

Effect of Automated Electrical Lighting control on Energy Performance of Buildings

- ❖ Internal heat loads: winter and summer effects
- ❖ Presence dependent dimming
- ❖ Task lighting dependent dimming
- ❖ Daylight dependent dimming



Internal heat sources and loads –

People, equipment and processes

People:

According to function – **cannot be regulated**

3, 8 W/m² – Office, school respectively⁽¹⁾.

Equipment and processes:

Use of efficient items – **can be regulated**.

Electrical lighting:

➤ Use of efficient light bulbs – **can be regulated**

10-15 W/m² for 500 LUX on desks.

➤ Operation – **can be controlled**.

(1) Internal heat loads. Ed. Unterpertinger, F., Author: Varga, M. Austrian Energy Agency. Vienna, Austria.

Control of electrical lighting – Presence dependent dimming

- ❖ Cuts lighting to zero when room is empty
- ❖ Leaves full lighting level when room is occupied
- ❖ Effective in rooms with frequent long vacancies
- ❖ Not effective in highly busy spaces
- ❖ Effect on energy saving not studied yet in Israel

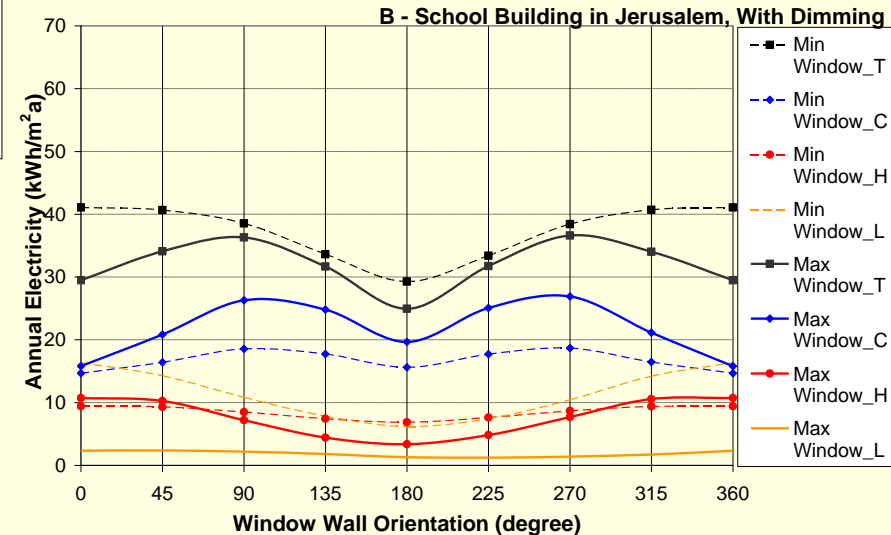
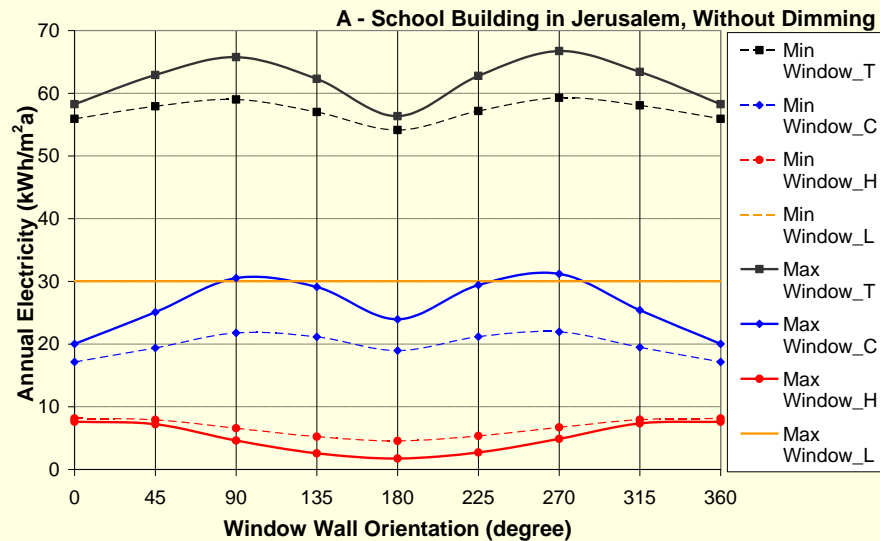
Control of electrical lighting –

Task lighting dependent dimming

- ❖ Enables lower background overall lighting
- ❖ Task lighting based on personal demand (can be supplemented by presence sensors)
- ❖ Effective in most types of office spaces
- ❖ Not effective in classrooms
- ❖ Effect on energy saving not studied yet in Israel

Control of electrical lighting – Daylight dependent dimming

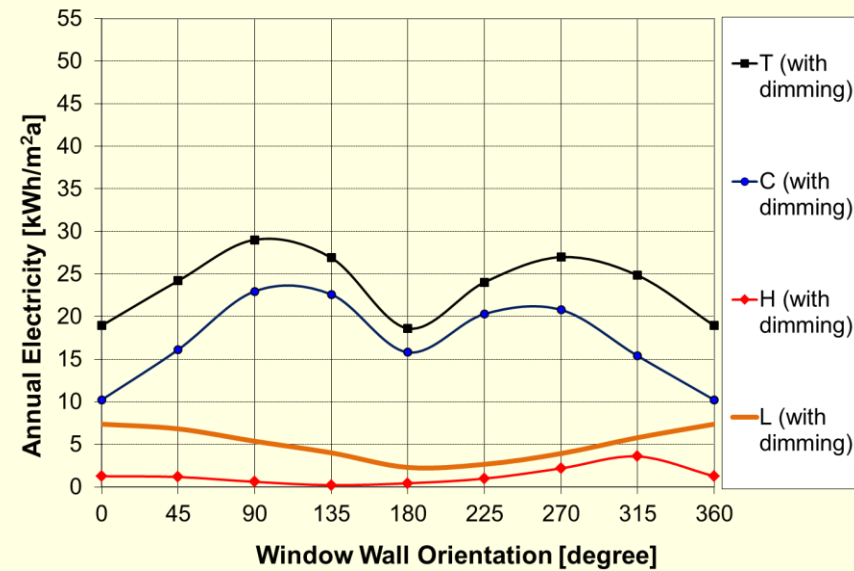
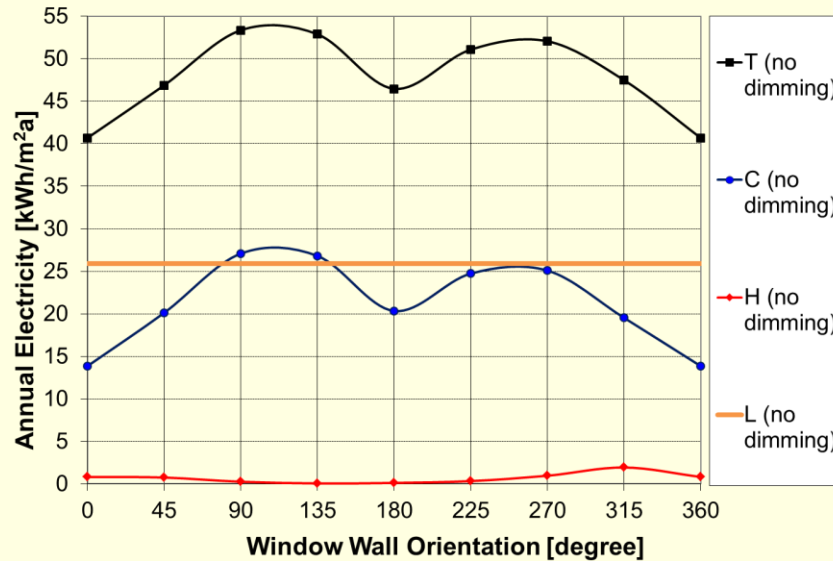
Classrooms, 6.8 m deep, Glazing: 8.4% - 22.9% of floor area



Results from M.Sc. Thesis of Evgeniy Beagon, Faculty of Civ. & Env. Eng., Technion, Haifa.

Control of electrical lighting – Daylight dependent dimming

Peripheral Offices, 4 m deep, Glazing: 11.3% of floor area



Conclusions

- ❑ Optimal design of glazed area and glazing properties is crucial.
- ❑ All methods of electrical lighting control and dimming reduce energy demand.
- ❑ Daylight dependent dimming seems to have the largest potential for major energy savings in schools and office buildings.
- ❑ Effects on illuminance gradients need further research.
- ❑ Prevention of glare requires further understanding and research.
- ❑ Experimental verification under controlled conditions is still required.
- ❑ Evaluation of energy savings associated with presence dependent dimming and task dependent lighting control is still required.
- ❑ Combined control strategies need evaluation.

Thanks for your attention

