

Annual Report 2005

Institute of
Environmental
Engineering

University Inns-
bruck



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1. Foreword

2005 the Institute of environmental engineering employs a permanent staff of 6 scientific researchers as well as project funded researchers, technical and administrative personnel, in total a group of 26.

Basic performance evaluation parameters in 2005:

Diploma theses finished	3
Dissertations finished	1
Habilitations finished	1
Doctoral students	9
Papers	28
Presentations	21
Funded Research projects	23

In 2005 the group on urban water management was once again extremely active and successful in external funded research. The group has been able to establish itself firmly as a national key research institution in the areas urban drainage and water management in alpine regions. Additionally Dr. Wett has initiated successful research activities in the field of biological waste management, including energy generation. These activities are carried out together with internal partners of the University Innsbruck e.g. the ARC Seibersdorf Research/Biotreat, Joanneum Research, TIWAG/Wasser Tirol, Deutscher Alpenverein, Land Tirol and various municipal service providers for water and waste.

Our contributions have been recognised also in the establishment of focused research areas at the University Innsbruck., where the Institute is participating in the following two: Alpine Infrastructure Engineering (coordinated by Prof. Rauch) and Environmental Research and Bioengineering.

Another highlight of the activities in 2005 was the second habilitation of the Institute, this time achieved by Dr. Wett in February 2005.

After being an Institute for more than 30 years, 2005 will be the last year the Institute of Environmental Engineering will exist in this form: with 2006 the former Institutes of Hydraulic Engineering, Environmental Engineering, Geotechnical and Tunnel Engineering, Railway Engineering and Traffic Planning will be united under the umbrella of the new Institute for Infrastructure. However, the former Institutes will remain individual units within this larger entity. At the moment it is anticipated that the group will be able to operate as until today.

W. Rauch

2. Staff

2.1. Division: Urban water systems

Professor:	D.I. Dr. Wolfgang Rauch (Head) D.I. Dr. Kurt Ingerle (Emeritus)
Associate Professor:	D.I. Dr. Uli Stegner
Assistant Professor:	D.I. Dr. Bernhard Wett
Assistant (K2):	D.I. Manfred Kleidorfer

Doctoral students / research fellows	D.I. Stefan Achleitner
	D.I. Sara De Toffol
	D.I. Abbas Eladawy
	D.B. Carolina Engelhard
	D.I. Davy Vanham
	D.I. Sebastian Meyer
	D.I. Irene Lek
	D.I. Phimpaka Phothilangka

Project staff	D.I. Alexandra Eberl
	D.I. Gerd Innerebner
	D.I. Michael Schön
	D.I. Martin Vallazza
	D.I. Manfred Kleidorfer
	D.I. Edwin Mihardja
	D.I. (FH) Florian Wackerle

2.2. Division: Waste management, air and soil pollution

Professor:	D.I. Dr. Hasan Belevi
Associate Professor:	D.I. Dr. Wolfgang Becker
Assistant (Wi-M-Aus):	D.I. Christian Müller

2.3. Staff

Computer:	Dipl. inf. Heiko Kinzel
Technician:	Ing. Peter Milleder Michael Schlapp
Secretary:	Monika Tomasini Gülay Güldemir

2.4. Master students

Irene Lek
Alexandra Eberl
Michael Möderl
Manfred Kleidorfer
Edwin Mihardja
Michael Schön
Martin Vallazza
Monika Platter
Shailesh Rajiv Sathe
Stefan Leitner
Michael Tipotsch
Erik Fruhstorfer
Florian Wackerle

3. Theses finished

3.1. Master Thesis

Vallazza, Martin *Entwicklung eines solaren Kompakttrockners zur dezentralen Schlamm-entwässerung, June 2005*

Kleidorfer, Manfred *Überrechnung und Bewertung eines Kanalsystems mittels hydrodynamischer Simulationen am Beispiel von Innsbruck, November 2005*

Lek, Irene Maria *Evaluation of instream Measures for mitigation Morphological Alterations in an Integrated Wastewater System, March 2005 (in collaboration with KTH Stockholm, Schweden).*

3.2. Dissertations

Eladawy, Abbas *Modeling of anaerobic sludge digestion – sludge characterisation and process analyses*

3.3. Habilitation

Wett, Bernhard *Separate biologische Prozesswasserbehandlung am Schnittpunkt von Abwasser- und Schlammlinie, February 2005*

4. Scientific activities

4.1. Research projects, applied research and grants

KAREN – development of a software program for the evaluation of CSO loads

Researchers: Hannes Jarosch and Wolfgang Rauch

Duration: January 2003 – July 2005

Funding: University Innsbruck

Budget: 10.000,-

CD4WC - Cost-effective Development of Urban Wastewater Systems for Water Frame- work Directive Compliance

Researchers: Stefan Achleitner, Carolina Engelhard, Sara De Toffol, Irene Lek, Michael Möderl, Wolfgang Rauch

Duration: February 2003 – August 2006

Funding: EU Research Project EVK1-CT-2002-00118 CD4WC

Budget: 457.920,-

Conrad – Conversion of rain data

Researchers: Sara De Toffol and Heiko Kinzel.

Duration: November 2004- May 2005

Funding: Amt der Tiroler Landesregierung

Budget: 3.500,-

Wassermappe – Leitfaden zur Wasserversorgung in Tirol

Researchers: Ulrich Stegner, Stefan Achleitner, Carolina Engelhard and Wolfgang Rauch.

Duration: September 2004 – January 2005

Funding: Wasserplattform Landeck (MIAR)

Budget: 16.500,-

Modelling of the WWTP Salzburg (RHVS2004)

Researchers: Bernhard Wett and Abbas Eladawy

Duration: 17.07. 2004 – July 2005

Funding: Reinhaltverband Salzburg

Budget: 14.752,-

Sludge treatment in alpine Areas (Part 2)

Researchers: Bernhard Wett, Wolfgang Becker, Martin Vallazza and Wolfgang Rauch

Duration: 2003 – 2006

Funding: DBU

Budget: 135.530,-

Ökostra

Researchers: Sara De Toffol and Wolfgang Rauch

Duration 01.07.2004 – 30.10.2005

Funding: TU-Graz on behalf of Austrian Ministry of Environment

Budget: 8.900,-

EU-India River Bank Filtration Network (GANGA)

Researchers: Bernhard Wett, Wolfgang Rauch, Stefan Achleitner, Michael Schön
Duration: 31.12.2004 – 31.12.2006
Funding: EU ASIE 2004 095-733
Budget: 32.774.-

KNET

Researchers: Wolfgang Rauch, Davy Vanham, Irene Lek, Carolina Engelhard, Stefan Achleitner
Duration: 24.08.2004 – 24.08.2008
Funding: Kompetenznetzwerk Wasserressourcen GmbH
Budget: 239.000,-

IBK Konzept

Researchers: Wolfgang Rauch, Manfred Kleidorfer, Sara De Toffol
Duration: 01.03.2005 – 31.12.2005
Funding: Innsbrucker Kommunalbetriebe
Budget: 27.600,-

Linz Konzept

Researchers: Wolfgang Rauch, Sebastian Meyer, Alexandra Eberl
Duration: 01.03.2005 – 30.09.2006
Funding: Linz AG
Budget: 111.000,-

City Drain

Researchers: Stefan Achleitner, Wolfgang Rauch
Duration: 01.02.2005 - 01.02.2006
Funding: Tiroler Wissenschaftsfonds
Budget: 8.000,-

City Drain II ©

Researchers: Stefan Achleitner, Wolfgang Rauch
Duration: 03.11.2005 – 30.04.2005
Funding: Tiroler Wissenschaftsfonds
Budget: 8.000,-

Infiltration

Researchers: Stefan Achleitner, Carolina Engelhard, Ulrich Stegner und Wolfgang Rauch
Duration: 21.06.2005 – 31.07.2006
Funding: Amt der Tiroler Landesregierung, Abt. Siedlungswasserwirtschaft
Budget: 15.350,-

Schneequalität

Researchers: Carolina Engelhard, Sara De Toffol
Duration: 18.04.2005 - 30.05.2006
Funding: Tiroler Wissenschaftsfonds
Budget: 3.000,-

TDH

Researchers: Bernhard Wett, Phimphaka Phothilangka, Michael Schön
Duration: 22.12.2005 - 2007
Funding: Thöni Industriebetriebe GmbH
Budget: 37.200,-

Kleinbiogasanlage M1

Researchers: Bernhard Wett and Florian Wackerle
Duration: 28.07.2005 – 31.08.2005
Funding: ARC Seibersdorf Research
Budget: 6.728,-

Kleinbiogasanlage M2

Researchers: Bernhard Wett, Michael Schön, Phimpaka Phothilangka
Duration: 01.10.2005 – 17.04.2006
Funding: ARC Seibersdorf Research
Budget: 18.000,-

GUD Stadl

Researchers: Ulrich Stegner and Wolfgang Rauch
Duration: 07.06.2005 - 30.09.2005
Funding: Energie AG Oberösterreich
Budget: 13.000,-

Mulde

Researchers: Sara De Toffol, Stefan Achleitner, Wolfgang Rauch
Duration: 19.12.2004 - 18.12.2005
Funding: Linz AG Managementservice
Budget: 10.800,-

Strass-Identity

Researchers: Bernhard Wett and Gerd Innerebner
Duration: 08.07.2005 – 30.06.2006
Funding: Uni Innsbruck – Aktion Hypo Tirol Bank 2005
Budget: 3000,-

GUD TIM

Researchers: Ulrich Stegner
Duration: 17.05.2005 - 19.09.2005
Funding: Energie AG
Budget: 2.500,-

Strass

Researchers: Bernhard Wett
Duration: 01.09.2004 - 31.12.2005
Funding: Abwasserverband Achenal-Inntal-Zillertal (AIZ)
Budget: 13.400,-

4.2. Important Activities in Scientific organisations

Wolfgang Rauch:

- Chairman IWA/IAHR Joint Committee on Urban Drainage (JCUD). Period 2002 – 2005.
- Member of the ÖWAV board
- Editor of the journal *Water Science and Technology*
- Editor of the journal *Water Research*
- Editor of the journal *Österreichische Wasser und Abfallwirtschaft (ÖWAV)*
- Scientific Program Committee member of the international conferences: International Conference on Urban Drainage 2005; International Conference on Urban Drainage Modelling 2006;
- Member of the Scientific committee of the Pennine Water Group, UK
- Chairman of the Scientific audit team of the EU LIFE Project LOTWATER, DK
- Member of the Steering Committee of the ÖWAV section: Wastewater and water pollution control.
- Member of ÖWAV Arbeitsgruppen: Entwässerungsverfahren und Mischwasserbehandlung.

Belevi Hasan:

- Member of the working group “Climate change and air pollution control in Tirol”
- Member of the working group “Options-Management Sustainable Waste Management in Switzerland”
- Reviewer panel of *Environmental Science and Technology, Waste Management, Waste Management and Research, Environmental Monitoring and Assessment, and Chemosphere*.

Bernhard Wett

- Member of the ÖWAV working group 2 (sludge treatment) of the committee for „Agricultural usage/ recycling of sewage sludge“ (Guideline 17)
- Member of the DWA (vormals ATV-DVWK) working group AK-1.3 “Return load from sludge treatment”
- HSG-working group “Simulation of wastewater treatment plants”
- Reviewer panel of *Water Research*

Sara De Toffol and Stefan Achleitner

- Member of GUR – Working Group of the joint IWA/IAHR Specialist Group on Urban Drainage making efforts to disseminate knowledge, technology and existing procedures relating to rainfall measurement, analysis and modelling for urban stormwater management

Sebastian Meyer

- DWA (vormals ATV-DVWK) working group AK-1.3 “Return load from sludge treatment”

4.3. Presentations

Achleitner, S.; Rauch, W.: Increase of river base flow by hydropower gate operation for mitigation of CSO impacts - Potential and Limitations. 10th International Conference on Urban Drainage, Copenhagen/Denmark, 21-26 August 2005.

Achleitner, S. and Rauch, W.: CITY DRAIN © - A simulation software for integrated modelling of urban drainage systems. 10th International Conference on Urban Drainage, Copenhagen/Denmark, 21-26 August 2005.

Engelhard, C., Achleitner, S., Lek, I. and Rauch, W.
Mitigation measures towards morphological alterations of rivers: The receiving water as part of the integrated wastewater system. 10th International Conference on Urban Drainage, Copenhagen/Denmark, 21-26 August 2005.

Stegner U., Achleitner, S., and Rauch, W.: Präsentation der Wassermappe Tirol - Leitfaden zur Wasserversorgung in Tirol (Tyrolean Water book – A guideline for the water supply in Tyrol /Austria), Zamer Lochputz bei Landeck, Tirol, March 2005.

Achleitner, S. and Wett, B.: Numerical modelling of Groundwater and Riverbankfiltration – Case studies in Innsbruck and Linz. Interim Meeting of the EU-India Riverbank filtration Network, Dresden, Germany, 06-09 September 2005.

De Toffol, S., De Simon Bürstrom, Y. and Rauch, W.: On the effect of spatial variances in historical rainfall time series to CSO performance evaluation. 10th International Conference on Urban Drainage, Copenhagen/Denmark, 21-26 August 2005.

Rauch, W. and De Toffol, S.: On the issue of trend and noise in the estimation of extreme rainfall properties. 10th International Conference on Urban Drainage, Copenhagen/Denmark, 21-26 August 2005.

Engelhard, C.: *Receiving water - Defining the target system.* International Workshop on integrated urban water management, 9th November 2005, Essen, Germany.

Belevi, H.: "Beeinflussung des Schwermetallverhaltens in der Abfallverbrennung". Berliner Abfallwirtschaftskonferenz, Perspektiven 2005 bis 2020, Energetische Abfallverwertung und thermische Abfallbehandlung, Berlin, Deutschland, 1. und 2. März 2005

Becker, W.: Diskussionsbeitrag "DBU-Forschungsprojekt Klärschlammproblematik im Hochgebirge: Aktueller Stand Sommer 2005" im Rahmen der DAV-Info-Tour 2005 vom 22.-24.09.2005, Kaiserjochhaus, Leutkircher Hütte, Stuttgarter Hütte

Becker, W.: Diskussionsbeitrag "DBU-Forschungsprojekt Klärschlammproblematik im Hochgebirge: Möglichkeiten des Einsatzes von solarunterstützten Schlammentwässerungsmodulen zur Gewichtsreduktion von Filtersäcken" im Rahmen der GRAMMER-SOLAR-Hüttenbegehung 2005, Traunsteiner Hütte, (03.04.2005)

Rauch, W.: Risk analysis and impact assessment of urban stormwater– with emphasis on the EU - WFD. DayWater Conference, ENPC Paris, November 2005

Wett, B.: "Infiltration rate as a key parameter for water quality of riverbank filtrate." Internat. Workshop on Riverbank Filtration in Roorkee, India (04.04.005)

Wett, B.: "ADM1 – Stickstoffinkorporation und –freisetzung." SIMBA-Anwendertreffen, Wittenberg, D (19.05.2005)

Wett, B.; „Separate biologische Prozesswasserbehandlung auf der Kläranlage Strass“ Schneider Technology Days, Saalfelden, A (31.05.2005)

Wett, B.: "Description of nitrogen incorporation and release in ADM1." International Workshop on the IWA Anaerobic Digestion Model No.1, Copenhagen, DK (05.09.2005)

Wett, B.: "Clogging phenomena at an experimental RBF-system at the Enns river." Course Bankfiltration of the EU-India RBF-Network, Dresden (07.09.2005)

Wett, B.: "Design and construction of large vertical wells." Course Bankfiltration of the EU-India RBF-Network, Dresden (08.09.2005)

Wett B.: "Solved scaling problems for implementing deammonification of rejection water". IWA Special. Conf. on Nutrient Management, Krakow, Poland (20.09.2005)

Wett, B.: "Different options of side-stream treatment of rejection water." DCWASA Workshop on Treatment of Sludge and Sludge Liquors, Washington, USA (27.09.2005)

Wett, B.: "ANA-AER-Process: Postaeration of digested sludge." DCWASA Workshop on Treatment of Sludge and Sludge Liquors, Washington, USA (28.09.2005)

4.4. Patents

Wett, B.: Deammonification-Process. A1550/2005

Wett, B.; Becker, W.; Ettl, R.; Renner, G.: Solar-thermic sludge dryer. A1762/2005

4.5. Miscellaneous

- Prof. Rauch: Mitglied des Senats der Universität Innsbruck
- Prof. Rauch: Vorsitzender des Fakultätsrates der Fakultät für Bauingenieurwissenschaften der Universität Innsbruck
- Forschungsschwerpunkt der Baufakultät: Alpine Infrastructure Engineering – Prof. Rauch acts as coordinator of the involved institutes at the faculty.
- Prof. Rauch: Member of Evaluation board of Habilitation Dr. M. Zessner – TU Vienna 19.05.2005
- Prof Rauch: Second referee of the Dissertation of D.I. Hochedlinger – 15.7.2005 TU Graz.

5. Publications

5.1. Monographs

Stegner, U., Achleitner, S., and Rauch, W.

Wassermappe Tirol - Leitfaden zur Wasserversorgung in Tirol (Tyrolean Water book – A guideline for the water supply in Tyrol / Austria), preparation and coordination on behalf of the Platform Water Landeck (MIAR), Institute of Environmental Engineering, University of Innsbruck, Austria, March 2005.

5.2. Publications in peer reviewed journals

1. **Müller, C., Belevi, H.:** „Differenzierung von organischem und elementarem Kohlenstoff in Rückständen der Müllverbrennungsanlagen“. Müll und Abfall, Juli 2005, S. 352 – 357
 2. **Achleitner, S., DeToffol, S., Engelhard, C. and Rauch, W.:** Model based hydropower gate operation for mitigation of CSO impacts by means of river base flow increase. Water Science and Technology, Vol 52 (5) pp 87–94.
 3. **De Toffol, S., Achleitner, S., Engelhard, C. and Rauch, W.:** Challenges in the Implementation of the Water Framework Directive: The case study of the alpine river Drau in Austria. Water Science and Technology, Volume 52 (9) pp 243–250.
 4. **Achleitner, S., DeToffol, S., Engelhard, C. and Rauch, W.:** The European Water Framework Directive: Water Quality Classification and Implications to Engineering Planning. Environmental Management, Volume 35, (4) pp 517 – 525
- Rossi, L., Krejci, V., **Rauch, W.**, Kreikenbaum, S., Fankhauser, R. and Gujer, W.: Stochastic modeling of total suspended solids (TSS) in urban areas during rain events. Water Research, 39 (17), pp 4188-4196
5. **Rauch, W.**, Seggelke, K., Brown, R. and Krebs, P.: Integrated approaches in urban storm drainage – where do we stand? Environmental Management; Vol. 35 No. 4 pp 396 – 409
 6. **Wett, B., Demattio, M., Becker, W.:** Parameter investigation for decentral dewatering and solar thermic drying of sludge. Water Science & Technology, 51/10, 65-73, 2005
 7. **Wett, B.:** Infiltration rate as a key parameter for water quality of riverbank filtrate. Journal of Indian Water Resources Society, 25/2, 8-15

5.3. Proceedings, book contributions and journals

1. **Achleitner, S. and Rauch, W.:** Increase of river base flow by hydropower gate operation for mitigation of CSO impacts - Potential and Limitations. 10th International Conference on Urban Drainage, Copenhagen/Denmark, 21-26 August 2005.
2. **Achleitner, S. and Rauch, W.:** CITY DRAIN © - A simulation software for integrated modeling of urban drainage systems. Proceedings 10th International Conference on Urban Drainage, Copenhagen/Denmark, 21-26 August 2005.
3. **Engelhard C., Achleitner S., Lek, I. and Rauch, W.:** Mitigation measures towards morphological alterations of rivers: The receiving water as part of the integrated wastewater system. Proceedings 10th International Conference on Urban Drainage, Copenhagen/Denmark, 21-26 August 2005.
4. **Engelhard, C. and Rauch, W.:** Risk analysis and impact assessment of urban stormwater – with emphasis on the EU - WFD. Proceedings of Day Water Conference, ENPC Paris, 3-4 November 2005.
5. **De Toffol S., De Simon Bürstrom, Y. and Rauch, W.:** On the effect of spatial variances in historical rainfall time series to CSO performance evaluation. Proceedings 10th International Conference on Urban Drainage, Copenhagen/Denmark, 21-26 August 2005.
6. Hochedlinger, M., Kainz, H. and **Rauch, W.:** Assessment of CSO Loads – Based on UV/VIS-Spectroscopy by Means of Different Regression Methods. Proceedings 10th International Conference on Urban Drainage, Copenhagen/Denmark, 21-26 August 2005
7. **Rauch, W. and De Toffol, S.:** On the issue of trend and noise in the estimation of extreme rainfall properties. Proceedings 10th International Conference on Urban Drainage, Copenhagen/Denmark, 21-26 August 2005.
8. **Rauch, W. and De Toffol, S.:** Vom Zeitbeiwertverfahren zur Hydrodynamischen Simulation - Einführung in die Methodik. Entwässerungsverfahren - Anwendung und Berechnung. Tagungsband: ÖWAV - Österreichischer Wasser- und Abfallwirtschaftsverband
9. **Belevi, H.:** "Beeinflussung des Schwermetallverhaltens in der Abfallverbrennung". in Optimierung der Abfallverbrennung 2. Thome-Kozmiensky, K.; Beckmann, M. Neuruppin, Germany, TK-Verlag: 535-552
10. Jardin, N., Arnold, E.; Beier, M.; Grömping, M.; Kolisch, G.; Kühn, V.; Otte-Witte, R.; Rolfs, T.; Schmidt, F.; **Wett, B.:** Return load from sludge treatment – process strategies (in German). Proc. DWA 4. Klärschlammstage Würzburg
11. **Wett, B.:** About the significance of infiltration rates on the water quality of river bank filtrate. Report of Internat. Workshop on Riverbank Filtration in Roorkee, India, publ. by Water Resources Research Center, University of Hawaii, 2005
12. **Wett, B.:** Solved upscaling problems for implementing deammonification of rejection water. Proc. IWA Special. Conference on Nutrient Management, Krakow 2005
13. **Wett, B., Eladawy, A. and Ogurek, M.:** Description of nitrogen incorporation and release in ADM1. Proc. Internat. Workshop on the IWA Anaerobic Digestion Model No.1, Copenhagen 2005

14. N.K. Andersen, P. Hallager, A. Laustsen, J.B. Nielsen, N.T.D Kristensen, P. Nordemann, **W. Rauch**, G.G. Nielsen, K. Arnbjerg-Nielsen: Full scale testing of enhanced local treatment of CSOs enabling a cost-efficient implementation of the EU Water Framework Directive. Proceedings 10th International Conference on Urban Drainage, Copenhagen/Denmark, 21-26 August 2005

5.4. Technical reports and other Publications

1. **Achleitner, S. and Rauch, W.:** CITY DRAIN I © - Software for integrated modelling of urban drainage systems, Supported by the state of Tyrol-Austria Fund for scientific research, Institute of Environmental Engineering, University of Innsbruck, Austria, February – May 2005.
2. **Achleitner, S., De Toffol, S. and Rauch, W.:** Hydrodynamische Überrechnung und Variantenstudie zur Sanierung des Sammlers Linz – Muldenstraße (Hydrodynamic simulation for the rehabilitation of sanitary sewer Linz Muldenstraße), Hydrodynamic Simulation on behalf of the LINZ AG for Energy, Telecommunication, Traffic and Municipal Services - Division of Wastewater, Institute of Environmental Engineering, University of Innsbruck, February 2005
3. **Rauch, W., De Toffol, S., Kleidorfer, M.:** Konzeptentwicklung für Planung, Bau und Betrieb des Kanalisationssystems Innsbruck – Masterplan zur Umsetzung der Richtlinie zur Mischwasserbehandlung. Im Auftrag der Innsbrucker Kommunalbetriebe AG. Dezember 2005
4. **Rauch, W., De Toffol, S.:** Bemessungsniederschläge für die Siedlungswasserwirtschaft (Ö-KOSTRA). Auswertung von Starkniederschlägen in Österreich. Statistische Analyse für die Zwecke der Ermittlung der Mischkanalisationen jährlich entlasteten Mischwassermengen. November 2005
5. **Belevi, H.:** "Beeinflussung des Schwermetallverhaltens in der Abfallverbrennung". in Optimierung der Abfallverbrennung 2. Thome-Kozmiensky, K.; Beckmann, M. Neuruppin, Germany, TK-Verlag: 535-552
6. **Wett, B.:** Rückbelastung aus der Schlammbehandlung – Verfahren zur Schlammwasserbehandlung. Arbeitsbericht der ATV-DVWK Arbeitsgruppe AK-1.3



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