pri Gorenjem Jezeru 1 1384 Grahovo) where a log fired boiler was used (Plate 26). The distilling room for fruit brandies is shown in Plate 27.



Plate 26. Logwood boiler for house / cafe/ distilling plant.



Plate 27. Distilling plant for fruit brandies.

A garden centre (<http://nep.vitra.si/ukrep.php?h=blo%E8ice&id=31> at Bločice) using a log wood boiler and collector to heat the house and garden centre buildings is shown in Plates 28 and 29.



Plate 28. The garden centre at Bločice.



Plate 29. The boiler at Bločice Garden Centre.

4. Businesses undertaking renewable energy installations

The company Agni run by Andrej Gruden (<http://www.agni.si>) installs boilers and solar collectors, Plate 30 shows a house recently built with a system fitted by Andrejand while Plate 31 show the boiler room. Plate 32 shows Andrej Grudens' own house with a pellet boiler.



Plate 30. Andrej Gruden brothers' house newly built.



Plate 31. Andrej Grudens brothers' house boiler room.



Plate 32. Andrej Grudens pellet boiler

<http://nep.vitra.si/ukrep.php?h=gruden&id=385>

Zdenko Bezjak runs a commercial company in Ljubljana specialising in heating systems (<http://nep.vitra.si/ukrep.php?h=blo%E8ice&id=59> at Bločice). His own and his fathers' house (adjacent buildings) have vacuum solar collectors for space heating on a rotating pedestal (Plate 33), floor heating, rainwater use and an inovative oven for baking bread or meat.



Plate 33. Zdenko Bezjak home with rotating solar collectors.

5. Self build systems visited

A mechanical system for preparing wood chips (tractor mounted to take to the forest), a mechanised auger system to feed from the barn to an automated wood system for a wood boiler was shown by Iztok Slejko (<http://nep.vitra.si/ukrep.php?h=slejko&id=222>). The boiler was converted by the owner to auto feed and the total construction cost including the boiler was less than Euro 2000 (Plate 34). This was a highly cost effective machine and the construction was reliant on the owner's ability as an engineer and his knowledge of electronics.



Plate 34. Home modified wood chip boiler with auto feed.

The house was a very comfortable well heated economical home (Plate 35 with a very nice setting Plate 36).



Plate 35. The home of Iztok Slejko.



Plate 36. The balcony of the home of Iztok Slejko showing the rural setting,

A similar ability to construct his own system was shown by Uros Mihelic (<http://nep.vitra.si/ukrep.php?h=brezovica&id=328>). The system was reliant upon electronic controls using pre-programmed microprocessor chips (Plate 37) to control heat and heat distribution from an external heat pump which employed an underground pipe to pre-heat the inlet air supply (Plate 38). Plate 39 shows the house.



Plate 37. Microprocessor controls and circuitry used to control the smart house of Uros Mihelic.



Plate 38. External heat pump drawing air from a pre-warming underground pipe prior to extracting heat.



Plate 39. The smart house of Uros Mihelic.

Waste air was released after heat recovery and a swimming pool was used as an additional heat sink. Solar collection was also present. While the system was effective both in economy and heating terms it was highly reliant on advanced technology while cost effective it would be very expensive to have a similar one manufactured and installed. The house was termed a 'smart house' because of the high degree of integration of the control circuits.

A different approach was taken by Otilija Vidrih (Ljubljanska 22, Rakek) who assembled and installed his own system quite economically. He retro fitted an older house where there were space limitations. He chose one room for a log burning decorative burner as a room feature which heated radiators and the water supply in a different room/s (Plate 41).



Plate 40. Otilija Vidrih with son Metod outside their older type house.



Plate 41. The wood burning 'lounge' stove of Otilija Vidrih.

6. Examples of domestic mixed energy systems used in Slovenia in new houses

A new low energy house (Rok Korenjak, Nova vas) was visited (Plate 42) which employed minimalist living style with an external heat exchanger from the air, an internal heat exchanger (Plate 43) from the internal waste air, a wood stove and a home design to maximise collection of sunlight.



Plate 42. House of Rok Korenjak at Nova vas.



Plate 43. The heat exchanger for used air in the house of Rok Korenjak at Nova vas. Damjan Knap, (<http://nep.vitra.si/ukrep.php?h=knap&id=41>) at Cerknica built a new house, passive heating, under floor heating with a rainwater storage system. (Plate 44).



Plate 44. House of Damjan Knap with grand styling and energy conservation features.

Milan Sernel (<http://nep.vitra.si/ukrep.php?h=sernel&id=161>) has a house with a ground water heat pump for space heating, passive solar use and rainwater collection. The house demonstrates a number of energy saving features including roof overhangs and window slats (Plate 43).



Plate 45. House of Milan Sernel demonstrating a number of energy saving features including roof overhangs and window slats.

Vasilij Škrlić (Plate 46)(Begunje 131, 1382 Begunje pri Cerknici) created a modern house (Plate 47) with traditional values (home preserves, food production Plate 49) but with new energy systems. 'The "Sun House" exploited solar energy (passive heating, solar panels and photovoltaic cells(Plate 48).



Plate 46. Vasilij Škrlić making a presentation to the group about his house.



Plate 47. The house of Vasilij Škrlić.



Plate 48. Photovoltaic cells on the roof of the house of Vasilij Škrlić.



Plate 49. Food production by Vasilij Škrlj and his son in their garden.

Numerous other examples of new build houses were seen for example Plates 50 and 51 show newly constructed houses.



Plate 50. Newly constructed houses with heavy insulation.



Plate 51. New house with overhang and thermal pump.

7. Passive house systems in Slovenia

Blaž Mozetič (<http://nep.vitra.si/ukrep.php?h=mozeti%E8&id=68> Rovte 42a, 1373 Rovte) built an entirely passive house conforming to the passive standards (heat load per metre square, air exchanges etc.). The centre of the house was a heat exchanger which took heat from air from an underground pipe. There was also heat recovery from the exhaust air. The house is shown in Plate 52, internal pictures in Plates 53 to 54 with the latter one suggesting that the owners were happy with their house!



Plate 52. Passive house of Blaž Mozetič in external view.



Plate 53. Passive house of Blaž Mozetič in internal view 1.



Plate 54. Passive house of Blaž Mozetič in internal view 3.

8. Older house retrofitting of renewable energy systems

Igor Blažina showed his system using flat solar panels in combination with a boiler (<http://nep.vitra.si/ukrep.php?h=bla%9Eina&id=277> Jamska 2, 6230 Postojna)(Plate 55). His water heat exchanger is shown in Plate 56.



Plate 55. Igor Blažina (left) with flat solar panels on his house.



Plate 56. Heat exchanger for hot water system in the house of Igor Blažina.

Niko Čuk showed his inventive system at Kalce
(<http://nep.vitra.si/ukrep.php?h=%E8uk&id=44>) 49a, 1370 Logatec (Plates 57-58).



Plate 57. Niko Čuk with John Whitfield,



Plate 58. The house of Niko Čuk.

9. Restoration of historic houses with renewable energy systems

The old homestead of the Škrabec family had been restored by the owner of Riko hiše and the internal part of the barn had been converted to a meeting room and sculpture display centre (Plate 59) and the main house restored including its traditional massive stone heat-store fireplace (Plate 60 and external view plate 61).



Plate 59. Škrabec old barn converted to a meeting room and sculpture display centre.



Plate 60. Škrabec main house restored including its traditional massive stone heat-store fireplace.



Plate 61. Škrabec main house external view after restoration.

Professor Dr Leon Kos (Plate 64)(<http://nep.vitra.si/ukrep.php?h=leon&id=16> Begunje 37a, 1382 Begunje in Cerknici) renovated an older house with solar panels for hot water, conservatory and rain storage (Plates 62-63). Leon also has a second house on the site awaiting structural repairs Plate 64.



Plate 62. Professor Dr Leon Kos.



Plate 63. The restored older house of Leon Kos



Plate 64. The restored house of Leon Kos in the background with a second house owned by him in the foreground awaiting structural repairs.

Miran Jernejčič has undertaken a top-end restoration of his house at Laze (<http://nep.vitra.si/ukrep.php?h=laze&id=45> 21C, 1382 Begunje in Cerknica)(Plates 65-66). It has a logwood heating system and rainwater collection.



Plate 65. Miran Jernejčič has undertaken a top-end restoration of this house.



Plate 66. Miran Jernejčič receiving tokens of appreciation from his Scottish guests.

10. Power calculations for installations used in Slovenia

The visiting Scottish team was interested to learn of the priorities for both business and private individuals in Slovenia. While the governance of the two countries put different priorities on the different renewable energy systems some interesting observations arise. Firstly, the interaction between private companies and government agencies or Non-Governmental Organisations differs. In Slovenia we saw situations where individuals had installed systems on the basis of supplier recommendations. These did not necessarily fit circumstances perfectly. Indeed, in one case a company fitted a boiler on the basis that it would receive a government grant and it did not. In other cases, the heat load requirement was not well calculated and we saw for example 20kW boilers in fully insulated new houses, old houses which were uninsulated and in one case a house with a large range of heated ancillary buildings. This suggests that the power requirement had not really been calculated especially as the floor area was similar in all these examples. Furthermore there appeared to be an expectation that internal house temperatures would be 20-25°C (usually 22°C) in all rooms. In some instances rooms did not have separate temperature controls. While there is no doubt that the houses were very comfortable, an excess of energy (albeit renewable energy) was being used. Ultimately, renewable resources have a cost both in terms of their generation and in terms of planet warming. This outcome is not surprising given the history of Slovenia and its current desire to become a modern nation. At present research on a worldwide basis has not really focused on the global redistribution of energy resultant from renewable energies. The entire thrust has been to gain an increase in use of renewable resources but their use may need to be moderated as we understand more about global energy / heat rebalancing. Perhaps in the meantime our thoughts should shift a little towards 'pullover' rather than 'T shirt' houses (i.e. dress well rather than lightly) and to have graded temperatures through the house (e.g. lounge warmest, bedrooms cool etc).

The author has calculated the heat load for a 250 m² greenhouse with triple wall polycarbonate sited in Scotland. At 26kW this is somewhat similar to the load of a fully insulated house in Slovenia, although this for a lower temperature regime, of similar floor area – spread over two floors!

The team also noted a strong industry in manufacturing wood burners at competitive rates but a preference to buy Austrian and German systems because of a perceived higher manufacturing quality.

11. Discussion and the future options for renewable energy in Slovenia

The forest resources of Slovenia are vast (or apparently vast). Plate 67 shows a typical wood land scene including native beech trees (*Fagus*).

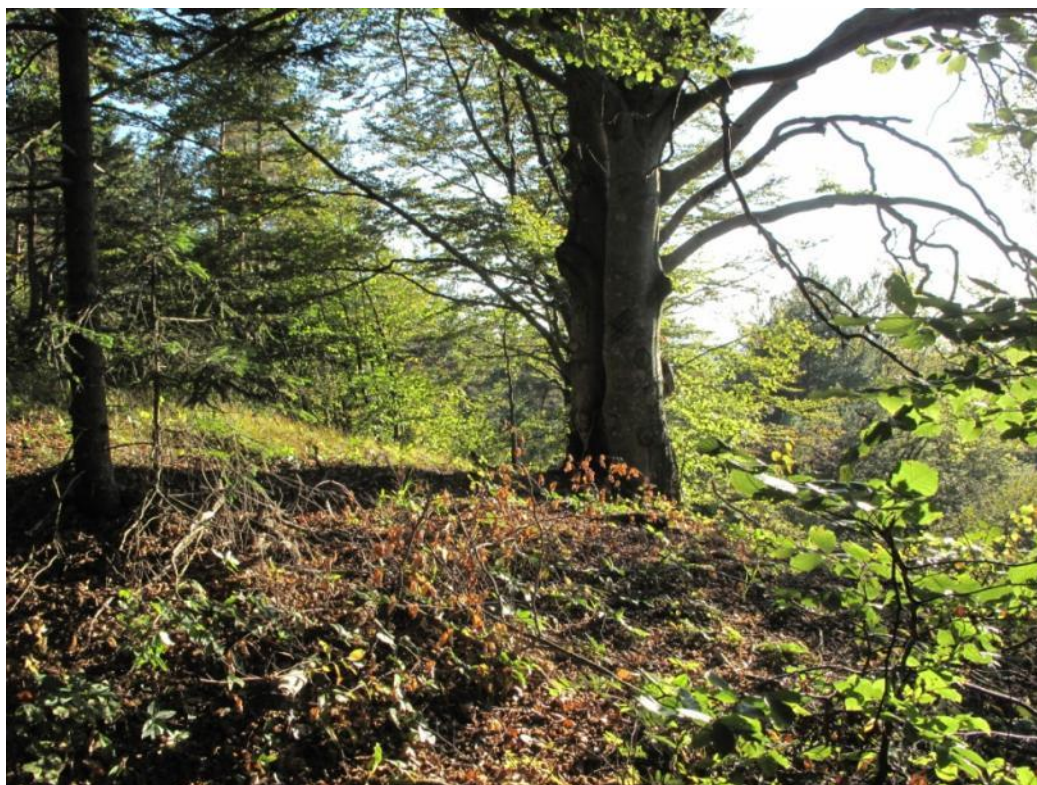


Plate 67. Native Beech trees in mixed woodland in Slovenia.

The ownership of the woodland is somewhat patchy with frequently 20 hectare blocks and some investors buying up larger parcels. Many of the new houses and heat installations viewed had associated woodlots. Rather astoundingly we saw one house where prime beech had been felled for the boiler and the same person was building a new house with spruce for the main beams. The design of the wood burning boilers favours the use of high quality woods such as beech which burn cleaner. This leads to the woodlot owners selectively harvesting beech and leaving the other trees. The regeneration cycle of these trees is hundreds of years while other species colonise much more quickly. There is a real danger that the nature of these woodlands and their ecology will be permanently changed if this practice continues unabatedly. Indeed, the real wealth in Slovenia is in its environment and short-term gain may be to the disbenefit of the country in the long term. We were given figures for the Postojna district heat scheme which suggested that the renewal rate of the forests was very high and that timber taken was minimal in this context. There is a real possibility that the current selective harvesting could be problematic in this regard. There is a real opportunity to focus more on wet woods, inferior wood and other lower quality burn materials to ease the impact on the forests even

though the boiler outputs may be slightly reduced. Plates 68-72 illustrate the development of woodlands.



Plate 68. Extensive mixed woodland forests in Slovenia – a huge asset.



Plate 69. Regeneration of native beech with other biodiversity including cyclamen plants.



Plate 70. A clearing slowly reverting to forest – the species here are alder, poplar and other species repopulating the area (compare with Plate 71 where there is leaf litter and light shade which favours the hardwood species).



Plate 71. Enjoying the forest in Slovenia a resource for the future.



Plate 72. Mature specimen beech trees felled for firewood while the house behind uses less desirable / less long lasting / less strong spruce in its construction by the same owner.

12. Some alternative strategies

Renewable energy system designers for Slovenia could consider the following-

1. Down rating boiler size is a possibility in many instances to ensure boilers operate nearer to their optimal performance levels.
2. The use of the excellent services of VITRA Center for Sustainable Development Cerknica which hosts a website (<http://nep.vitra.si>) providing independent support for efficient use and renewable energy systems is a desirable development. In the view of the participants this was far more helpful than any similar service in Scotland. The willingness of individuals to share experiences in Slovenia was astoundingly good.
3. Heat storage systems appear not to have been fully developed e.g. rock storage below buildings, underground energy from caves / mines / thermal sources.
4. The energy for food production could be encompassed in a larger scheme in Slovenia.

13. Benefits to participant and his nation

- a. The results of this study will be directly shared during special lectures to students studying green technology and sustainable building technology programmes at the Scottish Agricultural College.
- b. It is also anticipated that research will result from this project with possible joint partners from Slovenia.
- c. Part of the study tour enabled the commencement of an academic link between The Scottish Agricultural College and the Landscape Architecture Department <http://www.bf.uni-lj.si/en/deans-office/study-programmes/academic-study-programmes/landscape-architecture> (Professor Dr Davorin Gazvoda) and Agriculture / Horticulture Departments (Professor Dr Franc Štampar) at the University of Ljubljana. It is anticipated that this may lead to exchanges and joint academic activity (Plate 73).



Plate 73. The Landscape Architecture and Agriculture / Horticulture facilities at the University of Ljubljana.

14. Acknowledgements

The author wishes to acknowledge Funding by the Leonardo da Vinci programme and promoted by ARCH (Archnetwork – Libby Urquhart) and arranged by Vitra (Bojan Žnidaršič) as host partners in Slovenia.

Most particularly, Bojan Žnidaršič is an incredible colleague who is making a difference to his country at all levels which is very highly commendable. Coupled with this he has organised an exchange of the highest credibility while retaining especially good humour and superb organisational skills. It is excellent that he is carrying the banner for sustainable energy projects in Slovenia and indirectly will make a difference to Scotland via our team. Libby Urquhart has also worked with the utmost of enthusiasm supporting the project, even when there were some problems to be solved. This she did in style and has always been organisationally excellent and able to draw things together in an excellent way.

My thanks particularly also go to Slovenia, its incredibly kind and giving hosts and the pleasure they gave with their company.

My fellow colleagues from Scotland were all excellent company and unwilling to let their concentration wander from the subject in hand which led to a great enjoyable shared experience and the possibility of more to come. Thanks therefore are due to them - Fiona Stewart, John Ross and John Whitfield.

15. Appendices

The cultural exchange included excellent accommodation and food as below.

Appendix 1 Accommodation

The accommodation was excellent as was our host Marija Leskovec Kunstek – Dolenje Jezero 50, 1380 Cerknica Plates 74-76



Plate 74. View from our accommodation at Dolenje Jezero 50, 1380 Cerknica.



Plate 75. Our delightful host Marija Leskovec Kunstek.



Plate 76. John Ross enjoying our accommodation.

Appendix 2 Slovenian food

The group enjoyed tremendous hospitality and real Slovenian food. Plates 77-87 show some of the traditional foods sampled.



Plate 77. Lunch with Tone Marolt Novi pot 3.



Plate 78. Traditional drying of fruits on the old type massive heat retaining stove.



Plate 79. Evening meal at T'Dolenj Farm with Janko Kotnik as host.



Plate 80. Quality school lunch at SGLŠ Postojna.

The Jolanda family provided a number of excellent meals and great friendship and hospitality at the Tourist Farm Levar in Dolenje Jezero (Plate 83).



Plate 81. Excellent traditional food at Farm Levar.



Plate 82. The author enjoying a Jolanda meal.



Plate 83. An evening in Dolenje Jezero pub.



Plate 84. A traditional hunter's meal.



Plate 85. The enjoyment of the traditional hunter's meal by the group (a sustainable building crew behind who later showed their energy compliant buildings).



Plate 86. Lunch in Cerknica – the food seemed more important than conversation!



Plate 87. Another great meal at Farm Levar.

Appendix 3 – Vitra Office in Cerknica our base and the host organisation for the programme



Plate 88. Bojan Žnidaršič racing to his computer to keep up with his extensive activity.



Plate 89. The Vitra Cerknica Office.

Appendix 4 Ljubljana a cultural visit and a discussion visit to The University of Ljubljana



Plate 90. Energy discussion between Fiona Stewart and Bojan Žnidaršič in Ljubljana.



Plate 91. The historic heart of Ljubljana.

Appendix 5 Locations of sites referred to in the text

Figure 1. October 11 Route map.

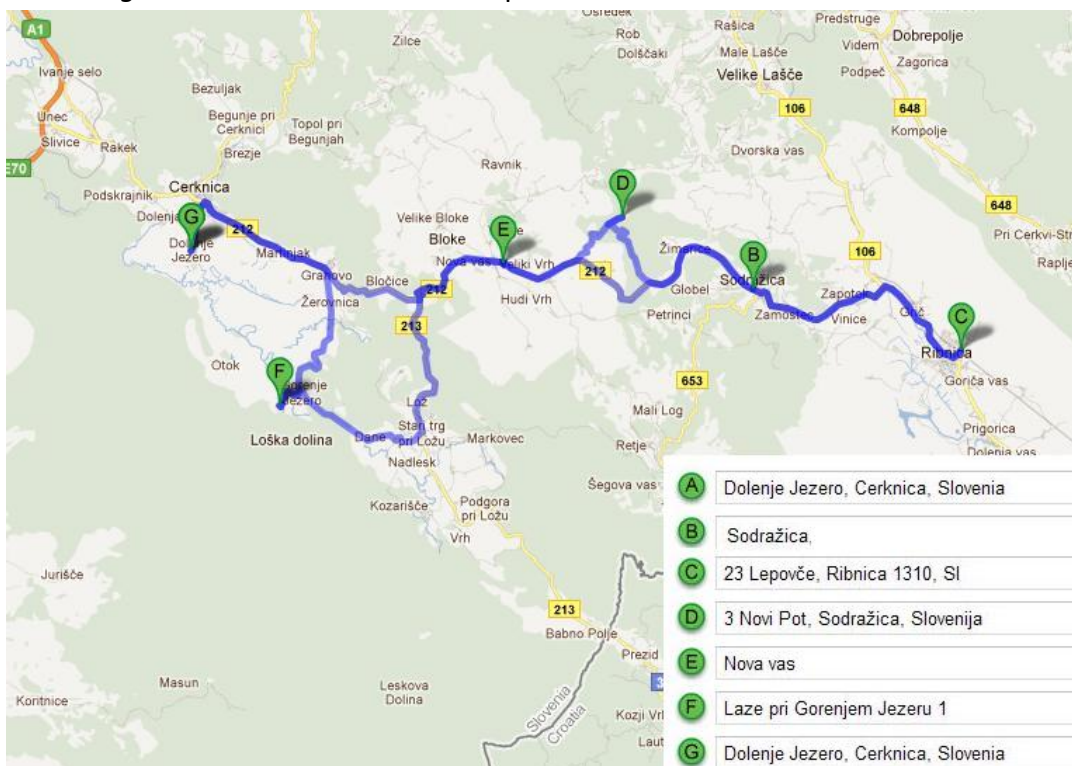


Figure 2. October 12 Route map.



Figure 3. October 13 Route map.

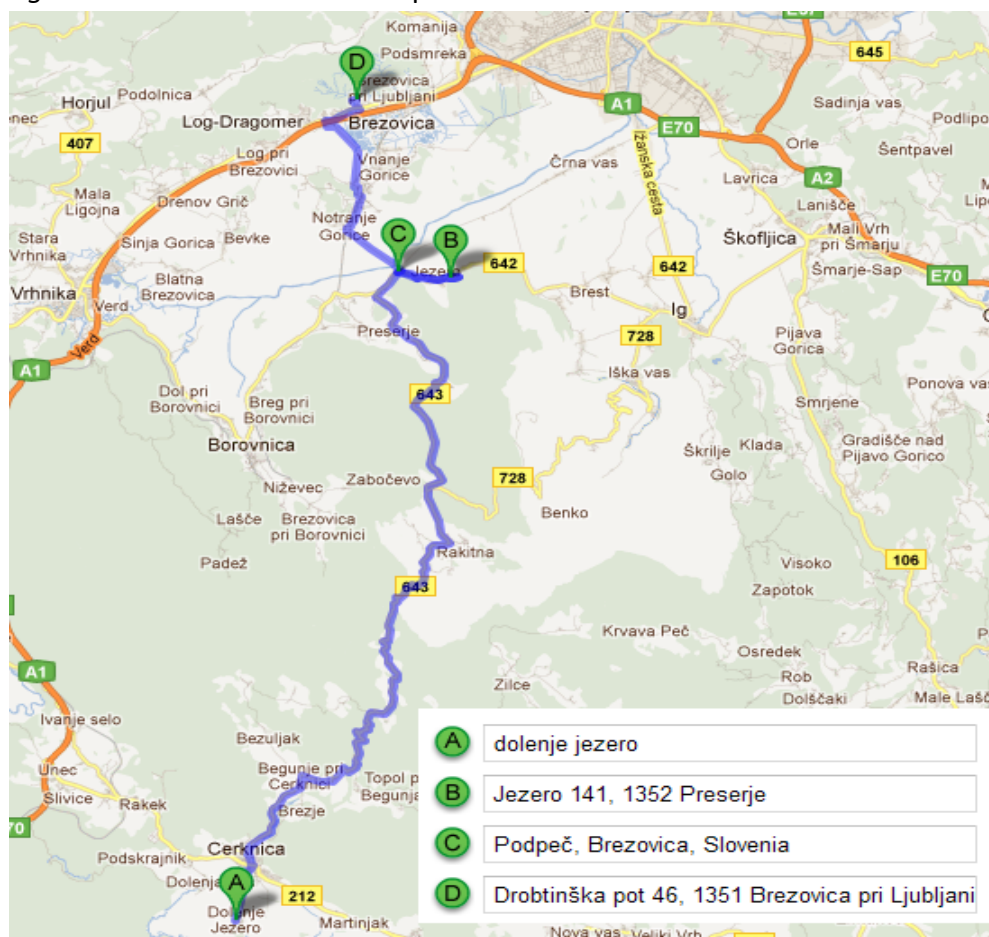


Figure 4. October 14 Route map.

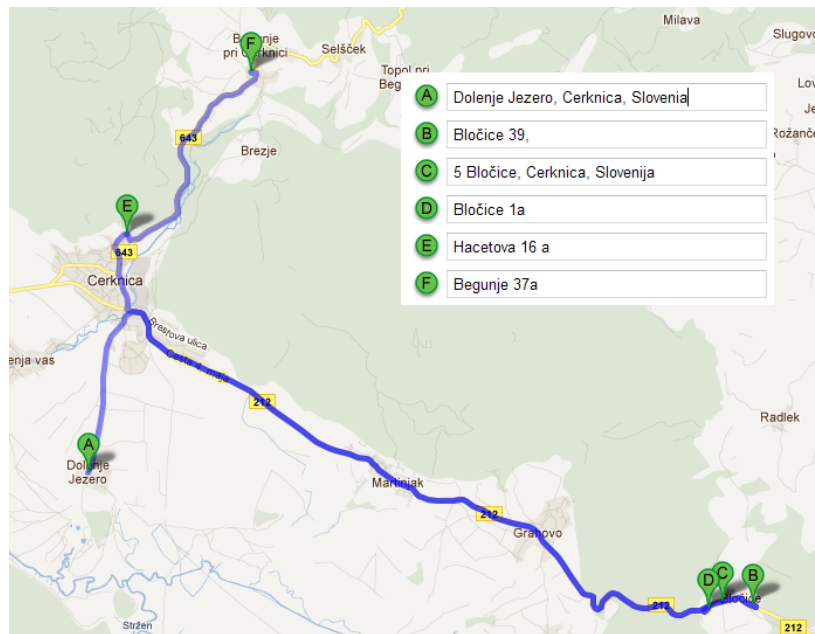


Figure 5. October 15 Route map.

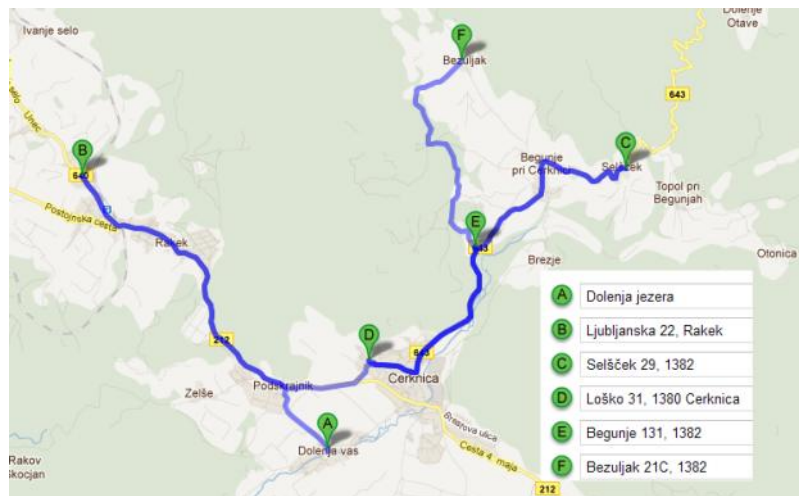
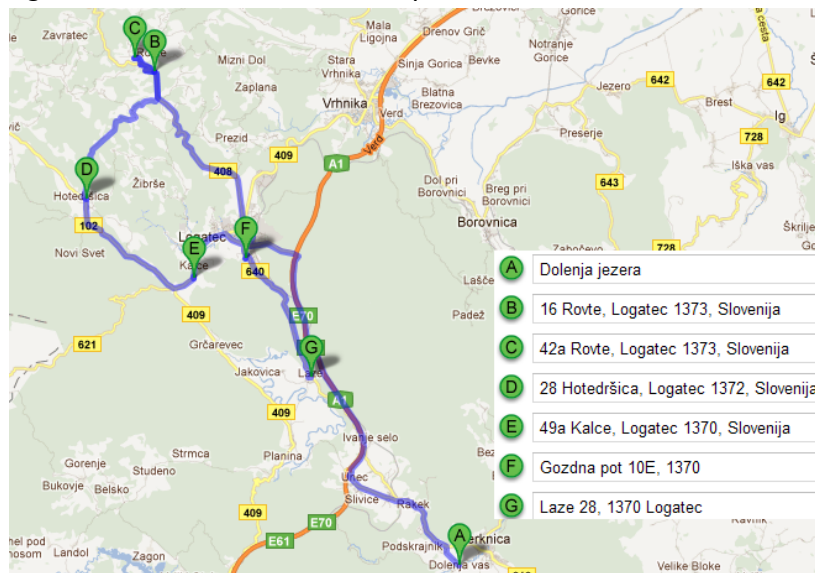


Figure 6. October 16 Route map.



Maps reproduced from Google maps.

Appendix 6 The itinerary

19.00 Dinner at Levar Farm,

Tuesday, 11 In October, Ribnika

8:00 Departure from Doleneje jezero

9:00 to 11:00 View production company Fibran XPS (Marjeta Videa Lutman)

11:30 to 13:30 Riko houses Bojan Lukšič, 041 348 830, bojan.luksic @ riko-hise.si, including homestead Škrabec

14:00 to 15:30 Lunch Tone Marolt, Novo pot 3, 01/837-10-50 old boiler log

16:00 to 18:00 New low energy house, Rok Korenjak, Nova vas,

19.00 Dinner T'Dolenj Farm, Janko Kotnik, Laze 1, Grahovo 1384, log-fired boiler

Wednesday, 12 October, Postojna

7:00 Departure from Doleneje jezero

8:00 to 9:00 189 Francis Šemrl Planina 189, 6232 Planina, Manufacture of wooden windows + sawdust waste heat to power 220 kW

9:45 to 10:30 English Lesson with students at SGLŠ

10.30 - 11 30 SGLŠ boiler heating system on chip for school and student home power 500 kW (Cvetka Kernel)

12:00 to 13:30 Iztok Slejko, Bukovje 35, 6230 Postojna, Tel: 041581229 boiler logs and wood chip boiler (do it yourself) solar collectors for hot water

13:30 to 15:00 Lunch

15:00 to 5:00 p.m. Urban Pinter, View of the new system (under construction) heating the chip as part of Postojna.

17:00 to 18:00 Igor Blažina, Jamska 2, 6230 Postojna, Flat solar panels for space heating

Dinner at Unec

Thursday, 13 October, marshes

7.30 Departure from Dolenje jezero

9:00 to 13:00 Andrej Gruden, Jezero 141, 1352 Preserje; pellet boilers, solar collectors

Tone Gruden, Podpeč, logwood boiler, solar

Andrej Gruden father, boiler logs and hot water storage

13:00 to 14:30 Lunch

3:00 p.m. to 17:00 Uroš Mihelič, Drobtinška pot 46, 1351 in Brezovica, passive use of solar, smart house, a heat pump air water, recovery of waste air, ground air collector, 19.00 Dinner at Farm Levar

Friday, 14 October, Cerknica

8.30 Departure from Dolenje jezero

9:00 to 11:00 Zdenko Bezjak, Bločice 39, 1384 Grahovo, vacuum solar collectors for space heating on a rotating pedestal, floor heating, rainwater use, innovative oven for baking bread or meat

11:00 to 12:00 Anica Žnidaršič, Bločice 5, 1384 Grahovo, log wood boiler and hot water storage, the collector, thermal insulation

12:00 to 13:00 Matija Mišič Bločice 1a Grahovo 1384, logwood boiler and hot water storage, the collector

13:00 to 14:30 Lunch, Janez Premrov, Martinjak 11, 1380 Cerknica visiting the old boiler log

15:00 to 16:30 Damjan Knap, Hacetova 16, 1380 Cerknica, new house, passive heating, underfloor heating, heat pump for sanitary water, rainwater

5:00 p.m. to 6:30 p.m. Leon Kos, Begunje 37a, 1382 Begunje in Cerknica renovated older house, solar panels for hot water, winter garden, rain water collector

19.00 Dinner Jolanda

Saturday, 15 October, Cerknica

8.30 Departure from Dolenje jezero

9:00 to 10:00 Otilija Vidrih Ljubljanska 22, Rakek, fireplace firewood to heat the house through the radiator reservoir 300L

10:30 to 11:30 Roman Švigelj, Selšček 29, 1382 at Cerknica Begunje, log wood boiler and hot water storage, thermal collector

12.00 - 13.00 Martin Pilih, Loka 31, 1380 Cerknica, , air water heat pump for space heating, passive solar heating

13:00 to 14:00 Lunch Cerknica (Valvasor)

14:00 to 16:00, Vasily Škrli, Begunje 131, 1382 Begunje in Cerknica "Sun House" exploits all three forms of solar energy (passive heating, solar panels, photovoltaic), 16:00 to 18:00, Milan Serna, Bezuljak 21C, 1382 Begunje in Cerknica, Ground water heat pump for space heating, passive solar use, rainwater

19.00 Dinner Farm Levar

Sunday, 16th October, Logatec

8:00 Departure from Dolenje jezero

9:00 to 10:00 Marjan Kunc Rovte 16, 1373 Rovte, 10:00 to 12:00 Blaz Mozetič Rovte 42a, 1373 Rovte, Passive House

13:00 to 14:30 Izidor Zelenc, Hotedršica 28, 1372 Hotedršica, wood chip boiler, solar collectors, air from the inn to recover.

15:00 to 16:00 Niko Čuk, Kalce 49, 1370 Logatec, log-fired boiler, solar

16:00 to 17:00 Kreso Šavrič, Gozdna pot 10E, 1370 Logatec, pellet boiler, fireplace, good thermal insulation

17:00 to 18:00 Miran Jernejčič, Laze 28, 1370 Logatec, renovated old house

19.00 Dinner Farm Levar

Monday, 17 October in Ljubljana

8:00 Departure from Dolenje jezero

9:00 to 10:30, Visit Ljubljana.

11:00 to 13:00 Davorin Gazvoda (Colin Norton) 15:00 Departure to Airport

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